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Performance-Oriented Packaging Standards; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Parts 107, 171, 172, 173, 174, 175, 176, 177, 178, and 179

[Docket Nos. HM-181, HM-181A, HM-181B, HM-181C, HM-181D and HM-204; Amdt. Nos. 107-23, 171-111, 172-123, 173-224, 174-68, 175-47, 176-30, 177-78, 178-97, and 179-45]

RIN 2137-AA01, 2137-AB87, 2137-AB88, 2137-AA10, and 2137-AB90

Performance-Oriented Packaging Standards; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative

AGENCY: Research and Special Programs Administration (RSPA), DOT.

ACTION: Final rule.

SUMMARY: This final rule comprehensively revises the Hazardous Materials Regulations (HMR; 49 CFR parts 171–180) with respect to hazard communication, classification and packaging requirements. The changes are based on the United Nations Recommendations on the Transport of Dangerous Goods (U.N. Recommendations) and RSPA's own initiative. They are made because the existing HMR are: (1) Difficult to use because of their length and complexity; (2) relatively inflexible and outdated with regard to non-bulk packaging technology; (3) deficient in terms of safety with regard to the classification and packaging of certain categories of hazardous materials; and, (4) generally not in alignment with international regulations based on the U.N. Recommendations. This action will: (1) Simplify and reduce the volume of the HMR; (2) enhance safety through better classification and packaging; (3) promote flexibility and technological innovation in packaging; (4) reduce the need for exemptions from the HMR; and (5) facilitate international commerce.

DATES: Effective October 1, 1991. However, compliance with the regulations as amended herein is authorized on and after January 1, 1991. The incorporation by reference of certain publications listed in these amendments is approved by the Director of the Federal Register as of October 1, 1991.

Petitions for reconsideration must be received on or before March 21, 1991.

ADDRESSES: Address comments and petitions for reconsideration to the Dockets Unit, Research and Special Programs Administration, Department of Transportation, Washington, DC 20590–0001. Comments should identify the docket and be submitted in five copies. If confirmation of receipt is desired, include a self-addressed stamped postcard showing the docket number (i.e., Docket HM–181). The Dockets Unit is located in room 8421 of the Nassif Building, 400 Seventh Street SW., Washington, DC 20590–0001. Public dockets may be reviewed between the hours of 8:30 a.m. and 5 p.m., Monday through Friday, except holidays.

FOR FURTHER INFORMATION CONTACT: Delmer Billings, telephone (202) 366–4488, Office of Hazardous Materials Standards, or Charles Hochman, telephone (202) 366–4545, Office of Hazardous Materials Technology, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590–0001.

SUPPLEMENTARY INFORMATION:

Special Notices

The amendments presented in this document entail changes, both editorial and substantive, to substantial portions of the existing HMR. In a rulemaking project of this magnitude it is inevitable that errors and omissions will come to light subsequent to publication. Comments addressed to such errors and omissions are requested, so that they may be corrected in future rulemaking action under this docket.

For this final rule, the 30-day limitation for the receipt of petitions for reconsideration (49 CFR 106.35) is hereby waived and 90 days is provided in consideration thereof.

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I. Overview of the HMR

The Hazardous Materials Regulations (HMR) apply to the interstate (and in some cases intrastate) transportation of hazardous materials in commerce. They have their origins in the Explosives and Combustibles Act of 1908, originally administered by the Interstate Commerce Commission. The HMR are currently issued pursuant to the Hazardous Materials Transportation Act (HMTA) of 1974, administered by DOT, and are found in the Code of Federal Regulations (CFR), title 49, subtitle B, chapter 1, subchapter C, parts 171 through 180.

The HMR govern the safety aspects of transportation. They include requirements for classification of materials, packaging (including manufacture, continuing qualification and maintenance), hazard communication (i.e., package marking, labeling, placarding, and shipping documentation), transportation and handling, and incident reporting.

Subchapter C occupies approximately fourteen hundred pages of the CFR. The largest parts, part 173, entitled "Shippers—General Requirements for Shipments and Packagings," and part 178, entitled "Shipping Container Specifications, occupy about three hundred and fifty and four hundred and fifty pages, respectively.

Part 171 of the HMR includes definitions, reporting requirements, a listing of matter incorporated by reference, and procedural requirements, including provisions which permit use of other regulations, such as the ICAO Technical Instructions and the IMDG Code. Part 172 of the HMR contains a listing of hazardous materials in the Hazardous Materials Table (§ 172.101) and various communications requirements for shipping paper descriptions, marking and labeling of packages, placarding of vehicles and bulk packagings, and emergency response communication.

Part 173 contains various hazard class definitions for classifying materials, lists the DOT packagings authorized for specific materials and references the appropriate sections of part 178 when DOT specification packagings are required. Parts 174 through 177 contain requirements applicable to specific transport modes: Part 174 for transport by rail car, part 175 for transport by aircraft, part 176 for transport by vessel, and part 177 for transport by motor vehicle. Part 176 will now include provisions for the transportation of military explosives by vessel. These

were previously contained in 46 CFR part 146, which is being revoked in a separate rulemaking.

Part 178, addressed primarily to container manufacturers, contains detailed construction specifications for a wide variety of packagings. The specification packagings found in part 178 range from paper bags to cargo tanks (tank trucks). The major portion of part 178 is devoted to non-bulk packagings (authorized capacities of 110 gallons or less) and includes approximately 100 specifications for carboys, drums, barrels, boxes, cases, trunks, tubes, bags and various sorts of inside containers or receptacles designed to be enclosed by larger containers. Not included in these 100 specifications are those covering cylinders for compressed gases and packagings designed solely for radioactive or explosive materials, none of which are addressed under this final rule.

Part 179 addresses specifications for tank cars. Part 180 contains requirements for the continuing qualification and maintenance of packagings.

Beginning with the creation of the Department of Transportation in 1967, the Department assumed responsibility for the HMR and embarked on a long-range effort to simplify and improve the regulations. In 1968, under Docket HM-7 [33 FR 11862; August 21, 1968], DOT stated its intent to revise the HMR to make them uniform for the various modes of transport and easy to understand and apply. DOT also stated it would improve hazard classification of materials to better describe their hazards and relate classification to appropriate handling and packaging designs, improve hazard communication through labeling, placarding and emergency response provisions, and prescribe packaging requirements in terms of performance standards rather than manufacturing specifications.

Major accomplishments of this effort to simplify and improve the HMR include adoption of labels and placards (1974) based on the United Nations Committee of Experts' Recommendations on the Transport of Dangerous Goods (U.N. Recommendations), development and widespread distribution of DOT's Emergency Response Guidebook, and adoption of identification numbers for hazardous materials (1980) based on the U.N. Recommendations. Numerous other rulemaking projects have addressed improvements to classification, hazard communication, and packaging. Docket HM-181 and related rulemaking projects represent the culmination of RSPA's efforts since 1968 to improve the HMR and align them with an internationally-based performance standards system.

The importance of this rulemaking initiative has been recognized in the Department's National Transportation Policy which states that it is Federal transportation policy to:

- Adopt hazardous materials packaging standards that are based on performance criteria rather than detailed design specifications, to accommodate technical innovation, and
- Implement Federal hazardous materials standards for movements by the various modes that are, to the maximum extent consistent with safety, compatible with international standards, in order to facilitate foreign trade and maintain the competitiveness of U.S. goods.

II. Problems With the HMR

The development of the HMR has been an evolutionary process. Regulations originally were addressed only to the most acute transportation safety hazards such as the risks of explosives and flammable materials. As new materials presenting different risks entered the transportation system, new hazard classes were added. The HMR now address over 20 different classes of hazardous materials. Hazard communication and packaging requirements were added as the need arose, based on the occurrence of accidents or the development and adoption of industry standards. Packaging requirements were based on industry standards, with economic considerations sometimes taking precedence over safety considerations, rather than on a systematic assignment of packagings based on the hazards of the materials to be packaged and the suitability of the packaging. By the same token, hazard classifications were often made based on subjective criteria, with economic considerations occasionally taking precedence over safety considerations.

Because of the non-systematic and piecemeal fashion in which they were developed, the HMR tend to be unnecessarily complex and difficult to use. RSPA believes there is a need to amend the HMR to address deficiencies related to safety, complexity of the regulations, inflexibility of packaging standards and incongruities between the HMR and international regulations for hazardous materials transport.

With regard to safety, correct classification of materials is essential for determining the hazards posed, appropriate hazard communication, and packaging. Classification procedures in the HMR were developed in a piecemeal fashion over an eighty-year period and tend to be imprecise and subjective. The classification scheme proposed in Docket HM-181, based in large part on the U.N. Recommendations, is more precise than the existing system and would replace subjective hazard class definitions with objective criteria, particularly with regard to gases which are toxic by inhalation and flammable solids. Other safety initiatives embodied in Docket HM-181 involve enhancements to general packaging provisions for both bulk and non-bulk packagings, and improvements to the integrity of packagings for extremely hazardous materials such as those which are poisonous by inhalation.

The HMR have long been criticized as being too lengthy (1400 pages), complex, and difficult to use and enforce. It is impossible to eliminate complexity in regulations which, of necessity, must address the legal, technical and operational concerns for classification, hazard communication and packaging for thousands of hazardous chemicals. However, a new format and use of performance standards rather than detailed design specifications will make the HMR more "user friendly" and substantially reduce the number of HMR pages.

With regard to packaging flexibility, the detailed design specifications which are found in the HMR are generally based on industry standards, many of which were incorporated into the regulations in the 1920's and 1930's. They tend to be overly specific and are outdated in many respects, thereby stifling innovation and resulting in the need for numerous burdensome exemptions. Authorizations to use specific packagings for specific hazardous materials were often made based on economic considerations, operating convenience or historical precedence, rather than by assessing the risks posed by the hazardous material and selecting a packaging suitable for the material. Typical specifications found in part 178 include requirements for materials of construction, thickness, fastenings, capacity, coatings, openings, joints and carrying devices. Much of the information contained in a specification is given in great detail and is repetitious. For example, there are fourteen specifications for wooden boxes. Most wooden box specifications list each acceptable type of wood from which the box must be constructed. This list may be repeated in the next specification for a similar, but slightly different box. In addition to listing the acceptable types of wood, the regulations also specify the thickness and width of boards, kinds

and dimensions of nails, and spacing of nails used in joining the box.

Many of these DOT specification packagings are obsolete or little used. They are too expensive to make or too labor-intensive to pack. On the other hand, new packagings for hazardous materials are constantly being developed. Since they are not included in the DOT specifications (part 178), new or innovative packagings for hazardous materials may only be used under the terms and conditions of exemptions issued by DOT granting a person relief from applicable portions of the HMR. The administration of the exemptions program is very labor-intensive for exemption applicants and for DOT since an exemption application containing much detailed information on a new packaging (including a safety analysis) must be prepared by the applicant and must be carefully analyzed by DOT (including publication in the Federal Register) before it is granted or denied. In addition, an exemption must be renewed every two years, and this requires additional resource expenditures by both applicants and DOT.

The HMR differ from international regulations based on the U.N. Recommendations with respect to classification, hazard communication and packaging. The major area of difference is international use of performance-oriented packaging standards and U.S. use of design specifications for packagings. DOT specifications have been accepted in international transportation under transitional provisions which expire on December 31, 1990. After that date, most hazardous materials in international transportation must be packaged in packagings which conform to U.N. standards. Some U.S. firms with export markets have brought their packagings into compliance by qualifying packagings to conform to both systems, incurring the additional costs of "dual compliance". Although dual compliance is a viable option for some entities, it is impracticable for others. For example, both the Department of Defense (DOD) and the General Services Administration (GSA) have indicated that it is difficult, if not impossible, in terms of costs and logistics to maintain two inventories, one for domestic transport and one for international transport.

The total value of U.S. chemical exports and imports is $56.5 billion with a net positive trade balance of $15.7 billion. Harmonizing domestic regulations with international regulations will eliminate "dual compliance." costs, remove artificial barriers to international trade and help promote a worldwide system of consistent regulatory requirements. According to both law and policy, standards-related activities should not be a barrier to trade. Title IV of the Trade Agreements Act of 1979 (Pub. L. 96-39) addressing technical barriers to trade states in pertinent part:

> No Federal agency may engage in any standards-related activity that creates unnecessary obstacles to the foreign commerce of the United States, * * *. Each Federal agency, in developing standards, shall take into consideration international standards and shall, if appropriate, base the standards on international standards * * *. Each Federal agency shall, if appropriate, develop standards based on performance criteria, such as those relating to the intended use of a product and the level of performance that product must achieve under defined conditions, rather than on design criteria, such as those relating to the physical form of the producer or the types of material of which the product is made.

The United States' position on the international scene has been to promote a worldwide system of consistent modal and regional transportation requirements that will ensure that hazardous materials shipments move freely and safely between the various modes and regions of the world. Strong U.S. participation in the development of international standards is also essential to the economic interests of the U.S. domestic hazardous materials industry. Application of international standards by governments throughout the world has a direct impact on U.S. shippers and carriers involved in international trade. The Department of Transportation supports this uniform, global approach to the safe transportation of hazardous materials through participation in the work of five international organizations. These organizations are:

(1) *The United Nations Committee of Experts on the Transport of Dangerous Goods.* This committee is the focal point of international activity regarding the transport of packaged hazardous materials (except radioactive materials) and promulgates the U.N. Recommendations. RSPA is the agency charged to represent the U.S. on this committee and on its subsidiary bodies.

(2) *The International Maritime Organization (IMO).* IMO is a specialized agency of the United Nations concerned primarily with the promotion of safety in shipping and the prevention of marine pollution from ships. The U.S. participates in the work of the IMO through the U.S. Department of State's Shipping Coordinating Committee (SCC). The U.S. Coast Guard provides the majority of technical expertise to SCC and, with RSPA, represents the Department of Transportation at sessions of the IMO's Subcommittee on the Carriage of Dangerous Goods (CDG). The CDG Subcommittee publishes and maintains the International Maritime Dangerous Goods (IMDG) Code. This Code is recognized as the worldwide standard for transportation of packaged hazardous materials by vessel.

(3) *International Civil Aviation Organization (ICAO).* The Dangerous Goods Panel (DGP) of ICAO was established to develop an Annex 18 to the Chicago Convention on International Civil Aviation. The implementing regulations to Annex 18, the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air, are recognized worldwide. RSPA represents the U.S. on the DGP, with technical expertise provided by the FAA.

(4) *Economic Commission for Europe (ECE) Group of Experts on the Transport of Dangerous Goods.* The ECE Group of Experts is responsible for updating and revising the European agreements concerning the carriage of Dangerous Goods by Road (ADR) and meets jointly at least once a year with the body responsible for updating the International Regulations concerning the Carriage of Dangerous Goods by Rail (RID) to ensure consistency between the two sets of regulations. RSPA participates in these meetings.

(5) *The International Atomic Energy Agency (IAEA).* The IAEA is an intergovernmental body chartered to foster the peaceful contribution of nuclear energy to mankind. The IAEA has developed a regulatory system to help ensure the safe international transportation of radioactive materials. RSPA serves as U.S. Competent Authority to the IAEA.

The following international systems of regulations have been promulgated by these organizations and are based on the U.N. Recommendations:

(1) ICAO Technical Instructions—international—worldwide, fully recognized by the HMR.

(2) IMDG Code—international—worldwide, conditionally recognized by the HMR.

(3) RID—international—regional, European rail rules.

(4) ADR—international—regional, European highway rules.

In addition, at least two nations, Canada and Australia, have implemented national systems based on the U.N. Recommendations.

The regulatory bodies issuing these rules have included plans for terminating transitional or "grandfather" provisions which will render non-U.N. packagings (including DOT's) unacceptable for transport in the modes which they regulate. Most of these "grandfather" provisions end on December 31, 1990. After that time, hazardous materials classed, described and packaged solely according to the present HMR (excluding §§ 171.11, 171.12, and 171.12a) will only be able to move in domestic U.S. commerce.

Since January 1, 1983, the HMR (at § 171.11) have allowed shippers to use the ICAO Technical Instructions for the shipment of hazardous materials domestically and internationally as long as the journey included some transportation by aircraft. Travel by highway transport to or from the air leg of the journey is permitted under the ICAO rules. Since the ICAO fully incorporates the U.N. Recommendations (hazardous material table, hazard classing, packaging standards, and performance tests), U.S. carriers are using it, and enforcement personnel are seeing U.N.-conforming shipments in domestic transportation. Indeed, some U.S. air carriers are no longer accepting hazardous material shipments tendered under the HMR rules and are accepting only shipments conforming to ICAO. Thus, shippers and carriers who wish to be in compliance with the regulations and enforcement personnel charged with enforcing the regulations are already faced with the task of being trained in both systems.

III. The International System

In contrast to the DOT system of detailed specifications for packaging construction is a system of performance-oriented packaging standards that has been developed in the form of Recommendations by the United Nations Committee of Experts on the Transport of Dangerous Goods (U.N. Recommendations). These standards address the same types of non-bulk containers (drums, barrels, boxes, bags, carboys and inside containers or receptacles) as the DOT specifications. Typically, these standards have general requirements for materials, construction and a maximum capacity. For example, the U.N. 1A1 steel drum must have welded seams if it is to carry liquids, welded or mechanically seamed chimes, a maximum opening size of 7 centimeters (2.75 inches) and a maximum capacity of 450 liters (118.9 gallons). There are additional requirements for rolling hoops if the drum capacity is greater than 60 liters. Aside from these very general construction requirements, the strength and integrity of the drum are established by a series of performance tests which the drum must either pass or be capable of passing before it is authorized (as indicated by marks to be placed on the drum) for the carriage of hazardous materials; hence, the term "performance-oriented packaging standards". For drums, the principal tests are drop test, hydraulic and leakage (or "leakproofness") tests and stacking tests. The height specified for the drop test in the U.N. system is determined by the "Packing Group" of the hazardous material to be transported.

Within most hazard classes, the U.N. system segregates hazardous materials into three distinct "Packing Groups" based on the relative danger of the materials. Packing Group I consists of very dangerous materials. Packing Group II consists of materials considered to present moderate danger. Packing Group III consists of materials presenting minor danger. The U.N. 1A1 steel drum would have to survive a drop test of 1.8 meters (5.91 feet) if it were to carry a material in Packing Group I, 1.2 meters (3.94 feet) for Group II materials and 0.8 meters (2.62 feet) for Group III materials. This assumes the specific gravity of the materials does not exceed 1.2. For more dense materials, the drop height or density of the test material would be correspondingly increased.

Within the broad and general construction requirements of these performance-oriented standards, packaging manufacturers are free to exercise their design and production ingenuity to produce packagings which are both cost-effective, as determined by the marketplace, and safe, as determined by conformance to performance standards.

The U.N. Recommendations are not regulations and, in general, do not assign packagings to individual hazardous materials. The U.N. system envisions that requirements (i.e., regulations) issued by national and international bodies would address the definitive requirements, tying a particular packaging or packaging system to an individual hazardous material. At present, there are two international (worldwide) modal hazardous material regulatory systems in place; one under the auspices of the International Maritime Organization (IMO) and the second under the International Civil Aviation Organization (ICAO). The IMO system is known as the International Maritime Dangerous Goods Code (or IMDG Code) and the ICAO system is known as the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air. Shipments of hazardous materials (both international and within the U.S.) are at the present time authorized (with certain exceptions) to be shipped under the ICAO system as fully equivalent to the HMR provided that the trip involves transportation by aircraft and motor vehicle only. (See 49 CFR 171.11.) Thus, there are at present, the U.S. domestic requirements for hazardous materials transportation as found in the HMR, characterized by very precise specifications for the construction of hazardous materials packagings and, on the other hand, an international system based on performance-oriented standards for packagings.

IV. History of HM-181 Proposals

On April 15, 1982, RSPA published an advance notice of proposed rulemaking (ANPRM), entitled *Performance-oriented Packaging Standards: Miscellaneous Proposals*, under Docket HM-181 (Notice 82-3; 47 FR 16268). The goals of that notice and the supplemental NPRMs issued since then have been to: (1) Simplify the HMR, (2) reduce the volume of the regulations, (3) provide greater flexibility in the design and construction of hazardous materials packaging to accommodate advances in packaging technology, (4) promote safety in transport through the use of better packagings, (5) reduce the need for exemptions, and (6) facilitate international commerce, including commerce between the United States and Canada.

In the ANPRM, a packaging system based on the U.N. Recommendations was advanced, using the flammable liquid hazard class for demonstration purposes. The proposal referenced non-bulk packaging requirements for flammable liquids in terms of U.N. performance-oriented packaging standards rather than existing DOT specifications (for example, a drum reference would be made to a U.N. 1A1 drum rather than a DOT-17E drum) and contained the U.N. packaging standards for non-bulk packagings (i.e., drums, barrels, jerricans, boxes, bags, etc.) and the U.N. performance tests which the packagings must pass.

Following review of public comments to the ANPRM and substantial developmental work, a notice of proposed rulemaking (NPRM) was issued on May 5, 1987 (52 FR 16432; Notice 87-4). In the NPRM, the scope of the proposals was expanded to address: (1) Packaging requirements, for both bulk and non-bulk, for all hazard classes except explosives, (2) revisions to

hazard communication requirements to improve hazard communication for gases and liquids which are toxic by inhalation and to make hazard communication requirements consistent with those in international regulations based on the U.N. Recommendations (e.g., the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air and the International Maritime Organization's International Maritime Dangerous Goods Code), (3) a classification system, based on the U.N. Recommendations which more accurately identifies the hazards of materials, and (4) format changes to parts 171, 172 and 173 intended to simplify and reduce the volume of the HMR.

Due to the magnitude of that rulemaking proposal, it was inevitable that numerous errors and omissions would occur. On November 6, 1987, a supplemental NPRM was published (52 FR 42772; Notice 87-4) to correct these errors and make additional proposals where omission's had occurred. Major issues addressed in the supplemental NPRM pertained to proposed provisions for tank cars and materials which are toxic by inhalation. Significant public interest and the need to issue two additional supplemental NPRMs addressed to the classification of gases (see 53 FR 45868, November 14, 1988, Notice 88-7; and 54 FR 31158, July 26, 1989, Notice 89-5) led to extensions and reopenings of the comment period, which finally closed on January 30, 1990. By the end of the comment period, RSPA had received well over 2000 public comments addressed to Docket HM-181 proposals, which were evaluated for merit.

The proposals published in 1987, 1988 and 1989 comprise a comprehensive, but incomplete, revision of the HMR. Several areas that were not addressed at that time were addressed in supplemental rulemakings issued in May and June of 1990, as follows:

- Docket HM-181A, entitled *Requirements for Explosives*, proposed to amend the HMR with regard to hazard classification, packaging and hazard communication requirements applicable to explosives, based on the UN Recommendations. An NPRM was published (55 FR 18438) on May 2, 1990. A correction NPRM was published June 15, 1990 (55 FR 24350).
- Docket HM-181B, entitled *Revisions to Modal Regulations*, proposed revisions to the carrier requirements in parts 174, 175 and 177, applying to transportation by rail car, aircraft, and motor vehicle, respectively, to align modal requirements with proposals made under Notice 87-4. An NPRM was published (55 FR 18546) on May 2, 1990.
- Docket HM-204, entitled *Transportation of Explosives by Vessel and Miscellaneous Amendments*, proposed to amend part 176, applying to transportation by vessel, for consistency with Notice 87-4 proposals and to incorporate into the HMR provisions for military explosives found in 46 CFR part 146. An NPRM was published (55 FR 20962) on May 21, 1990.
- Docket HM-181C, entitled *Performance-oriented Packaging Standards: Corrections and Supplemental Proposals Concerning the Transportation of Hazardous Materials in Tank Car Tanks and Rail Cars*, proposed corrections and supplements to the Notice 87-4 proposals addressing the transportation of hazardous materials in tank car tanks and rail cars. An NPRM was published (55 FR 21342) on May 23, 1990.
- Docket HM-181D, entitled *Performance-oriented Packaging Standards: Additional Proposals for Flammable Solids, Oxidizers, and Organic Peroxides*, proposed to revise Notice 87-4 proposals addressed to the classification, hazard communication and packaging for flammable solids, oxidizers and organic peroxides. An NPRM was published (55 FR 26574) on June 28, 1990.

V. Related Rulemakings

From the publication of the aforementioned NPRMs, RSPA has been analyzing comments, preparing a regulatory evaluation, deciding on a course of action and, beginning in 1990, drafting a final rule. During this period of time, many issues have arisen under other rulemaking dockets which are interrelated, in varying degrees, either to the earlier notices under this docket or to this final rule. These rulemakings, which are referenced at various points in this preamble, are identified as follows:

- Docket HM-36B, entitled *Data Collection and Reporting: Hazardous Materials Incident Reports*, adopted new criteria for reporting incidents and implemented a new hazardous materials incident report form. A final rule was published (54 FR 25808) on June 19, 1989.
- Docket HM-102, entitled *Definition of Flammable, Combustible, and Pyrophoric Liquids*, adopted the classification criteria for flammable, combustible and pyrophoric materials which preceded the HM-181 proposals. A final rule was published (39 FR 2768) on January 24, 1974.
- Docket HM-126C, entitled *Emergency Response Communication Standards*, adopted new requirements for emergency response information accompanying shipments of hazardous materials. A final rule was published (55 FR 33707) on August 17, 1990. This final rule affected proposed changes in Notice 87-4 addressed to hazard communications requirements (see part 172 under the section-by-section review).
- Docket HM-126D, entitled *Bulk Packagings and Miscellaneous Amendments*, added a definition for bulk packaging to § 171.8. A final rule was published (52 FR 29528) on August 10, 1987.
- Docket HM-166U, entitled *Transportation of Hazardous Materials: Miscellaneous Amendments*, made certain changes to the HMR which are pertinent to this rulemaking action. A final rule was published (52 FR 13034) on April 20, 1987.
- Docket HM-166W, entitled *Transportation of Hazardous Materials: Miscellaneous Amendments* made certain changes to the HMR which are pertinent to this rulemaking action. A final rule was published (54 FR 38790) on September 20, 1989.
- Docket HM-178, entitled *Definition of Flammable Solid*, proposed subgroupings for flammable solids which were similar to criteria in the UN Recommendations for Class 4 materials. An ANPRM was published (46 FR 25492) on September 3, 1981. That rulemaking was withdrawn in the HM-181D NPRM.
- Docket HM-179, entitled *Definition of Oxidizer*, contained definitions, tests and criteria for classifying oxidizers. An ANPRM was published (46 FR 31294) on June 15, 1981. That rulemaking was withdrawn in the HM-181D NPRM.
- Docket HM-183, entitled *Requirements for Cargo Tanks*, adopted new requirements for the qualification, use and manufacture of cargo tanks. A final rule was published (54 FR 24982) on June 12, 1989. The proposals in Notice 87-4 are revised in this final rule for consistency with the HM-183 final rule.
- Docket HM-189H, entitled *Hazardous Materials Regulations; Editorial Corrections and Clarifications*, made certain changes to the HMR which are pertinent to this rulemaking action. A final rule was published (54 FR 40066) on September 29, 1989.
- Docket HM-196, entitled *Packaging and Placarding Requirements for Liquids Toxic by Inhalation*, adopted requirements for identifying and packaging liquids which are poisonous by inhalation. A final rule was published (50 FR 41092) on October 8, 1985. In this final rule, criteria are added to identify gases which are poisonous by inhalation and packaging requirements

are enhanced for both liquids and gases. (See discussion under the section-by-section review for part 173.)

• Docket HM-198, entitled *Molten Sulfur*, adopted hazard communication and packaging requirements for molten sulfur. A final rule was published (53 FR 17158) on May 13, 1988. In that final rule it was decided not to reclassify molten sulfur as a flammable solid for domestic transportation. That decision is upheld in this final rule by including two entries for the material in the § 172.101 Table, one for domestic transport, with the material in Class 9 (miscellaneous hazardous materials), and the other for international transport, with the material in Division 4.1 (flammable solids).

• Docket HM-198A, entitled *Elevated Temperature Materials*, proposed classification criteria and packaging requirements for materials transported at elevated temperatures. An NPRM was published (54 FR 38930) on September 21, 1989. That rulemaking action may, in the future, lead to further revision of the criteria adopted in this final rule for flammable solids and flammable liquids, particularly materials transported at or above their flash points.

• Docket HM-202, entitled *Standards for Construction of Fireworks and Novelties; Approval for Transportation*, adopted criteria for classifying, approving and describing fireworks and novelties which are pertinent to this rulemaking action. A final rule was published (54 FR 19324) on September 25, 1989.

VI. Major Features of the Final Rule

This final rule makes significant changes to the HMR with regard to format of the HMR, classification of materials, hazard communication provisions and bulk and non-bulk packaging requirements. Particular features of this final rule are addressed in some of the following sections of this preamble, particularly in the section-by-section review. However, as an aid to the reader, the major features of this final rule are summarized, in a very broad manner, as follows:

• Format changes, such as consolidation of the §§ 172.101 and 172.102 hazardous materials tables into one table and elimination of approximately 100 packaging specifications, should substantially reduce the volume of the HMR.

• Standard international units (SI units) of measurement generally replace U.S. customary units of measurement. On an interim basis, U.S. customary units are included in parentheses following the SI units. (See § 171.8.)

• Hazard class definitions are aligned generally with the U.N. Recommendations and use the same numerical nomenclature. (For example, "flammable solids" are "Division 4.1 materials", "flammable liquids" are "Class 3 materials". (Certain DOT hazard classes, such as combustible liquid and ORM-D would be retained.) (See subpart D of part 173.)

• Hazardous materials descriptions are aligned with the U.N. Recommendations, except in certain instances where shipping descriptions unique to the U.S. transportation system are retained. (See § 172.101.)

• Hazard communication requirements for identifying materials which are poisonous by inhalation are made applicable to gases, in addition to liquids, to correct a safety deficiency in the HMR. (See § 172.203.)

• Packaging requirements for a material are based on the Packing Group of the material, its vapor pressure and chemical compatibility between the packaging and the hazardous material.

• Materials packaged under the IMDG Code generally are acceptable for inland transport away from a port area, for the first time. (See § 171.12.)

• Non-bulk packagings must be capable of withstanding a vibration test, in addition to the other performance tests, to address transportation rigors not taken into account by the U.N. tests. (See § 173.24a.)

• Reuse of plastic and metal drums are linked to minimum thickness requirements, to ensure that these reused packagings are capable of withstanding the rigors of transportation. (Minimum thickness requirements would substitute for the lack of performance tests in the U.N. standards with regard to puncture resistance, abrasion resistance and metal fatigue.) (See § 173.28.)

• For materials which are poisonous by inhalation, packaging provisions would be enhanced and, in some instances, made more restrictive.

• Bulk packaging provisions are enhanced with regard to filling limits (i.e., outage requirements) and requirements for reclosing pressure relief devices for bulk packagings used for flammable or poisonous liquids. (See § 173.24b.)

• To correct a shortcoming in the U.N. system, criteria are included for defining categories of gases which are poisonous by inhalation (Division 2.3). (See § 173.115.)

• For ease of use, simplicity and to reduce the volume of the HMR, generic packaging sections replace, for the most part, material-specific packaging sections in part 173. For example, there is one non-bulk packaging section (§ 173.202) for most Packing Group II liquids, rather than individual sections for poisons, flammables, corrosives, etc. Similarly, there is a series of generic packaging sections for bulk, related to the hazard characteristics of the material to be transported.

• In part 178, 100 specifications for DOT non-bulk packagings are eliminated and replaced with 20 U.N. performance-oriented packaging standards. (See subpart L of part 178.)

• Packaging manufacturers are required to notify their customers in writing of any specification shortfalls or steps that the user must take (such as the procedure for closing a packaging after filling) to conform with the applicable specification. (See § 178.2.)

• Requirements for conduct of performance tests, including design qualification tests and periodic retests, are included in part 178 for all packagings manufactured to U.N. standards. (See § 178.601.)

• Transition periods for compliance with the new requirements are provided as follows: (1) Five years from the October 1, 1991 effective date (till October 1, 1996) for continued use of packagings authorized as of September 30, 1991 (except for packagings for materials poisonous by inhalation or otherwise affected by a final rule); (2) Three years (till October 1, 1994) for continued manufacture of packagings rendered obsolete by this final rule; and (3) Two years (till October 1, 1993) for all other provisions of this final rule, such as hazard communication requirements and packaging for materials poisonous by inhalation. (See § 171.14 and discussion elsewhere in this preamble, under the section entitled *Transition Period*.)

VII. Shipper/Manufacturer Responsibility

The relative responsibilities of shippers and manufacturers for package testing and certification was a matter of concern to many commenters to Notice 87-4. "The roles of shippers and manufacturers are unnecessarily mixed in the NPRM and will create serious liabilities," said the Chemical Manufacturers Association (CMA). Several commenters requested that RSPA clearly distinguish shipper and manufacturer responsibilities in properly certifying a package to be suitable for use.

RSPA proposed in §§ 173.24 and 178.2 to require shippers and manufacturers to be jointly responsible for package design and construction to the extent that a package is determined to be

suitable for use for its lading and that it complies with the standards in subpart L of part 178 and the test requirements in subpart M of part 178.

Shippers alleged that Notice 87–4 moves RSPA away from existing rules that focus responsibility on the packaging manufacturer, thereby effectively shifting responsibility to shippers. They pointed out that, for example, as proposed in § 173.24(d), anyone who performs the functions of preparing packages for transportation is responsible for assuring that the packages they use conform to applicable DOT specifications or U.N. standards in parts 178 and 179. Shippers also must assure that each packaging is capable of meeting subpart M tests.

Manufacturers, on the other hand, alleged that they would be required to share responsibility with shippers for the determination of package "suitability" after they already have fulfilled part 178 obligations by marking and certifying packages they produce. Assigning the function of evaluating packaging suitability for a particular lading holds manufacturers responsible in unidentifiable ways, one commenter said. If, after the manufacturer has made a suitability determination, the package fails, the manufacturer is accountable. The problem for manufacturers, commenters said, is how they can limit responsibility under § 178.2(c).

One commenter recommended that paragraph (c) of proposed § 178.2 be deleted, stating that manufacturers are seldom knowledgeable of the uses to which their packagings are put and are almost never in possession of a specific product, filling, transport or package emptying details. The Steel Shipping Container Institute (SSCI) contended that evaluation of package suitability is uniquely a shipper function, encompassing factors such as mode of transport, distance shipped, palletizing, overpacking, and nature of contents, "* * * all of which are in the purview of shipper decisions."

RSPA agrees with commenters that determining suitability for use is essentially a responsibility of the shipper. To clarify this point, proposed paragraph (c) of § 178.2 has been deleted in this final rule.

Proposed paragraph (d) of § 178.2 in Notice 87–4 has been revised and appears as notification provisions in paragraph (c) in this final rule. This paragraph contains requirements for the manufacturer or the subsequent distributor of a packaging to notify in writing each person to whom that packaging is transferred of all part 178 requirements not fully complied with at the time of transfer, and of all actions that need to be taken to bring that package into compliance with part 178. Reliance is placed on a manufacturer's instructions to a shipper for the proper preparation of a package for transport. In accordance with new paragraph (a)(4) in § 173.22, and in § 173.24, the shipper is responsible for making sure that a package is assembled, closed or otherwise prepared for transport in full compliance with the specification or standard under which the packaging was manufactured, including any conditions for use set forth by the manufacturer under the notification provisions of § 178.2(c).

Section 178.2 previously contained a statement that the manufacturer of a packaging should inform each person to whom a packaging is transferred of any specification requirements which have not been met at the time of transfer. By making this a requirement rather than a recommendation in the final rule, RSPA is placing a responsibility on the manufacturer to assist the shipper in assuring compliance.

If the way a shipper assembles a package, fills it with a hazardous material and closes it, does not depart from the manner in which a manufacturer certifies that package for use, the shipper may assume the package is capable of meeting U.N. standards.

The shipper's actions in preparing a package should not adversely affect the performance capability of that package if it is prepared in accordance with procedures established by the manufacturer (and if those procedures are correct). The shipper cannot alter or amend a package design or specification without assuming full responsibility for doing so. Thus, if a shipper takes it upon himself to introduce any change to a package, he bears responsibility for compliance. RSPA believes the changes adopted in this final rule do not alter basic shipper/manufacturer responsibilities for determining package suitability, which could be defined as follows:

1. The manufacturer designs, constructs, and tests packagings in accordance with part 178 subparts L and M; notifies the shipper of all specification shortfalls in accordance with § 178.2; and performs any § 173.24 or § 173.24a functions for which he is assuming responsibility through contractual arrangements with the shipper.

2. The shipper relies on the manufacturer's mark as required in existing § 173.22(a)(i); performs any packaging functions required by §§ 173.24, 173.24a and 173.24b for which the shipper is responsible; and fulfills conditions for use prescribed by the manufacturer under § 178.2(c).

VIII. Transition Period

No consensus existed among commenters to Notice 87–4 on a suitable transition period for implementing various sections of Docket HM–181. Generally, carriers, as well as state and Federal agencies, urged RSPA to impose a short transition period to avoid the compliance problems of a dual regulatory system. Commenters supporting RSPA's proposal for a five-year period for conversion to U.N. standards, or urging a transition of greater length, were generally shippers who argued that the implementation of an international performance system will require substantial changes in operational practices requiring at least five years to accomplish.

In this final rule, RSPA is providing several transition periods for various portions of the new rules. First, the effective date of the rule as a whole is delayed until October 1, 1991. This facilitates incorporation of the new requirements into the 1991 edition of 49 CFR and gives both regulators and the regulated industry a period of time to familiarize themselves with the new requirements.

Second, for those shippers and carriers who are prepared to implement the provisions earlier, RSPA is permitting compliance with the new requirements on and after January 1, 1991. This makes U.S. regulations consistent with international regulations relative to use of U.N. performance packagings, removes impediments to the domestic transportation of U.N.-marked packagings, and relieves international shippers of the burdens of dual compliance with two different regulatory systems.

Third, in § 171.14, RSPA is providing five years from the effective date (until October 1, 1996) for continued use of DOT specification packagings, other than those for materials poisonous by inhalation, which would otherwise be rendered obsolete by this final rule. RSPA believes that this long transition period is justified, to ease the burden of transition to the new packaging standards, in those instances where safety considerations do not warrant a shorter implementation period. RSPA notes that the regulated industry has been aware of the impending need to use U.N. standards in international transportation for over eight years and many international shippers are already using packagings manufactured to U.N. standards. However, many smaller companies need the time to adjust their

inventories and convert to the new standards. Because of safety considerations, the five-year period does not apply to packagings for materials which are poisonous by inhalation.

Fourth, a three-year period is provided for continued manufacture of those packagings which will be rendered obsolete by this final rule at the end of the transition period. In conjunction with the five years for continued use, this provides for the continuing availability of DOT specification packagings during the first three years of the period such packagings are authorized for reuse, and provides an additional two-year period during which packagings in inventories could be used up but new packagings could not be manufactured.

Fifth, for other provisions of the final rule, such as classification, hazard communication and packaging changes for materials poisonous by inhalation, a two-year transition period is provided. RSPA believes that two years is adequate for making those changes which primarily concern hazard communication, noting that provisions in the § 172.101 Table (see § 172.101(1)) normally only provide a one-year period for use of pre-printed shipping papers and package markings. Also, two years provides a reasonable period of time for upgrading packagings, where necessary, for materials which are poisonous by inhalation.

During the transition period, a shipper would have the option of using either the same packagings, specification or non-specification, that were authorized in the 1990 49 CFR (i.e., the edition containing regulations in effect on September 30, 1991) for hazardous materials or the new packagings authorized by this final rule. This choice would be available to the shipper regardless of whether the hazardous materials are described using old or new hazardous materials descriptions.

The shipper would also have the option of classifying and describing materials, other than for new explosives, infectious substances, and materials poisonous by inhalation, using either classification criteria and hazard communication provisions in the 1990 49 CFR or in this final rule, the provisions of which will appear in the 1991 49 CFR. New explosives, infectious substances, and materials poisonous by inhalation would be classified and described using the new requirements.

Hazard communication requirements would have to be consistent. That is, if the material were described on a shipping paper in accordance with the 1990 49 CFR, then package markings, labels, and placards must also conform to the 1990 49 CFR. Alternatively, if the material is described on shipping papers in accordance with the new requirements (i.e., the 1991 49 CFR), then package markings, labels and placards must also conform to the new requirements. RSPA believes that to permit mixing of the old and new hazard communication requirements, as by allowing old descriptions on packages with new descriptions on shipping papers, would result in confusion to carriers and emergency responders faced with sorting out inconsistent shipping paper descriptions, markings, labels or placards.

RSPA strongly recommends that the 1990 49 CFR be retained after publication of subsequent editions of 49 CFR. If the 1990 49 CFR is not available from a Government Printing Office bookstore, a list of commercial sources may be obtained by writing the Office of Hazardous Materials Standards, Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590–0001.

IX. Impact on Exemptions

RSPA's authority to issue exemptions is established in section 107 of the Hazardous Materials Transportation Act of 1974 (HMTA). This section authorizes exemptions from specific requirements of the HMR when the hazardous materials would be transported in a manner which achieves a level of safety at least equivalent to that provided by the regulations or which would be consistent with the public interest and consistent with the policy of the HMTA. Exemptions may be issued for a maximum of two years and renewals are authorized. Specific requirements for applying for and the granting of exemptions are found in Part 107 of the HMR.

Exemptions have proven to be invaluable in providing flexibility from the detailed requirements of the HMR while ensuring the safe transportation of hazardous materials. Exemptions have been granted to support the space program, to provide for the cleanup of hazardous waste sites, and to provide for the introduction of new technologies. Hundreds of exemptions have been issued to authorize deviations from detailed and inflexible construction requirements for packagings. For example, an exemption was issued to allow use of mediterranean pine in the manufacture of a wood box. Although the specification for the wood box listed over 40 types of wood, it did not specifically list mediterranean pine.

Many commenters to Notice 87–4 expressed concern over the lack of a proposed exemption policy and questioned how RSPA would handle current exemptions under performance standards. They asked if current exemptions would be handled under a grandfather clause or if it will be necessary for RSPA to make post-Docket HM–181 determinations on exemption packaging ruled no longer authorized. They complained that RSPA was silent on procedures to handle exemptions from the performance standards themselves. Several commenters urged RSPA to maintain the current exemption process for products having a history of safe shipment in exemption packaging, even if these exemption packagings fall short of meeting every aspect of applicable performance standards under Docket HM–181. One commenter recommended that RSPA indefinitely extend all authorizations now included in the HMR and maintain all exemptions that holders may wish to renew. Two of the stated objectives of this rulemaking action are to promote flexibility and technological advances in packaging and to reduce the need for exemptions. In this final rule, RSPA departs from a system of inflexible package construction regulation developed through decades of incorporating piecemeal exemptions. By shifting to performance-based packaging, new innovations in design, manufacturing techniques, and technologies will be more easily accommodated. This will foster new shipper, manufacturer, and supplier relationships and remove barriers to efficient packaging development as technologies improve and new distribution systems emerge.

RSPA is not introducing changes to the existing exemption procedures to 49 CFR part 107. It should be noted, however, that most domestically-exempted variations will not be authorized in international commerce unless recognized in international standards. Major revisions to part 107 subpart B suggested by several commenters to establish entirely new exemption procedures under performance standards are regarded as beyond the scope of this rulemaking. In the interest of regulatory consistency, simplicity and uniformity, and particularly in those instances where the level of packaging integrity is increased in this final rule, RSPA does not plan to allow exemptions involving packaging specifications replaced by performance standards to remain in effect indefinitely. RSPA anticipates the phase-out of exemption packagings no longer necessary due to the performance based standards of this final rule and

will review requests for renewal accordingly. Further, each person who holds a current exemption should carefully review that exemption to determine whether it could be eliminated.

This final rule significantly reduces regulatory complexity by removing hundreds of detailed construction requirements occupying approximately 360 pages of part 178. Thus, the need for many exemptions for metal, wood and fiber drums, barrels, kegs, boxes, polyethylene containers, carboys and bags will also be reduced. Of the nearly 1,200 active exemptions RSPA has reviewed, approximately 400 may be eliminated. Elimination of these exemptions may be warranted because: (1) The exemption packaging specifications do not provide a level of safety equivalent to the packaging standards adopted under this final rule and thus do not meet the HMR requirements for an exemption; (2) because the exemption packagings meet the standards adopted under this final rule and thus are no longer required; or (3) because the exemption packagings are now authorized for the hazardous materials due to other recent regulatory changes. The elimination of these exemptions will further reduce the burden on shippers and packaging manufacturers. Packaging manufacturers will no longer be required to file for exemptions in order to develop new packagings, to file for renewals on at least a two-year cycle, or to mark packaging with exemption numbers. Shippers will no longer have to maintain current copies of exemptions for the packaging they are using, file for their own exemptions to use packaging not specifically authorized by the HMR, identify exemption numbers on shipping documents, and insure that the specific terms of the exemption are followed.

RSPA's authority to eliminate exemptions for packagings that do not comply with the new performance standards was questioned by one commenter who stated that RSPA does not have the authority to terminate existing exemptions merely because they do not comply with performance standards in Docket HM-181. The commenter based its argument on existing § 107.119(c) (1) and (2) which state that RSPA can terminate an exemption only if (1) it is no longer consistent with the public interest or (2) it is no longer necessary because of an amendment to the regulation. The termination of exemptions as a result of this final rule is not only consistent with § 107.119(c) (1) and (2) but also with the intent of the exemption provisions in the HMTA. Section 107 of the Act provides for the issuance of exemptions if they provide levels of safety that are at least equivalent to the HMR. In accordance with § 107.119(c) (1) and (2), the substantial amendments to the HMR undertaken in Docket HM-181 necessitate a reexamination of all existing exemptions to determine whether they are still necessary and whether they provide levels of safety that are at least equivalent to the new regulations.

A substantial number of active exemptions will remain in effect including those addressing cylinders, compressed gases in portable tanks and cargo tanks, cryogenic liquids in portable tanks, intermediate bulk containers (IBCs), and Class 7 (radioactive materials) packaging. RSPA also anticipates retaining exemptions that are not package-specific, such as those that grant companies relief from hazard communications or modal requirements but require additional specific safety control measures.

The following list identifies exemptions potentially affected by the deletion of non-bulk specification packagings and adoption of performance-oriented packagings and which may be eliminated or require review and revision under Docket HM-181. This list may not include all exemptions that are candidates for termination and may identify some which could remain in effect after the effective date of this final rule.

2482	6858	7628
2709	6702	7640
3126	6724	7654
2187	6762	7716
3330	6773	7735
3549	6787	7753
3630	6800	7768
3941	6001	7777
3998	6824	7811
4291	6881	7834
4338	6874	7835
4354	6895	7876
4575	6902	7888
4612	6922	7907
4719	6971	7909
4932	6985	7929
5243	7011	7943
5649	7035	7963
5704	7051	7987
5876	7052	8003
5895	7063	8035
5923	7070	8037
6122	7071	8051
6128	7072	8053
8154	7078	8065
6232	7087	8077
6287	7097	8080
6296	7252	8084
6434	7269	8091
6472	7454	8094
6501	7468	8099
6583	7489	8127
6602	7498	8141
6614	7544	8151
6637	7621	8157
6651	7625	8168
8175	9027	9711
8180	9040	9714
8184	9047	9715
8194	9054	9717
8195	9064	9722
8208	9108	9727
8215	9130	9733
8228	9133	9736
8230	9136	9744
8244	9146	9749
8248	9168	9751
8264	9182	9752
8265	9197	9754
8267	9209	9755
6329	9222	9765
8352	9230	9768
8362	9233	9770
8363	9235	9773
8389	9244	9774
8377	9253	9775
8387	9262	9780
8388	9275	9782
8390	9277	9785
8394	9281	9808
8396	9282	9822
8397	9286	9827
8409	9290	9828
8410	9296	9833
8432	9307	9836
8445	9308	9844
8450	9316	9857
8451	9322	9860
8465	9354	9861
8498	9364	9865
8519	9377	9870
8522	9413	9872
8536	9415	9873
8538	9416	9878
8545	9430	9885
8547	9433	9891
8571	9460	9892
8573	9464	9901
8585	9466	9915
8609	9481	9918
8645	9499	9933
8679	9505	9934
8691	9506	9936
8708	9529	9937
8716	9549	9938
8732	9552	9952
8735	9554	9970
8747	9555	9971
8770	9569	9981
8772	9571	9983
8780	9581	9989
8781	9595	9990
8787	9601	9992
8812	9606	9993
8850	9607	9994
8862	9610	9995
8867	9611	9997
8870	9618	10003
8878	9642	10007
8885	9644	10015
8888	9652	10016
8893	9654	10019
8901	9655	10020
8906	9657	10028
8911	9663	10035
8917	9670	10037
8923	9673	10040
8931	9676	10048
8936	9677	10055
8943	9679	10056
8952	9681	10057
8958	9685	10059
8963	9686	10073
8966	9688	10074
8967	9689	10088
8968	9698	10093
8978	9700	10096
9014	9702	10099
9010	9704	10102
9019	9705	10108
9026	9708	10116

10120	10159	10200
10126	10161	10231
10133	10166	10242
10139	10170	10249
10142	10173	10260
10150	10175	10261
10154	10176	10245
10156	10192	
10157	10197	

X. Enforcement of Performance-Oriented Packaging Standards

Under the new system of performance-oriented packaging standards RSPA is adopting in this final rule, an inspector can no longer look to detailed specifications as the basis for determining whether or not a package is in compliance with the HMR. The most important determinant of the qualification of a package will be how well it performs under test conditions. The enforcement process will continue to include random inspections of packagings by DOT inspectors at freight terminals, intermodal transfer facilities, airports and other transportation facilities to ascertain certain types of compliance, such as proper markings and use of proper packagings for specific hazardous materials. However, testing for compliance will become the cornerstone of RSPA's enforcement effort relating to non-bulk packagings falling within the scope of this final rule. RSPA will focus its inspection efforts on packaging manufacturers' facilities and testing-related activities, as well as shippers' facilities where manufacturing functions are performed. Inspection activities will include review of packaging manufacturers' and shippers' test records, observation of tests performed by manufacturers, shippers and third party testing agencies and, in some instances, conduct of tests either by or on behalf of RSPA personnel.

Shippers and manufacturers expressed concern in comments to Notice 87-4 over increased responsibilities and exposure to liability. Shippers welcomed the greater flexibility afforded by performance standards in selecting and combining packagings but were troubled by possible assumption of "manufacturers" responsibilities for packages that fail in transportation. In turn, many manufacturers were apprehensive about being responsible for the performance of packages they certify as having passed subpart M tests when they are transferred to shippers and which are subject to transportation conditions over which they have no control. On one hand, as a result of this final rule, shippers will not be held responsible under the HMTA enforcement provisions for package failures due solely to a manufacturer's non-compliance with the regulations. On the other hand, manufacturers will not be held responsible under those provisions for violations caused solely by shippers (e.g., a shipper's failure to comply with a manufacturer's notification of all steps to be taken in completing a package prior to transportation, as required by § 178.2(c)). (See the more detailed preamble discussion of shipper/manufacturer responsibilities above.)

Shippers and manufacturers both expressed concern that failure of a packaging test will be considered "prima facie" evidence of a violation. Testing must remain the cornerstone of any effective enforcement program when the legal requirements are performance standards instead of design criteria. Enforcement action often will be taken upon receipt of test results from a testing facility or after tests conducted at a manufacturing or shipping location. However, such actions will be preceded by thorough investigation (which could include additional testing) to determine what caused the failure, whether a violation occurred, who committed it, and what the appropriate sanction should be.

Any testing program to determine compliance must have as its foundation a set of standard procedures by which to measure performance. For most existing DOT non-bulk specification packagings, RSPA, had developed published test procedures and standards, in coordination with Wyle Laboratories, Huntsville, Alabama. These include test procedures and standards for DOT specification glass carboys, polyethylene bottles and drums, steel barrels and drums, fiberboard and wooden boxes, fiber drums, multi-wall paper bags and several other types of packaging. It is anticipated that these test procedures and standards will be modified to address the U.N. packaging standards adopted in this final rule. As modified, these test procedures and standards would be used by RSPA enforcement personnel as the basis for its monitoring, testing, and inspection program.

The development of an effective enforcement program under this final rule will be an evolutionary process. It may be necessary to modify enforcement policies, priorities and procedures during the first several years to take into account experience gained. To ensure development of a fair and effective enforcement program under performance standards, RSPA periodically will review the implementation of enforcement operations and consider any further comments and suggestions.

XI. Public Input to International Standards-Issuing Entities

Some commenters asked RSPA to develop procedures that would allow shippers, carriers and the U.S. public to be better represented in United Nations regulatory proceedings, or at least to be better informed about these proceedings. One commenter stated that it is necessary to put into place a process that gives the public the capability to participate in proceedings to change U.N. Recommendations through DOT. Several commenters urged RSPA to establish a process similar to the Safety of Life at Sea (SOLAS) meetings, sponsored by the State Department and conducted by the U.S. Coast Guard, in preparation for meetings of the International Maritime Organization. They said a SOLAS-type process would enable industry to more effectively participate in developing U.S. positions taken at sessions of the U.N. Committee of Experts on the Transport of Dangerous Goods or its Subcommittee. The establishment of a "study group" was suggested. Such a group could draw representatives from all sectors of industry to analyze all significant proposals before U.N. bodies and to advise U.S. delegates.

Other commenters argued that a SOLAS-type process would not go far enough in providing for public input to U.S. positions. They contended that SOLAS-type meetings often are restricted to discussions of only U.S. proposals and that little or no opportunity is given for commenting on proposals from other countries. It was recommended that U.N. procedures be changed to afford U.S. industry and the public more opportunity to comment on all regulatory proposals before international bodies.

Establishment of new public input procedures is beyond the scope of this rulemaking, but RSPA welcomes further comment on how the public might better participate in developing U.S. positions. Currently, RSPA conducts public meetings on U.S. positions in cooperation with the Hazardous Materials Advisory Council's (HMAC) International Regulations Committee (INTEREC). These meetings are similar to the SOLAS process, which is open to discussion of all proposals, not just those of the U.S. INTEREC meetings. They are held prior to each U.N. session to describe and seek comment on proposed U.S. positions on all papers to be considered, including those submitted by other governments or observer groups. Public meetings in cooperation with HMAC's INTEREC

also are held after each U.N. meeting to describe and discuss results and to explain U.S. plans for the next U.N. session. Descriptions of major issues to be discussed at these public meetings are published in the Federal Register. Copies of U.N. papers to be discussed are available from HMAC for a nominal fee.

Many commenters asked RSPA to seek improved public access to meetings of IMO and ICAO. One commenter suggested that DOT should publish the agendas and regulatory proposals to be considered, in advance of IMO and ICAO meetings, and that meeting locations should be varied to encourage fuller public participation. As indicated above, the U.S. Coast Guard conducts meetings preparatory to IMO meetings and publishes announcements of those meetings as well as the major agenda items. ICAO issues are discussed at public meetings similar to these described above. Meetings of the ICAO Dangerous Goods Panel and the IMO Subcommittee on the Carriage of Dangerous Goods are held where the support staffs for these groups reside. It is not within the authority of U.S. representatives to compel these groups to change the location of meetings, nor would it be practical in many instances.

Commenters recommended that the effective dates of DOT regulations implementing international regulations should coincide with the effective dates set by the international organizations to minimize confusion. RSPA is aware of the problems created by dissimilar effective dates and strives to eliminate these problems. For example, as the U.S. delegation participates in proceedings to amend ICAO's Technical Instructions or the IMDG Code, it endeavors to set the same effective dates in both sets of requirements. The phase-out date for transitional packaging provisions is December 31, 1990, in both ICAO and IMO regulations. The permissible date for meeting performance-oriented packaging requirements for international shipments of hazardous materials under this rulemaking also coincides with the date set by ICAO and IMO.

Several commenters requested clarification of the terms "competent authority" and "appropriate authority" as used in international regulations. The term "competent authority" is used in the U.N. Recommendations and the IMDG Code to refer to a national agency responsible for the control or regulation of a particular aspect of the transportation of hazardous materials. The term "appropriate authority" as used in the ICAO Technical Instructions has the same meaning. The responsibility of the competent authority in these international regulatory documents is analogous to certain responsibilities of the Associate Administrator for Hazardous Materials Safety in the HMR. As in the HMR, there are certain safety concerns which are not fully addressed in the regulations. Under the HMR, approval must be obtained from the Associate Administrator for Hazardous Materials Safety in some of these instances. Similarly, in the case of the international regulations, approval from the competent authority often must be obtained. Names and addresses of the offices of national competent authorities for purposes of maritime transport are identified in the IMDG Code. Under the HMR, the Associate Administrator for Hazardous Materials Safety is the competent authority (or "appropriate authority") for both the IMDG Code and the ICAO Technical Instructions. When the Associate Administrator for Hazardous Materials Safety issues an approval as the U.S. competent authority, a Competent Authority Approval (CAA) certificate is issued. This certificate typically identifies the specific paragraph in the international regulation that the certificate relates to and identifies what is being authorized under the certificate. Currently, by far the most commonly-issued CAA certificates are for the classification of explosives under the ICAO Technical Instructions. Some CAA's are also issued in accordance with the IMDG Code for special packagings and for the transport of certain organic peroxides where the use of an explosive subsidiary risk label is not required if deemed not to be necessary by the competent authority. CAA's are also issued in the case of some explosives where the regulations require that the packaging must be as specified by the competent authority. Competent authority approvals are generally accepted by other countries. Unless specifically stated otherwise, competent authority approvals of other countries are accepted under the HMR.

XII. Section-by-Section Review

A. Part 107
B. Part 171
C. Part 172
D. Part 173
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A. Part 109: Hazardous Materials Program Procedures

Sections 107.101, 107.103, 107.113, and 107.201. In §§ 107.101, 107.103, 107.113, and 107.201, which are adopted essentially as proposed under Docket HM–204, the reference to part 146 is removed as all requirements for vessel transportation of hazardous materials are now contained in 49 CFR and 46 CFR part 64.

Sections 107.601 and 107.603. Pursuant to the Paperwork Reduction Act of 1980, the Office of Management and Budget (OMB) issued regulations, "Controlling Paperwork Burdens on the Public" (5 CFR part 1320). The Paperwork Reduction Act requires designated agencies to implement Federal information policies, principles, standards, and guidelines and provide direction to and oversight of the efforts to reduce the Federal paperwork burden and assist agencies in efficient information resources management.

Though not addressed in the ANPRM, the publication of the parts or sections where information collection is identified or described is a non-substantive OMB requirement which has been accomplished in these sections.

B. Part 171; General Information, Regulations and Definitions

Comments received concerning § 171.7, matter incorporated by reference, were generally editorial in nature. Notice 87–4 contained a proposal to reorganize the "matter incorporated by reference", in column format, setting forth the source and name of the material and the section cite where the matter is referenced. A commenter expressed concerns regarding the effect of the "section reference cite" in the revised Table in paragraph (a)(3) (former paragraph (c)) of this section. The commenter stated:

> Although reference in this section to incorporating sections of the HMR appears to afford a desirable convenience, it raises a question as to the possible effect of any inadvertent omission of any such reference. For example, if the listing in this section for CGA pamphlet C–12 omitted reference to (present or proposed) § 173.34, would the reference to the said pamphlet in that section be valid?

The intent of revising § 171.7 is to consolidate all materials referred to in one section in an easy-to-use format and to update the material. Section 171.7 is revised to separate matter incorporated by reference from informational reference material. A sentence is included in paragraph (a)(3) of this section to clarify that the section cite

reference in § 171.7 is included for the convenience of the reader, and may not be all inclusive.

Several commenters recommended that "AAR Catalog Nos. SE6999AHT and SE69AHTE" be added to the Table in § 171.7 and referenced in § 179.14. We concur with the commenters. For consistency with a final rule under Docket HM–166W, which also includes the latest changes for coupler vertical restraint systems on tank cars, we have added the Catalog Nos. SE69AHT and SE69AHTE to the list of informational materials in § 171.7(b) and to § 179.14.

Approximately 20 comments were received concerning the definitions in § 171.8. Comments from several chemical companies address the definition of "technical name". Commenters recommended allowing the use of generic descriptions as technical names for "n.o.s." descriptions. Since publication of Notice 87–4, the definition of "technical name" was addressed under a separate rulemaking action under Docket HM–126C. In the final rule under Docket HM–126C, the definition of technical name was revised to permit the use of generic descriptions as technical names for "n.o.s" descriptions, as long as the names identify the general chemical group.

Several commenters recommended that the definition for "bulk packaging" and "non-bulk packaging", as adopted in the final rule under Docket HM–126D, remain unchanged in this final rule because they believe that these definitions eliminate confusion with regard to these terms by both shippers and field inspectors. RSPA agrees with the commenters. However, the definitions for "non-bulk" and "bulk" packaging are revised to include a requirement regarding an internal volume of 450 liters (119 gallons) for solids.

Several commenters suggested that the definition of a "Package" or "Outside Package", which they believe is sufficiently clear, should be retained. Also, several commenters recommended retention of the current definition, in the HMR, for "Strong outer (or outside) packaging" because the definition, as proposed in Notice 87–4, is inconsistent with the U.N. Recommendations. RSPA agrees with the commenters and, therefore, the definitions of "Package or Outside Package" and "Strong outer (or outside) packaging", as defined under the HMR, remain unchanged in this final rule.

Several commenters recommended that the term "Bar" be defined because it is used for pressure rating of portable tanks. RSPA agrees with the commenters and the definition of "Bar" is added in § 171.8.

Several commenters recommended adoption of a performance specification and a definition of "Flexible Intermediate Bulk Containers" (FIBCs), as described in the U.N. Recommendations. Currently, under the HMR, FIBCs are not authorized for transportation of hazardous materials in the U.S., except under exemption. At this time, RSPA believes this issue is beyond the scope of this rulemaking because of the need to develop tests and performance procedures for FIBCs, therefore, this issue will be addressed in a future rulemaking.

Section 171.3. The general provisions in part 171 remain essentially unchanged. Paragraph (e) of § 171.3 is deleted because the provision which allows the use of open-head drums for hazardous waste liquids containing solids or semi-solids is relocated to § 173.12. Sections 171.1, 171.2, 171.4 and 171.5 are unchanged.

Section 171.6. Section 171.6 is added to incorporate the International System of Units ("SI" or metric units) as the regulatory standard. The U.S. customary units follow the SI units, but are provided for information only and are no longer intended to be the regulatory standard. RSPA will remove the customary units of measurement at a future date. Paragraph (b) explains that SI units are abbreviated, while customary units are not. Paragraph (c) contains a conversion table to be used when an exact conversion is needed.

Section 171.7. The title of § 171.7 is revised to read "Reference Material". Section 171.7 is revised in its entirety to present material incorporated by reference in an easy-to-use format, to consolidate all references in one section, and to update the material. The format is identical to that used by the Federal Register in the "FINDING AIDS" portions of the CFR. RSPA believes this format is easier to use than the existing format in § 171.7. The *Table of Material Incorporated by Reference* provides citations of the applicable 49 CFR sections in which material is referenced and clearly identifies sources for reference material.

Section 171.8. Section 171.8 is revised to incorporate U.N. terminology and definitions and to define other terms which are used in this final rule, such as "international transportation", "kPa", "n.o.s. entry" and "subsidiary hazard". The definitions of "bulk" and "non-bulk" packaging are made consistent with the rules promulgated under Docket HM–126D and, in addition, are revised to change the obsolete section cite "§ 173.300" to "§ 173.115", for the definition of a gas. A new definition of "manufacturer" is included to correspond with package marking and certification requirements in part 178. The present definition of "Package" or "Outer or Outside Packaging", under the HMR, remains unchanged in this final rule. The definitions for "Bar" and "Single packaging" are added to this section. Approximately 40 definitions are added and 16 are revised. Numerous cross references are added or revised. Definitions for terms rendered obsolete by this final rule, such as "STC" and "Poison A" are deleted.

Section 171.10. Section 171.10 is revised to illustrate the distinction between "bulk packaging" as defined in § 171.8 and "bulk carriage by vessel or barge" as addressed in 46 CFR, subchapters D, I, O and N.

Section 171.11. This section addresses provisions for transporting hazardous materials in accordance with the ICAO Technical Instructions. Changes are adopted essentially as proposed in Notice 87–4. Paragraph (c) is revised to prohibit transport, under provisions of the ICAO Technical Instructions, of materials which are poisonous by inhalation. Paragraphs (d)(4) (i) and (ii) are removed, as it will no longer be necessary to indicate the name of the DOT hazard class which corresponds to the ICAO hazard class (i.e., they will now be the same). Accordingly, paragraphs (d)(4) (iii) and (iv) are redesignated (d)(4) (i) and (ii), respectively. Also, paragraph (d)(9) is removed and paragraph (d)(10) is redesignated as paragraph (d)(9).

Section 171.12. Section 171.12 addresses requirements for import and export shipments and for use of the IMDG Code for transportation by vessel. The section has been editorially reorganized. Paragraph (a) concerns importers' responsibility, and is a restatement of a previously existing requirement. Paragraph (b) authorizes, with certain exceptions, use of the IMDG Code for shipments involving transportation by vessel. In Notice 87–4, RSPA proposed to revise this section to authorize use of non-bulk packagings conforming to IMDG Code provisions. Although manufactured and marked to U.N. standards, such packagings might not conform to all the technical requirements in parts 173 and 178 applicable to non-bulk packagings. The proposal is adopted in this final rule. Paragraph (c) addresses movement of hazardous materials within port areas. Proposed for deletion in Notice 87–4, this section is retained to address transshipments of materials which may move through port areas in compliance with

the IMDG Code but not the HMR in the course of being transported from one foreign country to another. Paragraph (d) addresses requirements applicable to transportation of radioactive materials under the provisions of International Atomic Energy Agency (IAEA) regulations. A change to this paragraph updates Safety Series No. 6 from the 1973 edition to the 1985 edition. Additional changes to the HMR based on the 1985 IAEA Safety Series No. 6 will be addressed under Docket HM–169A.

Section 171–12a. This section, which recognizes provisions in Canadian regulations, has been rewritten in its entirety for clarity. Paragraph (a) sets forth the scope and applicability. It clarifies that the provisions of this section are intended to apply to imports of materials and that similar exceptions in Canadian regulations apply to U.S. exports to Canada. Paragraph (b) sets forth conditions and limitations for use of the Canadian Transportation of Dangerous Goods Regulations. With the move to U.N. standards, DOT will no longer recognize those Canadian standards for non-bulk packagings which are based on those DOT specifications which are removed from the regulations by this final rule.

Section 171.14. Section 171.14 is revised to include requirements for implementing transitional packaging, and the provisions for continued use of packagings marked "ICC" is relocated to § 173.25(b).

C. Part 172; Hazardous Materials Table, Special Provisions and Hazardous Materials Communication Regulations

1. Cross Reference of Identification Numbers and Proper Shipping Names

Because of the numerous changes to the § 172.101 Table, and the removal of the § 172.102 Table, the cross reference table of identification numbers and proper shipping names has been revised.

2. Subpart A; General

Subpart A of part 172 is not changed in this final rule.

3. Subpart B; Hazardous Materials Tables and Special Provisions

Since the Hazardous Materials Table (§ 172.101 Table) was proposed in Notice 87–4, substantial changes have been made to the source documents from which entries to the § 172.101 Table were derived. The 1987 proposed table was developed principally from Revision 4 of the U.N. Recommendations published in 1985. Entries to the table in this final rule account for Revisions 5 and 6 of the U.N. Recommendations, which were published in 1987 and 1989, respectively. The final table also reflects changes included in the 1991/1992 ICAO Technical Instructions for air transport and Amendment 25 to the IMDG Code for vessel transportation.

Columns 2 through 6 are substantially changed in the § 172.101 Table to update hazardous materials descriptions and proper shipping names, hazard classes, identification numbers, packing groups and primary and subsidiary labels. Changes also include deletion of existing UN numbers where they no longer exist in the U.N. Recommendations; inclusion of new UN numbers where entries have been added; and closer alignment of NA numbers where changes in UN numbers affect NA entries.

In particular, the 172.101 Table is amended to reflect the introduction of the generic shipping description system for Division 5.2 and the removal of 156 obsolete entries for organic peroxides. Twenty generic entries for organic peroxides are added. In addition, 21 entries for self-reactive materials are revised to reference the new packaging table (§ 173.224) for those materials. However, two self-reactive entries are not changed. As proposed in Notice 87–4, shipments of self-reactive samples (UN 3031) and self-reactive trial quantities (UN 3032) require approval by the Associate Administrator for Hazardous Materials Safety. Paragraph (c)(14) is added to require use of the new Organic Peroxides Table in § 173.225 for selection, based on the technical name of the organic peroxide, of an appropriate proper shipping name. Because of this change, it is also necessary to revise paragraph (c)(5) to delete the reference to organic peroxides.

The § 172.101 Table has also been revised in response to comments received to Notice 87–4. Some of the comments were editorial in nature, while others questioned the classification of products or were concerned about the deletion of old shipping descriptions. Even though comments were too numerous to discuss individually, RSPA has carefully considered each comment and, when determined to be appropriate, made corresponding changes to the Table. The following is a discussion of several of these comments.

Several commenters stated that "Sulfur" and "Sulfur, molten" did not meet the definition of flammable solid and, therefore, they should not be classed as a 4.1 material. RSPA concurs and has listed the materials as Class 9 for domestic transportation and as Division 4.1 for international transportation. RSPA will address this issue further under Docket HM–198A.

Several commenters requested that the shipping name "Compound, cleaning liquid" be retained. Because of the potential economic impact from the deletion of this shipping name, RSPA has retained the proper shipping name "Compound, cleaning liquid" for domestic transportation. The entry in the § 172.101 Table appears twice for Class 3 and Class 8 materials.

One commenter requested that a shipping name prefaced by an "I" be allowed even when international transportation *is not* involved (i.e., solely a domestic movement). RSPA concurs and has amended the definition of the symbol "D" in § 172.101 accordingly.

Several commenters requested that the shipping name "Liquified petroleum gas" be retained because of the large cost of remarking packagings with a new shipping name and identification number. RSPA concurs and has modified each applicable shipping name to refer also to "Petroleum gases, liquified". "Petroleum gases, liquified", references "Liquified petroleum gas", which is an authorized shipping name for domestic shipments of this material.

Several commenters requested changes in regard to the shipping name "Motor fuel antiknock mixtures". Commenters stated that the material should: (1) Be defined as in current § 173.354; (2) have a "+" in the first column which would fix its hazard class; (3) be permitted to be shipped in steel tanks per ASME specification as currently provided in § 173.354(c); and (4) change the shipping name to "Motor fuel antiknock *compounds*". RSPA concurs with the first three suggestions, however RSPA disagrees with the request that the word "compounds" be used instead of the word "mixtures" in the shipping name. RSPA sees no benefit in adding this shipping description for domestic shipments. RSPA has only added domestic shipping names where there is a recognized substantial economic hardship or safety hazard.

The ORM–E class has been removed and hazardous substances and hazardous wastes have been placed into Class 9 (see § 173.140). RSPA has added the U.N. Recommendations' shipping name of "Environmental hazardous substance, liquid or solid, n.o.s." and has removed the shipping name "Hazardous substance, liquid or solid, n.o.s." However, the shipping name "Hazardous waste, liquid or solid, n.o.s." has been retained because of its widespread use and acceptance in the hazardous waste industry. In addition, a

special provision has been added to the shipping name "Environmental hazardous substance, liquid or solid, n.o.s." which allows the use of the shipping name "Other regulated substances, liquid or solid, n.o.s." if the material is not a hazardous waste.

RSPA has not adopted proposed § 172.101(l)(3) which would have allowed the use of IMDG Code shipping descriptions which do not appear in the § 172.101 Table, if approved by the Associate Administrator for Hazardous Materials Safety. Section 171.12, under certain limitations, permits a material classed and described under the IMDG Code regardless of whether the IMDG Code shipping description appears in the § 172.101 Table. Therefore, RSPA does not believe that it is in the interest of safety to require approval of these shipping descriptions.

Several commenters requested that a subsidiary risk column be added to the § 172.101 Table. RSPA does not concur. The subsidiary risk of a material is identified through the listing of additional labels in Column 6 (Labels) of the § 172.101 Table. Another commenter wanted to know if a material did not meet the hazard associated with the additional label, did the additional label have to be applied. The answer to this question is no, the additional label does not have to be applied; however, a different shipping name must be selected (e.g., a generic proper shipping name) which does not require the additional label. RSPA has revised § 172.101(c) (10)(i)(G) and (12) (i) and (ii) to clarify this issue.

Several commenters were concerned regarding the assignment of "N" notes (non-bulk packaging requirements for all modes) in Column 7. Commenters felt that many of the "N" notes were actually ICAO requirements and, therefore, should become "A" notes (e.g., apply only in air transportation). RSPA examined each "N" note carefully and made the following changes:

(1) Proposed "N" notes N1, N2, N11, N13, N26, N35 and N40 were made "A" notes; and

(2) The following "N" notes were deleted altogether, N14, N15, N16, N17, N42, N44, N55, and N70. Except for N42, N44, N55 and N70 which were deleted for editorial reasons, these notes have been deleted because RSPA believes these requirements are addressed in the compatibility requirements of § 173.24. All other "N" notes have been adopted as proposed.

In Notice 87–4, RSPA identified materials poisonous by inhalation with a note 10 in Column 7. RSPA has reviewed its list of materials poisonous by inhalation and, based on new data, has amended the list accordingly. In addition, note 10 has been replaced by five separate notes (1 through 5) which (except for note 5) identify a material as poisonous by inhalation and indicate its hazard zone, in accordance with § 173.133(a)(2). Note 5 identifies materials that may or may not, depending on the circumstances, meet poisonous by inhalation criteria. In those circumstances, the shipper must determine if it meets the definition of a material poisonous by inhalation. If it does, the material is required to be described using an appropriate generic Division 6.1, Packing Group I or generic Division 2.3 proper shipping name. Materials that are poisonous by inhalation must comply with the applicable communication requirements of the HMR, which include shipping papers, marking, labeling and placarding requirements.

In addition, some materials that RSPA has identified as poisonous by inhalation have been assigned a hazard class other than Division 6.1, Packing Group I or Division 2.3. In order to be consistent with the international regulations and the Precedence of Hazard Table in § 173.2a; these materials, except for Class 2 materials, have been classified in accordance with the U.N. Recommendations and have been assigned a "+" in the first column of the § 172.101 Table which fixes their hazard class. Class 2 materials that have been identified as poisonous by inhalation are classed in Division 2.3.

One commenter asked RSPA and the Federal Railroad Administration (FRA) to retain the existing authorization for the use of sift-proof, weather-resistant, metal-covered hopper cars for the transport of sodium cyanide and potassium cyanide. Sections 172.101 and 172.102 have been modified accordingly.

New special provision B54 has been added to certain low hazard solid materials to authorize the use of open top rail cars. New special provisions B55 and B56 have been added to certain solid materials to authorize the use of watertight hopper cars. New special provision B57 has been added to require that tank car tanks carrying chloroprene be equipped with non-reclosing pressure relief devices. For dimethylhydrazine, unsymmetrical, new special provision B58 replaces special provision B32. For phosphorus pentasulfide, new special provision B59 has been added to permit the use of Class AAR 207 tank car tanks. In order to limit the types of single and multi-unit tank cars used for the transportation of phosgene, hydrogen cyanide, nitrogen dioxide and nitric oxide to those cars presently authorized, new special provisions have been added and other special provisions deleted for those products. New special provision B62 is added for hydrogen peroxide solutions exceeding 60 percent hydrogen peroxide to require that the venting arrangements be approved by the Associate Administrator for Hazardous Materials Safety. New special provision B63 is added for ethyl chloride, ethylamine, and ethyl methyl ether to allow the continued use of existing tank car tanks not equipped with thermal protection or head protection. The issue of retrofitting these tank cars with thermal protection or head protection will be addressed in Docket HM–175A. These commodities were formerly classified as flammable liquids, but are reclassified as flammable gases in this final rule.

New special provision B64 is added for bromine, isophorone diisocyanate, silicon tetrafluoride, nitrogen trifluoride, and hydrogen cyanide, anhydrous, stabilized, absorbed in a porous inert material to require that tank car tanks built after December 31, 1990, be equipped with head protection. Note B9, which states that bottom outlets are not authorized for bulk packagings, has been added to each Division 6.1, Packing Group I, Hazard Zone A and B material and each Division 2.3, Hazard Zone A and B material. Those provisions of Notes B30–B33 related to tank car tanks have been moved to new B Notes B72–B75, respectively. Omissions in special provisions B73 and B74 have been corrected. All B notes have been modified to incorporate those applicable changes from Docket HM–183. The tank car tank grandfathering provisions of special provisions in B72–B75 have been deleted. However, § 171.14 has been added to permit the continued use of packagings previously authorized under the HMR until October 1, 1998, and special provision B77, which authorizes packagings approved by the Associate Administrator for Hazardous Materials Safety, has been added to the following materials: acetone cyanohydrin, acrolein; allyl alcohol; n-butyl isocyanate; crotonaldehyde; cyclohexyl isocyanate; dimethylhydrazine, symmetrical; dimethylchlorosilane; ethylene dibromide; ethyleneimine; hexachlorocyclopentadiene; hydrogen fluoride, anhydrous; iron pentacarbonyl; methyldichlorosilane; methylhydrazine; mercaptan; methyltrichlorosilane; phenyl isocyanate; phenyl mercaptan; phosphorus oxychloride; phosphorus trichloride; poisonous liquids [inhalation hazard, Packing Group I, Hazard Zone A]; sulfur chlorides; sulfur trioxide, inhibited; sulfuric acid, fuming; and trimethylchlorosilane. These

commodities are toxic by inhalation and are now authorized in tank car tanks that are not equipped with thermal protection or head protection. The issue of retrofitting tank car tanks carrying these commodities will be further addressed in Docket HM-175A. One commenter noted that for anhydrous hydrazine or aqueous hydrazine solutions, special provision B17 (requiring aluminum packagings) and special provision B24 (molybdenum content of stainless steel may not exceed 1.0%) were inconsistent. RSPA and FRA agree and for those commodities, special provision B17 has been deleted and special provision B24 has been modified to permit aluminum bulk packages or stainless steel bulk packages. One commenter noted that AAR specification 207A40W tank car tanks had been successfully used, under exemption, for phosphorus pentasulfide and recommended that special provision B59 be modified to permit the continued use of such tanks. RSPA and FRA agree and special provision B59 has been modified to permit the use of AAR specification 207A40W, 207A40W6, 207A48W, and 207A60W tank car tanks for phosphorus pentasulfide.

Typographical errors in special provisions B57, B65, and B67 were noted by several commenters and have been corrected in this final rule. One commenter noted that for some commodities, both special provisions B17 (requiring that packagings be of aluminum) and B28 (requiring that packagings be of stainless steel) were referenced and the commenter recommended that instead special provision B53 (requiring that packagings be of either aluminum or stainless steel) be used. RSPA and FRA agree and for hydrogen peroxide and peroxyacetic acid mixtures; hydrogen peroxide, aqueous solutions (with more than 40 per cent but not more than 60 per cent * * *]; hydrogen peroxide, aqueous solutions (with not less than 20 per cent * * *]; and hydrogen peroxide, stabilized (or] hydrogen peroxide aqueous solutions, stabilized (with more than 60 per cent * * *], nitric acid (other than red fuming], Packaging Group II; and for nitric acid, red fuming special provisions B17 and B28 are deleted and replaced with special provision B53. RSPA and FRA agree with the commenter who recommended that the current special tank car tank requirements for potassium nitrate and sodium nitrite mixtures be continued. Therefore, a new special provision B78 has been added to potassium nitrate and sodium nitrite mixtures that would restrict the bulk rail transportation of that commodity to presently authorized (or superior) bulk packagings. RSPA and FRA agree with the commenter who recommended that carbon steel tanks continue to be authorized for nitrating acid mixture. Therefore, special provision B28 has been deleted from nitrating acid mixture.

RSPA and FRA agree with the commenter who suggested that special provision B10, concerning leak tight packagings, should be deleted, since all packagings should be leak tight. Therefore, special provision B10 in § 173.101 and all references to B10 in § 172.101 are deleted. RSPA and FRA agree with the two commenters who recommended that the current requirements for protective housing on hydrogen fluoride multi-unit tank car tanks be continued. Therefore special provision B46, has been added for hydrogen fluoride." Special provision B26 has been modified to clarify that bottom outlets are not authorized on phosphorus tanks. Special provision T37 for tert-butyl hydroperoxide is deleted because the provision is relocated to § 173.225(o). New special provisions T43, T44 and T45 have been added to permit the use of specific IM portable tanks configurations for the transport of liquid materials poisonous by inhalation. New special provisions 41 and 53 provide exceptions from the requirement for a subsidiary EXPLOSIVE label for certain packages for self-reactive materials.

Entries in Column 9 reflect new quantity limitations detailed in the 1991/1992 ICAO Technical Instructions. The vessel stowage requirements in Column 10 are updated to account for the 25th Amendment to the IMDG Code. RSPA also consolidated proposed Columns 10A and 10B into a single stowage Column 10A, using letter designations instead of numbers. This was done to allow space for more entries and to be consistent with the IMDG's format for stowage descriptions. Stowage descriptions in the consolidated Column 10A are organized under stowage categories "A" through "E" Authorized stowage locations specified in the consolidated Column 10A are defined in 172.101(k). In the final § 172.101 Table, Column 10C ("Other stowage provisions") is relabeled Column 10B and contains additional notes. Each code in Column 10B is defined in § 176.84. Some notes in this column have been deleted and condensed into general regulatory provisions where the requirement is oriented to a particular class or group of materials.

4. Appendix to § 172.101: List of Hazardous Substances and Reportable Quantities

The appendix to § 172.101 has not been revised in this final rule. However, RSPA has been unable to determine if any of the new shipping names appear as hazardous substances or if any of the shipping names that have been removed also appeared as hazardous substances. Therefore, even if a material has the footnote "*" or "@", shippers must examine the § 172.101 Table to determine if the hazardous substance appears as a proper shipping name.

5. Subpart C; Shipping Papers

Several commenters suggested that, under § 172.202(a)(2)(ii), subsidiary hazard classes should be required, not just permitted as an option, after the numerical hazard class on shipping papers. As proposed in Notice 87-4 in § 172.202(a)(2)(ii), an option was provided to include the entry of class names, IMO class and division numbers, or the subsidiary hazard class on shipping papers. RSPA believes that shippers should be afforded the flexibility to include such information. Since a package containing a hazardous material meeting more than one hazard class is labeled (when required) with subsidiary hazard class labels in accordance with § 172.402, inclusion of subsidiary hazard classes on shipping papers is not necessary. Placarding for the subsidiary hazard class is not required except for packages containing a material which has a subsidiary hazard of being dangerous when wet (see § 172.505(c)).

The Air Transport Association of America (ATA) expressed concern regarding the sequence and content of information required on shipping papers as proposed in § 172.202. RSPA was encouraged to modify the sequence of elements in the shipping description, which the ATA stated conflicts with the established standard presentation of information by the worldwide airline convention. For example, under the ICAO Technical Instructions, shipping documentation information is as follows:

—proper shipping name
—hazard class or division number
—UN identification number
—quantity and type of packaging
—subsidiary risk(s), if any
—packing instruction or special provision, together with packing group

The order of the first three elements of the description, under ICAO, must always be in the correct sequence, which is, "Allyl alcohol 3 UN 1098". The

additional information, as shown above, must be included on the shipping documentation, however; the ICAO Technical Instructions do not address the sequence of this information on the documentation or whether the letters "PG" should precede the packing group for the material.

In Notice 87–4, RSPA proposed that the sequence and elements of information on a shipping paper must be shown as follows: (Inclusion of the class names, IMO class and division numbers, or subsidiary hazard classes, following the numerical hazard class on shipping papers, is optional.)

—proper shipping name
—hazard class or division
—subsidiary hazard class, etc. (optional)
—UN or NA identification number
—packing group (if any, displaying the letters "PG")
—total quantity

RSPA recognizes the use of the ICAO Technical Instructions for both domestic and international aircraft shipments. Under 171.11, if a hazardous material is packaged, marked, labeled, classified, described and certified on a shipping paper as required by the ICAO Technical Instructions, they are acceptable for domestic transportation in the U.S. by aircraft, and by motor vehicle either before or after being transported by aircraft. Therefore, for hazardous materials shipped in accordance with the ICAO Technical Instructions, the established presentation of information on shipping documentation can be used.

The AAR suggested that the proposed requirement to identify "Materials Poison-by-inhalation" on shipping papers is redundant regarding Division 2.3 materials and should be deleted. The AAR stated that, for Division 2.3 materials, it is obvious that a poison gas is an inhalation hazard.

RSPA disagrees. Communication of this fact to emergency responders and the general public is an important safety consideration. RSPA believes that the identification of "materials poisonous by inhalation", for Division 2.3 and for Division 6.1, Packing Group I materials on shipping papers and packages alert emergency responders of their presence and, in addition to identification numbers on shipping papers, a label on a package, or placards on a transport vehicle, assist in identifying the hazards of a material. When used in conjunction with emergency response information (e.g., the DOT Emergency Response Guidebook), the information provides quick and accurate identification of the material and precautions necessary to mitigate incidents involving hazardous materials. In Notice 87–4, the "Materials Poison-by-inhalation" shipping paper requirement is also extended to materials having primary receptacles of one liter (1.06 quarts) or less. RSPA believes any quantity of a material having an inhalation hazard that is spilled or leaking from a damaged package poses health risks to emergency response personnel.

The shipping paper requirements of subpart C of part 172 are changed to incorporate features found in the U.N. Recommendations. The use of class or division numbers replaces the words used to describe the present hazard, classes (e.g., "8" in place of "Corrosive Material" or "6.1" in place of "Poison B"). Packing group numbers are added to the basic description after the identification number (e.g., "PG II"), to indicate the level of packaging integrity required. The final rule allows the use of hazard class words (e.g., "Flammable liquid") to be used in addition to the required U.N. class (e.g., "3") or division numbers for shippers who wish to show both.

In Notice 87–4, RSPA proposed to add a new paragraph (f) to § 172.202 to include technical names of n.o.s. descriptions on shipping papers, which is currently done under the international system. Since publication of Notice 87–4, RSPA has published a final rule under Docket HM–126C that revised § 172.203(k) to include the additional shipping paper requirements for technical names of hazardous materials described by n.o.s. descriptions. In addition, under Docket HM–126C, paragraph (m) was added to § 172.203 to incorporate some of the requirements for poisonous materials which previously appeared in paragraph (k) of this section. Therefore, the proposal contained in Notice 87–4 to add paragraph (f) to § 172.202 to include the requirements for technical names for n.o.s. descriptions on shipping papers, is obsolete and withdrawn. In addition to the editorial changes to delete references to the § 172.102 Table and to the ORM–A, B and C hazard classes, the list of "n.o.s." descriptions in § 172.203(k)(3) of the HMR is revised to include "n.o.s." descriptions used in the international system. Specific changes are discussed in the following paragraphs.

Section 172.200. A proposal was made to revise paragraph (b) for clarity in Notice 87–4. Since publication of the proposal, paragraph (b) of this section was revised under Docket HM–198. The proposed revision in Notice 87–4 to paragraph (b) has been rendered obsolete and, therefore, is withdrawn.

Section 172.201. In § 172.201, in paragraph (a)(3), the word "subpart" is changed to "subchapter", paragraph (a)(4)(i) allowing the entry "IMO" or "IMO Class" on shipping papers, and (a)(4)(ii), allowing the additional hazard class(es) on shipping papers, are no longer necessary and are removed.

Section 172.202. In § 172.202, concerning descriptions of hazardous materials on shipping papers, paragraphs (a), (b), (c), and (d) are revised.

Section 172.203. In the "Hazardous Substances" final rule under Docket HM–145G, paragraph (c) of this section was revised. The proposed revision to paragraph (c) which appeared in Notice 87–4 is obsolete and, therefore, is withdrawn.

In the final rule under Docket HM–126C, paragraph (k) in § 172.203 was revised to include the technical name of materials described by "n.o.s." descriptions on shipping papers. The proposed revision in Notice 87–4 to add paragraph (f) to § 172.202 to include technical names on shipping papers has been rendered obsolete by the changes to § 172.203 in Docket HM–126C and is therefore withdrawn. Other changes made to this section under Docket HM–126C are as follows: Paragraph (i)(2) was removed, paragraph (i)(3) was redesignated as paragraph (i)(2), paragraph (1) was removed, and paragraph (m) was added to contain the additional description requirements for poisons. In this final rule in § 172.203, the example shown in paragraph (c)(2) and the section cite in paragraph (j) is revised. As proposed in Notice 90–12, paragraph (k) in § 172.203 is revised to require that the concentration be added to the shipping description for those organic peroxides which may qualify for more than one generic entry depending on their concentration, and paragraph (k)(3) is revised to include generic shipping names for organic peroxides. Also, additional "n.o.s." descriptions are included in paragraph (k)(3) for entries used under ICAO. Paragraph (m)(3) is revised to remove the exception for materials poisonous by inhalation in packagings containing inner receptacles of one liter capacity or less, and to add a sentence requiring entry of the words "Hazard Zone A", "Hazard Zone B", "Hazard Zone C", or "Hazard Zone D", as appropriate, on shipping papers for Division 2.3 materials and Division 6.1 materials based on inhalation toxicity criteria specified in the Table in § 173.133(a)(2).

6. Subpart D; Marking

A commenter questioned whether marking the proper shipping name on a portable tank serves a useful purpose where consumer tanks are concerned, particularly for liquefied petroleum gas, and also questioned the necessity of displaying the name of the owner on the tank. The commenter stated:

> * * * On the whole, attaching these markings to these tanks for transportation purposes is difficult and no one in the industry has an altogether satisfactory method to accomplish the literal requirements of the Regulations.
>
> * * * these tanks are portable in a sense but are not moved in transportation in the same manner as an MC-51 portable tank, as an example, nor are these tanks in anything at all like a similar service as where MC-51 tanks are used.

At present, the HMR requires portable tanks to be marked with the proper shipping name, and proposes in Notice 87-4 to continue this practice. RSPA believes that, because portable tanks are not permanently attached to the transport vehicles and are eventually removed from the vehicle, it is necessary to keep the requirement for marking the proper shipping name on the portable tank to identify the contents of the material for emergency response purposes.

Several commenters suggested that the phrase "at least" apply to the height of the markings for bulk packagings in § 172.302. RSPA agrees and has added the phrase "at least" to § 172.302(b). A commenter also suggested that the exemption marking required by paragraph (c) of this section include the size of the marking. RSPA believes this is unnecessary since the general size requirements for markings on bulk packages are contained in paragraph (b) of § 172.302.

Several commenters suggested that, although they cannot quantify the expense, RSPA should eliminate the proposal in Notice 87-4 to require marking of the technical name for n.o.s. descriptions on bulk packagings. RSPA agrees and in the final rule under Docket HM-126C, the requirements for marking the technical name for n.o.s. descriptions of hazardous materials apply only to non-bulk packages. However, shipping papers are required to contain the technical name of n.o.s descriptions for hazardous material for both bulk and non-bulk shipments to assist emergency response personnel in incidents involving hazardous materials.

Several commenters stated, relative to bulk containers and especially tank cars, that the requirement in § 172.303(a) to remove or obliterate package markings (i.e., proper shipping name and identification number, unless the package contains the hazardous material identified or its residue), would be impractical and costly. They stated that an empty tank car stencilled with a product name and either bearing placards or residue placards has caused no problems to date.

The communication of the identity of a hazardous material or its residue in a package is necessary to assist emergency response personnel at incidents involving hazardous materials. RSPA believes the misrepresentation that a material is in a package, when the package does not contain that material or its residue, leads to unnecessary confusion. In this final rule, however, in addition to the exception to permit the transport of such packages under certain conditions, when markings are not visible in transportation, a new paragraph (b)(2) is added to this section to permit transport of these packages when markings on a package are securely covered in transportation.

In Notice 90-5 (HM-181A), RSPA proposed to require that packages containing explosive materials be marked with the EX-number of the explosive contained therein. Several commenters objected to this proposal and stated that marking the EX-number on packages can be accomplished through markings already on the package, such as the manufacturer or product number, or the national stock number. One commenter stated that this marking should not apply to explosives shipped under the provisions of § 173.56(h) because they are not subject to the approval process, and therefore, are not assigned an EX-number.

RSPA believes that marking the ex-number on packages will increase the level of safety in transportation of Class 1 (explosive) materials. No regulatory action is effective without an efficient enforcement effort. Through the years, enforcement of the regulations dealing with the transportation of explosives has been hampered by the inability to compare actual explosives being transported with readily available approval information. Because the names, formulations, and dimensions of many explosives are quite similar, it is far more difficult to make a determination as to whether or not an explosive item has been approved. Marking the EX-number on a package containing Class 1 (explosive) materials will provide readily available information necessary to make such a determination. In addition, RSPA is aware that numerous carriers are already requiring shippers of Class 1 (explosive) materials to mark their packages with the applicable EX-number(s). In many cases, this has led to costly delays while the shipper tries to ascertain the EX-numbers for the products. Thus, through a more effective enforcement program, the level of compliance will increase which will, in turn, increase safety. Therefore, as proposed in Notice 90-5, a requirement to mark Class 1 (explosive) materials with an EX-number is adopted under this final rule.

RSPA agrees, however, with those commenters that the intended effect of marking EX-numbers on packages can be accomplished through alternative markings, such as national stock numbers or the manufacturer and product number. In this final rule, § 172.320 is modified to permit (except for fireworks approved in accordance with § 173.56(j)), in lieu of the EX-number, the marking of a product code or a national stock number, if it is traceable to the specific EX-number that has been assigned by the Associate Administrator for Hazardous Materials Safety. Traceability can be accomplished by providing RSPA with the product code or national stock number that is particular to the specific EX-number. Through this modification of § 172.320, RSPA has eliminated a substantial portion of the anticipated cost associated with this requirement, without removing any of its intended benefits.

In addition, a commenter stated that those explosives meeting the conditions of § 173.56(b) should be excepted from this requirement. RSPA agrees and has taken the commenter's concerns further by excepting any explosive which is not assigned an EX-number (e.g., unapproved explosives shipped for developmental testing in accordance with § 173.56(e), etc.) from this requirement.

Included on the list of excepted explosives are those which have been approved by the Bureau of Explosives and are shipped under § 171.19. However, RSPA has limited this exception to October 1, 1996, the compliance date of this final rule. Because this final rule substantially changes how an explosive material is described and classed, all explosives that are to be transported (including those shipped under the provisions of § 171.19), must be assigned a new shipping description by the Associate Administrator for Hazardous Materials Safety before the end of the compliance date of this final rule. When the Associate Administrator for Hazardous Materials Safety receives a request to reclassify an explosive material which has been shipped under the provisions

of § 171.19, the Associate Administrator for Hazardous Materials Safety will also assign an EX-number to that material. For further discussion of the reclassification of Class 1 (explosive) materials, the reader is referred to the discussion of subpart C of part 173.

RSPA also has modified §§ 171.11, 171.12 and 171.12a to require that packages shipped in accordance with these sections be marked in accordance with § 172.320. RSPA did not intend to allow conformance with other regulations (e.g., ICAO Technical Instructions) in lieu of the HMR and not subject these materials to § 172.320. Accordingly, RSPA has modified the aforementioned sections.

Section 172.301. Package marking requirements found in subpart D of part 172 are changed essentially as proposed in Notice 87–4, to reflect the features of the U.N. Recommendations. Section 172.301 contains general marking requirements for non-bulk packagings. Paragraph (a) specifies requirements for marking proper shipping names and identification numbers. The requirement to mark exemption numbers on packagings used under the terms of exemption is relocated from part 107 to § 172.301(c). As in the case of shipping papers, when an "n.o.s." proper shipping name is selected to describe a hazardous material, the technical name of the hazardous constituent or constituents (at least two) is required by § 172.301(b) to be marked on non-bulk packagings. Paragraph (d) contains requirements, proposed at § 172.306 in Notice 87–4, for marking the name of either the consignee or consignor on packages. This represents a relaxation of requirements for bulk packagings other than portable tanks, cargo tanks, and tank cars which previously were subject to this marking requirement. Paragraph (e) addresses previously marked packages, and paragraph (f) sets forth exceptions from marking requirements.

Section 172.302. Package marking requirements for bulk packagings are changed to reflect the features of the U.N. Recommendations. Section 172.302 contains general marking requirements for bulk packagings. The requirements for marking exemption numbers on bulk packagings used under the terms of exemption are relocated from part 107 to § 172.302. In § 172.302, minimum size requirements for markings on bulk packagings are added to include minimum height requirements of 100 mm (3.9 inches) on rail cars, 75 mm (3 inches) on cargo tanks and 50 mm (2 inches) on other bulk packagings. The proposal (Notice 87–4) for marking technical names for n.o.s. descriptions on bulk packagings is withdrawn for consistency with the requirements under Docket HM–126C.

Section 172.303. A new § 172.303 is added, essentially as proposed in Notice 87–4, containing a prohibition against offering or transporting a package marked with a proper shipping name or identification number unless the package actually contains the identified material or its residue. These provisions parallel existing provisions in § 173.29(d). Paragraphs (b)(1) and (b)(2) are added to include an exception when a marking on a package is not visible and when packages are securely covered in transportation.

Section 172.306. The requirements of this section are relocated to § 172.301, and the section is removed and reserved.

Section 172.308. This section is revised, essentially as proposed in Notice 87–4, to add a new paragraph (a)(3) to allow the use of abbreviations which appear as authorized descriptions in the § 172.101 Table.

Section 172.312. This section is revised for clarity and to require arrows for orientation markings, instead of "THIS SIDE UP" or "THIS END UP". These text statements cause confusion, such as when "THIS SIDE UP" appears on an end or "THIS END UP" appears on a side.

Section 172.313. A new 172.313 entitled "Poisonous hazardous materials", is added to subpart D. The requirement for permanently marking "POISON" on plastic packagings used for poisonous materials is relocated to this new section from § 173.24. The requirement for marking "Inhalation Hazard" on packages containing materials poisonous by inhalation is relocated from § 172.301 and is made applicable to both non-bulk and bulk packagings.

Section 172.316. This section is revised editorially for clarity and to delete references to the hazard classes ORM–A, B, C, and E.

Section 172.320. A new § 172.320, proposed in Docket HM–181A, entitled "Explosive hazardous materials", is added to subpart D. The new provision requires that packages be marked with the approval number (i.e., the EX-number) for the explosive. This will communicate to carriers that packages of explosives have been approved for transportation. Exceptions are provided for packages marked with a stock number or product code through which the EX- number can be determined.

Section 172.324. In § 172.324, the title and the introductory text preceding paragraph (a) are revised to clarify that the provisions are applicable only to non-bulk packagings.

Section 172.326. This section is revised to consolidate many of the existing provisions and relocate them to § 172.302. The remaining provisions in this section are revised editorially.

Section 172.328. This section is revised to consolidate many of the existing provisions and relocate them to § 172.302. The remaining provisions in this section are revised editorially.

Section 172.330. This section is revised to consolidate many of the existing provisions and relocate them to § 172.302. The remaining provisions in this section are revised editorially.

Section 172.331. This section is revised to consolidate many of the existing provisions and relocate them to § 172.302.

Section 172.332. In § 172.332, paragraph (c)(3) is revised as proposed in Notice 87–4 to prohibit the display of identification numbers on placards corresponding to the subsidiary, rather than the primary, hazard of a material. This is necessary to avoid confusion that may result from the display of identification numbers on subsidiary placards. The remaining provisions are revised to include metric measurements.

Section 172.334. This section is revised to permit display of identification numbers on POISON GAS placards, and to delete the phrase "§ 172.102."

Section 172.336. This section is revised to delete references to the hazard classes ORM–A, B, C, D or E and to include metric measurements.

7. Subpart E: Labeling

Package labeling requirements found in subpart E of part 172 are changed to reflect the features of the U.N. Recommendations. Numerous editorial and format changes are made for clarity and ease of use. Label graphics are revised to permit display of hazard class or division numbers in the lower corners of square-on-point labels. Size requirements on labels are changed slightly with regard to overall label size and inner border size to accommodate labels conforming to the U.N. Recommendations without rendering obsolete many labels which conform to existing HMR requirements. Use of text on labels, for other than Class 7, is optional. The EXPLOSIVE A, B and C, BLASTING AGENT, AND IRRITANT labels are removed. EXPLOSIVE 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 labels, an EXPLOSIVE subsidiary hazard label, and KEEP AWAY FROM FOOD and INFECTIOUS SUBSTANCE labels are added. Specific

changes are discussed in the following paragraphs.

Section 172.400. Section 172.400 is revised in its entirety. Paragraph (a) sets forth the types of packaging to which labeling requirements apply, i.e., non-bulk packagings, overpacks, freight containers, unit load devices, and certain "small" bulk packagings. Paragraph (b) sets forth, in tabular form, the labels corresponding to each hazard class and the applicable sections containing label designs. The EXPLOSIVE 1.5 label, which was adopted in the U.N. Recommendations following publication of Notice 87–4, is added to the table.

Section 172.400a. A new § 172.400a, proposed in Notice 87–4, sets forth exceptions from labeling requirements, which remain essentially unchanged. In Notice 87–4, RSPA inadvertently proposed to except all Division 1.4 Compatibility Group S (1.4S) explosive materials from the labeling requirements of the HMR. Though some Division 1.4S material should be excepted from labeling, RSPA does not believe it is in the interest of safety to except all Division 1.4S materials from labeling requirements. Therefore, RSPA has deleted the proposed exception in § 172.400a and has instead placed a "None" in the label column of the § 172.101 Table for those proper shipping names it feels do not require a 1.4S label.

Section 172.401. In § 172.401, paragraph (d), concerning labeling of packages containing samples, is removed because once the shipping name and hazard class are tentatively assigned for a material under the provision of the revised § 172.101(c)(11), the appropriate label is set forth in the § 172.101 Table.

Section 172.402. Additional labeling requirements in § 172.402 are revised to reflect numerical hazard class nomenclature. Paragraph (a) of § 172.402 is revised to propose labeling for multiple hazards which is consistent with chapter 13 of the U.N. Recommendations.

Section 172.403. Paragraph (e) addressing labeling for subsidiary hazards for radioactive materials is removed and its requirements are relocated to paragraph (c) of § 172.402.

Section 172.404. Section 172.404 remains unchanged.

Section 172.405. Section 172.405 is revised to make optional the display of hazard warning text (i.e., "POISON", "FLAMMABLE LIQUID", etc.) on labels for Classes 1, 2, 3, 4, 5, 6 and 8. For consistency with international requirements, the appropriate hazard class or division number must be displayed on labels representing the primary hazard class of the materials. Class or division numbers are not permitted on subsidiary hazard labels for the aforementioned classes. Existing provisions in § 172.405, for display of CHLORINE or POISON labels, is eliminated. Based on the merits of comments received, the OXYGEN label is retained as a domestic alternative to using NON-FLAMMABLE GAS and OXIDIZER labels on packages containing oxygen, compressed, and oxygen, refrigerated liquids.

Section 172.406. Section 172.406 is revised as proposed in Notice 87–4 for clarity.

Section 172.407. This section, dealing with placement of labels is adopted essentially as proposed in Notice 87–4. Changes to label designs accommodate labels made in conformance with IMO, ICAO, or U.N. label specifications and previous specifications in the HMR. These changes entail a minimum label size of 100 mm (3.9 inches) instead of 4 inches and a solid line inner border of 5.0 to 6.3 mm (0.2 to 0.25 inches) from the edge of the label. The height of the U.N. class or division numbers are minimum and maximum sizes of 6.3 mm (0.25 inches) and 12.7 mm (0.5 inches), respectively. Provisions permitting inscriptions required by the country of origin and, for import or export purposes, inscriptions on Explosives A, B and C labels, are removed and replaced by a revised paragraph (f) in § 172.407, which allows use of any label conforming to the U.N. Recommendations in place of the corresponding label in subpart E of part 172.

Section 172.411. In § 172.411, the EXPLOSIVE A, B, C and BLASTING AGENTS labels are replaced with EXPLOSIVE 1.1, 1.2, 1.3, 1.4, 1.5 labels conforming to the U.N. Recommendations, as proposed in Notice 87–4. A new EXPLOSIVE 1.6 label and an EXPLOSIVE subsidiary hazard label are added to this section, as proposed in Docket HM–181A.

Section 172.415. In § 172.415, the NON-FLAMMABLE GAS label is changed only to show hazard class numbers in the lower corners of the square-on-point designs.

Section 172.416. In § 172.416, the POISON GAS label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.417. In § 172.417, the FLAMMABLE GAS label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.419. In § 172.419, the FLAMMABLE LIQUID label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.420. In § 172.420, provision is made to permit text to be printed over the vertical stripes. The class number is displayed in the lower corner of the label.

Section 172.423. In § 172.423, the DANGEROUS WHEN WET label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.426. In § 172.426, the OXIDIZER label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.427. In § 172.427, the ORGANIC PEROXIDE label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.430. In § 172.430, the POISON label is changed only to show the hazard class number in the lower corner of the square-on-point design.

Section 172.431. A new § 172.431 is added to specify the design and color of the KEEP AWAY FROM FOOD label, also known as the St. Andrew's Cross label.

Section 172.432. In § 172.432, both IRRITANT labels are removed, as irritating materials are now classed as Division 6.1 poisons. A new § 172.432 is added to accommodate the INFECTIOUS SUBSTANCE label from the U.N. Recommendations.

Section 172.436. In § 172.436, the RADIOACTIVE WHITE–I label is changed only to show the hazard class number in the lower corners of the square-on-point designs.

Section 172.438. In § 172.438, the RADIOACTIVE YELLOW–II label is changed only to show the hazard class number in the lower corners of the square-on-point designs.

Section 172.440. In § 172.440, the RADIOACTIVE YELLOW–III label is changed only to show the hazard class number in the lower corners of the square-on-point designs.

Section 172.442. In § 172.442, CORROSIVE label is changed only to show the hazard class number in the lower corners of the square-on-point designs.

Section 172.444. The ETIOLOGIC AGENT label in § 172.444 is removed. A note in § 172.400 points out this label, specified in Department of Health and Human Services regulations, may be required for shipments of infectious substances.

Section 172.446. A new § 172.446 is added to adopt a CLASS 9 label for miscellaneous hazardous materials, for consistency with the U.N. Recommendations.

Section 172.448. The CARGO AIRCRAFT ONLY label (§ 172.448) remains unchanged. Size requirements are now specified in § 172.407(c). Therefore, § 172.448(b) is removed. Also, paragraph (c), containing obsolete provisions, is removed.

8. Subpart F: Placarding

The changes to the placarding requirements are similar to those for labeling. Editorial and format changes are made throughout the subpart for clarity and ease of use. Placard graphics are revised to display hazard class or division numbers on placards. Use of text (e.g., CORROSIVE, FLAMMABLE) on placards for classes 2, 3, 4, 5, 6 and 8 are optional. Minor changes are made to accommodate placards conforming to the U.N. Recommendations without rendering obsolete many placards which conform to previous HMR requirements. For those placards which are rendered obsolete by the new requirements, the transitional provisions in § 171.14 provide for their continued use until October 1, 1993.

Placards conforming with the U.N. Recommendations are essentially labels enlarged from 100 millimeters to 250 millimeters on edge. Symbols generally take up the upper half of the placard, with the lower half reserved for class or division numbers, hazard warning text and four-digit identification number. Placards conforming to subpart F of part 172 prior to this final rule measure 273 mm (10.8 inches) on the edge and have symbols in the upper third of the placard, with the middle third reserved for hazard warning text or four-digit, 88 mm (3.5 inches) high, identification numbers and the bottom third either left blank or used to display a 41 mm (1.6 inches) high hazard class number. In this final rule, the existing size graphics on placards are used to accommodate a 63.5 mm (2.5 inches) identification number. The use of graphics on placards sized in accordance with the U.N. Recommendations would necessitate a reduction in the identification numbers to approximately a 50.8 mm (2 inches) height, with potential for rendering the identification numbers more difficult to read in emergency situations.

Section 172.500. Section 172.500 is revised to delete references to etiologic agents and to ORM-A, B and C materials and to clarify that placarding provisions do not apply to combustible liquids in non-bulk packagings, materials packaged under the "small quantity" provisions of § 173.4, limited quantities, ORM-D materials, and infectious substances.

Section 172.502. Section 172.502 is revised, essentially as proposed in Notice 87-4, to specify the conditions under which: (1) Placards may not be displayed, (2) placarding is prohibited, and (3) placarding is permitted, even when not required.

Section 172.504. Section 172.504 is revised editorially for ease of use, and to present new placarding tables based on the numerical hazard classes proposed in this final rule. In § 172.504, a new entry, "EXPLOSIVE 1.6 * * * 172.525", is added to Table 2. A reference to the use of the OXYGEN placard is added in paragraph (f)(8).

Section 172.505. Section 172.505 is revised essentially as proposed in Notice 87-4. However, the erroneous reference to a placarding exception for certain poisons is removed from paragraph (a) for consistency with emergency communication requirements, found in §§ 172.203 and 172.313.

Section 172.506. Section 172.506 remains unchanged.

Section 172.507. Section 172.507 remains unchanged.

Section 172.508. In § 172.508, paragraph (a), addressing affixing placards to rail cars, is revised for clarity.

Section 172.510. In § 172.510, editorial changes are made to § 172.510, essentially as proposed in Notice 87-4. Paragraph (a) is revised to require that placards be displayed on square backgrounds on rail cars transporting Explosives 1.1 and 1.2 materials and Division 2.3 and 6.1, Packing Group I, Hazard Zone A materials, which are poisonous by inhalation under the criteria in § 173.133(a)(2), similar to previous requirements for Class A explosives and Poison A gases.

Section 172.512. In § 172.512, minor editorial changes are made.

Section 172.514. The provisions of § 172.514, applicable to bulk packagings other than tank cars, are adopted essentially as proposed in Notice 87-4. However, paragraph (c) has been added for consistency with § 172.400 to provide options for labeling "small" bulk packagings.

Section 172.516. The introductory text of paragraph (c) of § 172.516 is revised editorially and paragraph (c)(7) is added to require that a placard either be affixed to a background of contrasting color or have an outer border which contrasts with the background color.

Section 172.519. The format in § 172.519 is changed, essentially as proposed in Notice 87-4, for ease of use. For consistency with changes under Docket HM-166U, paragraph (a)(3) requires that the tagboard must have a weight of at least "175 pounds", and that includes waterproofing materials. In addition, rather than specifying 17 different heights for letters as currently in the HMR, a minimum height of 41 mm (1.6 inches) for hazard class numbers or text indicating a hazard is specified. Hazard warning text on placards for Classes 2, 3, 4, 5, 6 and 8 are optional. The hazard class or division number is required on a placard representing the primary hazard of a material and prohibited on subsidiary placards to aid in identifying the primary hazard of materials with multiple hazards. Except on the CORROSIVE and RADIOACTIVE placards, the placard color is permitted to extend to the outer edge rather than only to the inner border, as an optional means of conforming to placard color specification in the U.N. Recommendations. Exceptions to the placard specifications are provided for placards conforming to the U.N. Recommendations or the Canadian Transport of Dangerous Goods Recommendations to accommodate any minor differences in the placarding system.

Sections 172.522 through 172.558. In § 172.522 through 172.558, the specifications for placards are changed to reflect the revised placarding provisions. In addition, the section "172.525" is redesignated as "§ 172.526", and the new entry, "EXPLOSIVES 1.6, § 172.525", is added in the appropriate numerical sequence to Table 2. Accordingly, the section cite for the RESIDUE placard is changed to "§ 172.526". The placards deleted include EXPLOSIVES A (§ 172.522), EXPLOSIVES B (§ 172.523), BLASTING AGENTS (§ 172.524), CHLORINE (§ 172.536) and FLAMMABLE SOLID W (§ 172.548). The placards added include EXPLOSIVES 1.1, 1.2, and 1.3 (§ 172.522), EXPLOSIVES 1.4 (§ 172.523), EXPLOSIVES 1.5 (§ 172.524), EXPLOSIVES 1.6 (§ 172.525), SPONTANEOUSLY COMBUSTIBLE (§ 172.547), and DANGEROUS WHEN WET (§ 172.548). The KEEP AWAY FROM FOOD placard which was not in Notice 87-4, (11/6/87) is being added at § 172.553 in this final rule and § 172.560 is added to include a Class 9 placard for miscellaneous materials. The OXYGEN placard is retained in § 172.530. Hazard class numbers (or in the case of Division 5.1 and 5.2, division numbers) appear on all except the DANGEROUS placard in numbers proportionately sized to a height of 44.45 mm (1¾ inches) on full-

sized placards. For other than the CORROSIVE and RADIOACTIVE placards, placard colors are depicted as running to the outer edges in conformance with the U.N. Recommendations. The DANGEROUS (§ 172.521) and RESIDUE (§ 172.526) placards and the square white background in § 172.527 remain unchanged.

9. Appendices to Part 172

Appendix A to part 172 containing color tolerance charts and tables remain unchanged. Appendix B, containing dimensional specifications for placard designs, is removed. Appendix C, containing recommended dimensions for placard holders, remains unchanged.

D. Part 173: Shippers, General Requirements for Shipments and Packagings

Part 173 establishes general shipper responsibilities and requirements for all packagings and consists of five subparts. Under subpart B, shippers are responsible for ensuring that the packagings they use are suitable for shipping hazardous materials in the U.S. transportation environment. The subpart contains requirements for the preparation of hazardous materials for transport and sets forth general provisions for packages and packagings. It includes package reuse requirements and contains provisions for the qualification, preparation and maintenance of rail tank cars, cargo tanks and portable tanks.

Subpart C contains hazard classification, packaging and hazard communication requirements applicable to explosives, based on the U.N. Recommendations. The subpart sets forth new definitions and criteria for determining the classification of explosives in six divisions (1.1, 1.2, 1.3, 1.4, 1.5 and 1.6) of Class 1.

Subpart D contains definitions, classifications, packing group assignments and exceptions for materials other than explosives or radioactive materials, based on the U.N. Recommendations. Three divisions (2.1 flammable gas; 2.2 non-flammable, non-poisonous compressed gas and 2.3 poisonous gas) are established for gases in Class 2. The flash point range for the regulation of flammable liquids is extended to 60 °C (140 °F), but an optional domestic exception is provided, allowing shippers to reclassify liquids in the 38 °C (100 °F) to 60 °C (140 °F) range as combustible. A new hazard zone system is established for assigning the packaging of poisonous gases and liquids. New methods and criteria for classifying materials into Classes 4 (flammable solids, spontaneously combustible materials and materials dangerous when wet) and 5 (oxidizing substances and organic peroxides) are established, together with appropriate packaging assignments. Linked with the packaging authorizations in the § 172.101 Table, subpart E sets forth generic non-bulk packaging requirements for hazardous materials other than explosives and radioactive materials. Certain materials are addressed specifically in subpart E, others are generically assigned packagings based on the U.N. packing group principle that materials of similar hazard, chemical and physical properties generally are packaged in the same manner. Requirements for the high-integrity non-bulk containment of liquid materials poisonous by inhalation are included in this subpart.

Subpart F contains requirements for the bulk packaging of materials other than explosives and radioactive materials. It establishes a hierarchy of generic packaging assignments keyed by the bulk packaging authorizations in the § 172.101 Table. In this arrangement, materials are matched with groups of bulk packagings that provide generally equivalent levels of packaging integrity. Subpart F also specifically addresses the bulk packaging of certain materials.

1. Subpart A: General

Section 173.1. The section is adopted essentially as proposed in Notice 87-4. In § 173.1, a paragraph is added to indicate that, although the provisions in subchapter C of the HMR generally are based on the U.N. Recommendations and are consistent with the regulations of ICAO and IMO, they are not identical in all respects and compliance with the HMR will not guarantee compliance with international regulations.

Section 173.2. Section 173.2 is revised to list the various hazard classes, by class or division number and name, and to provide an index to the hazard class definitions which appear throughout part 173. The section is adopted essentially as proposed in Notice 87-4. A commenter stated that the listing of "irritating materials" in Division 6.1 of the § 173.2 Table may be erroneous because Notice 87-4 (May 5 preamble) refers to eliminating the "irritating materials" class. Consistent with the U.N., RSPA has moved this category of materials into Division 6.1, to be regulated as Division 6.1 Packing Group I and II liquids and solids. Thus, the entry in the § 173.2 Table for irritating materials is removed. In addition, all references to "ORM-E" materials are removed, as these materials are now regulated as Class 9 materials.

Section 173.2a. Section 173.2a replaces former § 172.2 and provides requirements for classification of hazardous materials with multiple hazards. The editorial revisions in this section reflect changes made to the PRECEDENCE OF HAZARD TABLE in the Sixth Edition of the U.N. Recommendations and include the following:

(1) A material with multiple hazards which is not specifically listed by name in the § 172.101 Table is classed according to the PRECEDENCE OF HAZARD TABLE in this section.

(2) Because of their unique hazard characteristics, the following materials are not classed according to the PRECEDENCE OF HAZARD TABLE because the primary hazard of these materials always take precedence—Class 1 explosives; all divisions; Class 2 gases, divisions 2.3, 2.1 and 2.2; Division 4.1, wetted explosives and self-reactive substances; Division 4.2, pyrophoric materials; Division 5.2, organic peroxides; Division 6.1, Packing Group I, inhalation toxicity materials; Division 6.2, etiologic or infectious substance; Class 7, radioactive materials.

(3) The PRECEDENCE OF HAZARD TABLE does not apply to Combustible liquids and Class 9 miscellaneous materials.

Section 173.3. Paragraph (a) of this section specifies that methods of manufacture, packing, and storage of hazardous materials, as well as methods of manufacture of DOT specification and U.N. standard packagings must be open to inspection by a representative of the Department. Paragraph (b) states that, in general, the regulations apply to all modes of transportation. Paragraphs (a) and (b) are adopted as proposed in Notice 87-4.

Paragraph (c) contains provisions for the use of salvage drums to transport packages of hazardous materials that are damaged or found leaking, and hazardous materials that have spilled or leaked. A drum used as a salvage drum must be a U.N. 1A2, 1B2, 1N2, or 1H2 drum, and must be marked and labeled. Additionally, cushioning and absorption material are required to prevent excessive movement of damaged packages, and to absorb free liquid. Notice 87-4 proposed that a salvage drum be marked for the performance standard commensurate with the packing group of the material it is to contain. Several commenters to Notice 87-4 urged RSPA to authorize the use of a "non-specification drum" as a salvage drum, as long as the drum has equal or greater structural integrity than an authorized package. They stated that to

do so would facilitate emergency response operations by not delaying containment of released hazardous materials because specifically named drums are unavailable at incident sites. Another commenter recommended that paragraph (c) recognize that most salvage drums, as shipped, have interior packagings and cushioning materials. The commenter said that determination of the U.N. standard that a salvage drum meets should be based on performance testing conducted with the drum prepared as shipped. A commenter suggested that salvage drums be required to meet performance standards, but that the performance standards be those for a drum intended for Packing Group II solids, with the addition of a "capability to withstand" a hydrostatic pressure test.

RSPA believes that drums used as salvage drums must meet some performance standards to ensure that they are capable of safely transporting damaged packagings or spilled or leaked hazardous materials. RSPA believes that testing is necessary to ensure the performance level. Because salvage drums are used in many different ways, from transporting damaged drums to containing a range of absorbent materials and spilled or leaked hazardous materials, RSPA believes it would be impractical to establish testing requirements based on intended service. However, because the salvage drum often will contain liquids, the drum must be tested with liquids. RSPA wants to encourage the use of salvage drums to minimize the hazards associated with damaged or leaked shipments of hazardous materials, and recognizes the difficulties associated with requiring that a salvage drum meet the performance standard for the material it is to contain. Therefore, in this final rule, a salvage drum must be a UN 1A2, 1B2, 1N2, or 1H2 drum tested and marked for the Packing Group III performance standard for a liquid with a specific gravity of 1.2, and with a hydrostatic pressure test of 35 kPa (5 psig).

A commenter objected to the proposed requirement in paragraph (c)(2) that sufficient absorption material be provided to "absorb all free liquid." The commenter stated that even if there is no free liquid at the time a salvage drum is closed, liquids can settle out during transportation or "squeeze out" of absorption material. The commenter suggested that the requirement be only that there be no free liquid at the time the drum is closed. RSPA accepts the commenter's suggestion, and the requirement is as suggested.

Section 173.3a. In Notice 87–4, RSPA proposed that this section contain references to hazard communication and packaging requirements for materials poisonous by inhalation which are prescribed in subparts C through F of part 172 and subparts D and E of part 173. RSPA believes this section is unnecessary and has removed it.

Sections 173.4 and 173.5. These sections, adopted essentially as proposed in Notice 87–4, are revised to conform to U.N. terminology (e.g., "Class 3" instead of "flammable liquid") and to include both U.S. standard and metric system measurements. In § 173.4, quantity limits are set at: (1) 30 milliliters for liquids and 30 grams for solids, other than Class 7 or Division 6.1 materials; (2) 30 milliliters for Division 6.1 poisonous liquids), Packing Groups II and III; and (3) for Packing Group I poisons, 1 gram for both liquids or solids. Provision has also been made for certain Class 9 materials to be transported under small quantity authorizations. This is to maintain consistency with the 1991–92 edition of the ICAO Technical Instructions and the next revision to the U.N. Recommendations.

Sections 173.6 through 173.11. These sections are adopted essentially as proposed in Notice 87–4. Section 173.6 is removed and requirements applicable to air shipments are consolidated in § 173.27. Sections 173.7 and 173.10 are revised editorially. A provision for use of an EPA-required placard instead of a FUMIGANT placard is added to paragraph (b) of § 173.9. No changes have been made to § 173.11.

Section 173.12. This section is revised to consolidate provisions applicable to the packaging of hazardous wastes. The section is adopted essentially as proposed under Notice 87–4. Under the "lab pack" exception in paragraph (b) in this final rule, U.N. standard packagings are required as outer packagings. A commenter urged RSPA to revise paragraph (b) to include the UN 4G fiberboard box. RSPA does not agree, and will not authorize a UN 4G fiberboard box to be an outer packaging under the "lab pack" provisions. Paragraph (b) is also revised to allow use of common motor carriers to accommodate numerous small shipments of lab waste. Several commenters recommended inclusion of Division 6.1, Packing Group I, materials in the lab pack exception, prohibiting only materials poisonous by inhalation. RSPA disagrees. The exception does not apply to Division 6.1, Packing Group I, materials. Provisions formerly in § 171.3 applying to use for open head drums and in § 173.28 applying to reuse of packagings for waste material are relocated to § 173.12 and the section is revised editorially.

2. Subpart B: Preparation of Hazardous Materials for Transportation

Section 173.21. Section 173.21 is rewritten to improve clarity and is adopted essentially as proposed in Notice 87–4. The categories of materials which are forbidden are expanded to include electrical devices which are likely to create sparks or generate a dangerous quantity of heat, unless the devices are packaged in a manner which precludes such an occurrence. Also forbidden is the packaging of any incompatible material (hazardous or non-hazardous) in the same packaging, freight container, or overpack if the mixing of these materials would be likely to cause a dangerous evolution of heat, flammable or poisonous gases or vapors, or to produce corrosive materials. This is similar to a provision previously in § 173.21(a) which addressed the mixing of two hazardous materials.

In response to comments on Docket HM–181D, § 173.21(f) is revised to authorize use of self-accelerating decomposition temperature (SADT) of 50 °C (122 °F) as the criterion for determining if a material should be subject to the provisions of § 173.21. This revised criterion is applicable to all thermally unstable materials, such as certain organic peroxides and self-reactive materials. In addition, the limitation of using only the U.S. version of SADT test method has been removed and shippers are authorized to use any of the SADT test methods prescribed in Part II of the U.N. Recommendations on the Transport of Dangerous Goods, Test and Criteria, Second Edition (1990). Therefore, the 173.223 Table on Method of Determining Control and Emergency Temperature is moved to § 173.21 and § 173.223 is removed and reserved.

Section 173.22. No changes to this section were proposed in Notice 87–4. For clarity, however, RSPA is adding a new paragraph (a)(4) to this section which requires persons preparing a package for shipment to bring that package into full compliance with part 178, based on the manufacturer's or subsequent distributor's notification.

Section 171.23. The provision for continued use of packagings marked "ICC" is relocated from § 171.14 to § 173.23(a). Obsolete provisions in § 173.23(a) concerning DOT–34 drums are removed.

Sections 173.24, 173.24a, and 173.24b. The standard requirements for all

packages which appear in § 173.24, as proposed in Notice 87–4, are revised and expanded into three sections in this final rule. Section 173.24 addresses general requirements applicable to all packages. Section 173.24a addresses general requirements unique to non-bulk packages and § 173.24b addresses requirements unique to bulk packages. General marking requirements for specification packages are relocated from § 173.24 to § 178.3. Some general requirements applying to the construction and composition of packagings are removed; others are relocated to the individual specifications in part 178.

Section 173.24. A statement of applicability appears in paragraph (a) to clarify that the section applies to all packagings used for hazardous materials: Specification and non-specification, bulk and non-bulk, and new and reused packagings. Paragraph (b) contains requirements for the preparation of packages so that under conditions normally incident to transportation, there will be no identifiable (without use of instruments) release of materials to the environment or reduction of package effectiveness. Paragraph (c) defines "authorized packaging". Paragraph (d) requires DOT specification and U.N. standard packagings to conform to the applicable Part 178 specifications and be capable of meeting the performance tests specified in subpart M of part 178. Paragraph (e) contains requirements for compatibility of packagings with their lading. Paragraphs (f) and (g) contain requirements for proper package closure and package venting, respectively. Outage and filling limit requirements are addressed in paragraph (h). Requirements for packages intended for air transportation are contained in paragraph (i). Paragraphs (c), (d), (f), (g), and (i) are adopted essentially as proposed in Notice 87–4.

RSPA's proposal in paragraph (b)(1) that there be no release of a hazardous material under conditions normally incident to transportation prompted substantial opposition from industry commenters. Many commenters urged RSPA to retain language in § 173.24(a)(1) that there be no "significant" release. Commenters offered no suggestion of how to define "significant" or how the term should be specifically applied.

Deletion of the term "significant" in Docket HM–181 may produce some simplification of the enforcement process, a commenter stated, "but it also establishes a highly unfair and inequitable standard, reducing compliance to a matter of fortuitous circumstance." Other commenters also contended that the "no release" provision would be difficult to comply with. They said enforcement officers would have a "legal license" to detain any shipment having a minor leak. Commenters said an infinitesimal release "would constitute evidence of non-compliance."

RSPA believes that a packaging should permit no release under conditions normally incident to transportation. Although RSPA acknowledges the commenters' concerns that the phrase "no release" may result in enforcement actions, RSPA believes that "significant" is unquantifiable and thus is modifying § 173.24(b)(1) in the final rule. Section 173.24(b)(1) is reworded to read: "There will be no identifiable (without use of instruments) release of the hazardous material to the environment."

"Puffs" and "spurts" from drum, jerrican or bag closures that re-close with no further leaks during package drop testing are permitted "recognized" releases in the final rule and are not to be considered failure of a package to comply with § 173.24(b)(1).

Requirements proposed in paragraph (e) regarding compatibility of plastic packagings with intended lading drew substantial comment. Although RSPA stated in paragraph (e)(1) that it is the shipper's responsibility to ensure that packagings are compatible with their lading, provisions were proposed in § 178.608 requiring packaging manufacturers to test plastic packagings for compatibility. Most commenters opposed RSPA's proposal to make compatibility testing a manufacturer's requirement in subpart M of part 178. A commenter recommended that the responsibility for determining chemical compatibility assurance be shifted from packaging manufacturers to shippers. The commenter also recommended that shippers be permitted to make a determination of chemical compatibility based on successful shipping experience, previous data and the properties of shipped materials.

Commenters especially objected to proposed requirements in §§ 178.602(g) and 178.608(b) that the samples used for compatibility testing should then be used for the required drop, stacking, hydrostatic pressure and leakproofness tests. Section 9.7.2.5 of the U.N. Recommendations also links compatibility testing with the required performance tests. Commenters stated that this requirement would be prohibitively expensive and burdensome. They pointed out that the test procedure in appendix B to part 173 was meant to be a stand-alone test not related to other performance testing. Many manufacturers also stated that they are not equipped to perform the compatibility test, lacking appropriate facilities to store, at elevated temperatures, containers filled with hazardous materials.

RSPA agrees with commenters who contended that the requirement for compatibility testing of plastic packagings more appropriately rests with shippers of hazardous materials. Shippers are more knowledgeable about the products they ship, are more prepared to respond to hazardous materials incidents involving their products, and are more likely to maintain facilities to perform compatibility testing, which involves long-term elevated temperature storage of plastic packagings and intended ladings. RSPA acknowledges that there is substantial data shippers can use to make compatibility determinations. However, RSPA believes that specific testing is necessary in certain instances to ensure compatibility, such as for extremely hazardous materials. In this final rule, proposals in §§ 178.602 and 178.606 for compatibility testing by the packaging manufacturer are withdrawn. The compatibility standard in § 173.24(e) is adopted essentially as proposed except that a provision has been added to § 173.24(e)(3) to require that the compatibility test be performed for packagings and receptacles intended for Packing Group I. Packagings for Packing Group II or III materials must be capable of withstanding the compatibility test. However, actual testing is not required if shippers have relevant shipping experience or existing test data. The compatibility test is a stand-alone test, not followed by performance tests.

Some commenters noted that the test procedures for determining chemical compatibility and rate of permeation may not be appropriate for materials, such as certain organic peroxides, which are thermally unstable. For such materials, even the lowest temperature test specified, 18 °C (64 °F), is not appropriate for storage for any period of time. These commenters recommended that compatibility testing be authorized at the "recommended storage temperature" for thermally unstable materials. This recommendation is not adopted in this final rule. The procedures for testing chemical compatibility and rate of permeation, as proposed in Notice 87–4 and adopted in this final rule, contain a provision for the use of alternative procedures if they yield a level of safety equivalent to the specified procedure and are approved

by the Associate Administrator for Hazardous Materials Safety.

RSPA received a late comment to Notice 87–4, suggesting an alternative method of testing for chemical compatibility and rate of permeation for polyethylene packagings. The alternative procedure includes a series of storage tests with reference liquids followed by the full performance testing specified in §§ 178.603 to 178.606. Laboratory testing on the polyethylene, comparing the chemical resistance of the plastic to the standard liquids and the liquid to be packaged, is then used to assess compatibility. RSPA believes that this proposal may have merit. However, RSPA has not had adequate time to fully evaluate the proposed procedure, and because the procedure was not proposed in Notice 87–4, other interested parties have not had the opportunity to comment on it. Therefore, the suggested alternative procedure is not included in this final rule. RSPA believes that some revisions to the requirements for determination of chemical compatibility and rate of permeation may be necessary, and will address the issue in a future rulemaking. As adopted in this final rule, paragraph (e)(3)(iii) authorizes alternative procedures if they are approved by the Associate Administrator for Hazardous Materials Safety.

A new paragraph (e)(5) is added to ensure adequate packaging integrity for a solid material which may become a liquid due to temperatures encountered during transportation.

Several commenters questioned paragraph (h)(1) that addresses the proposed reference temperature of 55 °C (131 °F) below which packagings must not be completely filled. This requirement applies to the expansion of liquid hazardous materials caused by temperatures likely to be encountered in transportation. Noting that existing § 173.116(b) applies a 130 °F reference temperature only to non-bulk packagings, commenters suggested that RSPA should only reference 55 °C for non-bulk packaging and multi-unit-tank-car-tanks. RSPA accepts that suggestion. Thus, in this final rule, the last sentence in proposed § 173.24(h)(1), indicating that liquids may not completely fill a receptacle at 55 °C (131 °F), is moved to § 173.24a(d). However, references to §§ 173.24a and 173.24b, which contain specific outage and filling limit requirements for non-bulk and bulk packagings, have been added to § 173.24(h)(1).

Section 173.24a. Non-bulk package design requirements addressing closure, thickness of construction material, securing and cushioning and capability of package design types to withstand the vibration test specified in § 178.608 are contained in paragraph (a). Filling limit requirements for non-bulk packages carrying liquids are established in paragraph (b). Provisions for transporting mixed hazardous materials in combination packagings are contained in paragraph (c).

RSPA's requirement in paragraph (a)(1), proposed in Notice 87–4, that drum closure devices be designed to assure that they cannot be incorrectly or incompletely closed, and to allow accessible checking, was opposed by numerous commenters. They stated that such a requirement is not necessary, and that is it not always possible to perform a check when a tamper-resistant seal is applied. Several commenters added that checking for proper closure is impossible after application of the tamper-proof cap seals now being required under DOT special approvals for shipments of materials poisonous by inhalation.

RSPA agrees with commenters that checking for proper closure may not be possible if tamper-proof seals are applied over closure devices. Therefore, in this final rule, RSPA is withdrawing the proposal in (a)(1) which stated, "A closure device must be so designed that it is unlikely that it can be incorrectly or incompletely closed, and must be such that it may be checked easily * * *" RSPA believes that § 173.24(f)(1) sufficiently addresses proper closure design, stating that closures are "to be so designed that they are * * * secure and leakproof."

Responding to several commenters who questioned the distinction between "inner receptacle" and "inner packaging" in Notice 87–4, RSPA is changing an incorrect reference to "inner receptacles" in paragraph (a)(1) to "inner packagings."

Comments on paragraph (a)(5) were divided over RSPA's proposal in Notice 87–4 to require that packages be capable of withstanding a one-hour base-level repetitive shock vibration test. Many commenters said the "capability to withstand" a vibration test is one area where it is worthwhile to deviate from U.N. Recommendations. One commenter said the base-level test should be referenced in both parts 173 and 178, and the test should be an initial design qualification for the manufacturer of package types and a shipper's package evaluation function.

Other commenters asserted that the vibration test ought to be mandated in part 178 solely as a design qualification test. One commenter stated that the addition of a vibration standard is a significant concept. Other commenters said a U.N. agreement should be reached on a vibration test before the U.S. requires the procedure. A commenter recommended that, until such an agreement is reached, RSPA should revise paragraph (a)(5) to require that the ability of packagings to withstand vibration testing be determined by "practical or successful shipping experience, or by passing an appendix C or a more stringent test."

Many commenters claimed that the procedure proposed in appendix C of part 173 may not adequately represent actual vibration conditions likely to be encountered in transportation. One commenter said the appendix C test is somewhat vague. Another commenter stated that the appendix C test fails to address potential damages that can occur in stacked packages from stacked resonant vibration experienced from over-the-road vibration. Many commenters, supporting vibration testing for manufacturers serving a fluid shipper market, urged RSPA to go further and consider vibration tests of greater amplitude, duration and variable frequencies, such as the ASTM Standard D 999–75 test.

Commenters to the 1982 ANPRM emphasized that U.N. test standards for non-bulk packages fall short of adequately simulating U.S. transportation environments. They said tests that simulate various conditions likely to be encountered, such as vibration, puncture and abrasion, are missing from U.N. Recommendations. For years, part 178 has required manufacturers to vibration test such plastic packagings as the DOT Specification 34, 2U, 2T, 2TL, 2S and 2SL. In Notice 87–4, RSPA proposed to extend vibration testing to all packagings to enhance the safety of hazardous materials shipments in a typical U.S. transportation environment of up to 50 hours per shipment.

Although the U.N. does not recommend a vibration test, RSPA believes a cost-effective, easily duplicated test is needed to screen out package designs likely to fail when subjected to continuous over-the-road vibration. RSPA rejects claims that the test specified in proposed appendix C is inadequate to account for what happens to packages subjected to vibration for up to 50 hours. Transportation environments produce random natural frequencies beyond the capability of any easily reproduced test. Poorly designed packages will not survive repetitive shocks, and RSPA believes that a one-hour test will sufficiently indicate a poor design.

The vibration test proposed in Notice 87–4 is not meant to be sophisticated or rigorous or to cover every anticipated transportation condition. It is intended to point out gross packaging deficiencies. However, RSPA acknowledges the concern of many commenters who claim the need for more sophisticated testing when designing packages for unique distribution conditions. Other vibration test methods are authorized provided they offer at least an equivalent level of testing and are approved by the Associate Administrator for Hazardous Materials Safety. RSPA agrees with commenters who believe that manufacturers are responsible for assuring that the packagings they produce can withstand the base-level test described in appendix C. RSPA also believes shippers have a similar responsibility. Thus, in this final rule, § 178.608 contains requirements that packagings produced by a manufacturer be capable of withstanding a vibration test. This requirement also is contained in § 173.24a(a)(5).

One commenter recommended that RSPA add a new sentence to paragraph (b) of § 173.24, comparable to Section 9.3.1 of the U.N. Recommendations, that "no harmful quantity of a dangerous substance should adhere to the outside of packagings." RSPA believes the U.N. language would be inapplicable to the transport of such materials as asphalt in cargo tanks and tank cars and therefore is adding a provision (4) to paragraph (b) of § 173.24a for non-bulk packagings and packages, stating: "No hazardous material may remain on the outside of a package after filling."

Section 173.24b. As proposed in Notice 87-4, this section contained general requirements applicable to the transportation of hazardous materials in all bulk packagings. Commenters pointed out that the requirements for pressure relief devices in paragraph (a) should not be applied to all bulk packagings and if applied to all bulk packagings would result in major retrofitting costs with no additional safety benefit. The commenters suggested that pressure relief devices be addressed in §§ 173.31 through 173.33 which contain specific requirements for the qualification, maintenance, and use of bulk packagings. RSPA agrees and has placed pressure relief device requirement in §§ 173.31 through 173.33 as appropriate.

Paragraph (a) contains outage and filling limits for all bulk packagings. Commenters to Notice 87–4 opposed the proposal to limit allowable outage in bulk packagings, stating that the minimum outage requirement should be 2%, as is presently required for some materials. In this final rule, RSPA is establishing a standardized minimum 1% outage for all bulk packagings. Shippers may offer hazardous materials ladings at outages exceeding 1%, but at no less than 1% outage. In Docket HM–181C, RSPA and FRA discussed in detail their rationale for the filling limits for tank car tanks mandated in this final rule.

Several commenters suggested that RSPA delete the requirement in proposed paragraphs (b)(1) and (b)(2) which stated "Tanks must not be liquid full at 131 °F (55 °C)." They claimed that this requirement was "arbitrary and not based on experience," adding that this requirement was inappropriate for large bulk equipment where the temperature of the lading will not reach 55 °C (131 °F) because the lading and tank act as a heat sink. RSPA agrees that is not necessary to specify that tanks must not be liquid full at 55 °C (131 °F) because we are specifying a minimum outage requirement; therefore the requirement has been deleted. Paragraph (b)(3), addressing the minimum outage requirements for liquids which are toxic by inhalation, is adopted as proposed in Notice 87–4.

Paragraph (c), as proposed in Notice 87–4, is redesignated paragraph (b) in this final rule. Several commenters pointed out that the formulas contained in this paragraph were incorrect. The commenters stated that the equivalence formulas incorrectly used stainless steel as the base reference material, and that the constants contained in the formulas were based on mild steel. RSPA agrees with the commenters and has revised the formulas to use stainless steel with a minimum tensile strength of 51.7 deka newtons per square millimeter (75,000 psi) and an elongation of 40% as the reference material. RSPA does not agree with other commenters who stated that it was not necessary to increase the minimum thickness of bulk packagings used to transport materials toxic by inhalation. These commenters stated that existing bulk packagings have been used to safely transport these materials for many years. While that may be true, RSPA has increased the overall integrity of all packagings used to transport materials toxic by inhalation to adequately address the hazards possessed by these materials.

Paragraph (d), as proposed in Notice 87–4 addressing heating coils on tank car tanks used to transport certain inhalation hazard materials, has been moved to § 173.31 because this is not a general requirement for all bulk packagings.

Two new paragraphs have been added to this section. Paragraph (c) restricts the use of air pressure to load or unload bulk packagings. This requirement was proposed in §§ 173.31 through 173.33 of Notice 87–4. Based on a comment review of these sections, paragraph (c) has been revised to prohibit the use of air pressure in excess of ambient atmospheric pressure. The bottom unloading of most flammable materials will continue to be authorized. Paragraph (d) contains the requirement proposed in §§ 173.31 through 173.33 of Notice 87–4 that the lading temperature be within the tank design temperature range and the weight of the lading, due to its density, not exceed the maximum weight of lading marked on the specification plate.

Section 173.25. In § 173.25, the section is adopted essentially as proposed in Notice 87–4. The provisions for overpacks are revised to require the use of orientation arrows in place of the "This side up" or "This end up" marking consistent with § 172.312. Also, the overpacking of Packing Group I corrosives and oxidizers with other materials is prohibited.

Section 173.26. Section 173.26 addresses quantity limitations on packagings. The section is adopted as proposed in Notice 87–4. Existing provisions for metric conversions are eliminated, as measurements are shown in SI units.

Section 173.27. Section 173.27 contains standard packaging requirements for transportation by aircraft. The section is adopted essentially as proposed in Notice 87–4. Paragraph (a) is revised to require that packagings for Packing Group III materials in Classes 4, 5, and 8 must conform to Packing Group II performance requirements for transportation by aircraft. Pressure requirements and requirements for use of absorbent materials for packagings used for liquids, based on the ICAO Technical Instructions, are added in paragraphs (c) and (e) respectively. One commenter suggested that all packaging requirements for transportation by aircraft be eliminated and use of the ICAO Technical Instructions should be mandatory. RSPA disagrees with the commenter and believes that provisions for transport in all modes should appear in the HMR without the need to refer to other sets of regulations. For combination packagings, quantity limitations for inner packagings appear in paragraph (f) in two tables, one for passenger aircraft and the other for cargo aircraft only, primarily based on the ICAO Technical Instructions and on the maximum quantity per package

authorized in the § 172.101 Table. As suggested by a commenter, paragraph (d) is revised to include an additional sentence: "Each screw-type closure on any packaging must be secured to prevent closure from loosening due to vibration or substantial change in temperature." Paragraph (g) contains provisions for transporting cylinders by aircraft, and paragraph (h) prohibits the transport of a tank car or cargo tank containing hazardous material aboard aircraft.

Section 173.28. Section 173.28 contains requirements for the reuse, reconditioning, and remanufacture of packagings. Because of changes to this section based on comments to Notice 87–4, the section has been reorganized. Paragraph (a) contains general requirements for the reuse of all packagings, and specifies that a packaging may not be reused unless it conforms in all respects with the requirements of the subchapter and it is free from incompatible residue or damage that reduces its structural integrity. Paragraph (b) contains requirements for the reuse of non-bulk packagings, including the general condition of the packaging, a leakproofness test for all packagings intended to be reused for liquids, and minimum thickness standards for reuse of metal and plastic drums and jerricans. Packagings made of paper, plastic film, or textile are prohibited from reuse. Paragraph (c) contains definitions of "reconditioning" of metal drums and other non-bulk packagings. Reconditioning is required if a packaging shows evidence of a reduction in integrity. Paragraph (d) defines "remanufacture" and states the requirements for the remanufacture of packagings, and is adopted as proposed in paragraph (c) in Notice 87–4.

Notice 87–4 did not specifically state that packagings must be reconditioned prior to reuse. A commenter noted that language regarding removal of residues and restoration of drum contour was not included in Notice 87–4. The commenter objected to this omission, indicating that these provisions are necessary to ensure that packagings are suitable for reuse. Some commenters recommended more specific procedures for requalifying, or reconditioning, used packagings for reuse.

RSPA believes that if a packaging shows evidence of a reduction in integrity from any cause, actions must be taken to restore the packaging to a condition such that it conforms in all respects to the requirements of the subchapter. For metal drums, this means using traditional reconditioning procedures such as cleaning and restoring to original shape and contour. However, RSPA believes that some packagings that show a reduction in integrity can be restored to a suitable condition by other means. For example, the inner cushioning material and partitions of a combination packaging can be replaced, and the outer fiberboard box can be reused if it has not been damaged. Some packagings cannot be restored, even if reconditioned. Therefore, in this final rule, paragraph (b)(1) specifies that a non-bulk packaging which shows evidence of a reduction in integrity must be reconditioned so that it conforms in all respects with the subchapter prior to reuse. Reconditioning is defined for metal drums with traditional reconditioning procedures. For other non-bulk packagings, reconditioning includes repairing a packaging or replacing non-integral packaging components such that the packaging conforms in all respects with prescribed requirements of the subchapter. A packaging which shows significant defects may not be reused.

Many commenters objected to the proposal in Notice 87–4 that all packagings be leakproofness tested before being reused for liquid hazardous materials. These commenters said the test is inconsistent with the U.N. Recommendations' 20 kPa (2.9 psig) leakproofness test requirements for Packing Groups II and III, which were proposed in part 178 for original manufacture of drums. Another commenter supported the proposed leakproofness test prior to reuse, but noted that Notice 87–4 did not require removal of all residues of prior contents before conducting the leakproofness test. The commenter contended that these residues can block holes in the packaging through which materials will leak once the packaging is refilled and vibrated in transportation.

Because of comments to the ANPRM from the reconditioning industry, RSPA proposed a 48 kPa (7 psig) leakage test to ensure that the test accounts for any residue which may mask leaks in a packaging. RSPA has found no evidence that drum performance is enhanced by removal of residues before a test if reuse involves the same material.

A commenter stated that packages now authorized for reuse should be excepted from the proposed leakproofness test before each reuse, citing an economic burden that is not justified by a corresponding safety benefit. It must be noted that leak testing was previously required prior to reuse of DOT Specification 17-series drums. Some DOT specification packagings were authorized for reuse without reconditioning, but these packagings had stringent minimum construction standards which ensured their adequacy for continued reuse. Because construction specifications are not established in this final rule, a leakproofness test is necessary to reassess the integrity of packagings. A leakproofness test is consistent with the U.N. Recommendations, which specify such a test prior to reuse for all packagings intended to contain liquids. RSPA believes a leakproofness test also is necessary before reuse or after reconditioning of plastic drums and jerricans to detect cracking, pitting, and gouges that might otherwise go undetected. The 48 kPa (7 psig) leakproofness test requirement is adopted in this final rule for plastic and metal drums and jerricans.

Many commenters urged RSPA to eliminate the reuse prohibitions which appeared in paragraph (a)(3) of Notice 87–4. These commenters objected most strongly to the prohibition against the reuse of packagings made of fiberboard. A number of commenters indicated that fiberboard packagings, particularly fiber drums, have been successfully reused for many years, and that to prohibit their reuse now would be inconsistent with commonly accepted industry practices. Furthermore, commenters asserted that the prohibitions against reuse would increase waste and disposal problems as well as increase packaging costs.

Notice 87–4 proposed to prohibit reuse of paper, plastic film, textile, and fiberboard packagings. These packagings generally cannot be properly restored by reconditioning. Plastic film containers are especially vulnerable to abrasions and punctures that would render them unreusable. Although RSPA is not certain of the possible effects of environmental moisture on the strength and transport safety of fiberboard containers, particularly fiberboard boxes, RSPA acknowledges that certain fiberboard packagings are designed and manufactured for reuse, and can successfully be reused. Therefore, in this final rule, fiberboard packagings are authorized for reuse, provided the conditions of § 173.28 (a) and (b) are met. RSPA emphasizes the need to reassess the integrity of fiberboard packaging prior to each reuse. A packaging may not be reused unless it can be restored to a condition such that it complies in all respects with the subchapter. Packagings made from paper, plastic film, or textile are not authorized for reuse.

Several commenters suggested that the use of a minimum thickness as a prerequisite for reuse, as proposed in paragraph (a)(4) of Notice 87–4, is appropriate only if the same minimum thickness requirement is applied to new construction. These commenters said that minimum thickness standards ought to be incorporated into Part 178 standards for new steel and plastic packagings. RSPA does not agree that a minimum thickness standard must be applied to new construction standards if there is a minimum thickness standard for reuse. A packaging may be capable of withstanding the prescribed performance tests, and be adequate to contain a hazardous material for a single journey. However, for repeated use, a minimum thickness standard must be established to ensure that the packaging can withstand the rigors of the transportation environment. RSPA believes that Chapter 9 of the U.N. Recommendations does not contain adequate provisions to ensure puncture and abrasion resistance over repeated use of a packaging; therefore, a minimum thickness requirement for reuse is included in § 173.28(b)(4). References to § 173.28(b)(4) and 178.503(a)(10) have been added to the standards for metal and plastic drums and jerricans (§§ 178.504, 178.505, 178.506, 178.509, 178.511) to advise manufacturers of these packagings that there is a minimum thickness requirement for reuse.

Other objections to the proposed minimum thickness standard for reuse were based on a concern that U.N.-certified packagings are not currently marked to indicate the thickness of the material of construction. Although Notice 87–4 contained a proposal, at § 178.503(a)(9), that metal or plastic drums or jerricans intended for reuse be marked with the wall thickness in millimeters, no such requirement appears in the U.N. Recommendations. Commenters stated that a large number of U.N.-certified packagings entering this country will not be authorized for reuse because of a restrictive U.S. minimum thickness standard which is not applied at the time of manufacture. These commenters contended that if the proposals under Notice 87–4 were adopted, thousands of foreign drums entering the U.S. marked U.N.-only would have to be scrapped for lack of minimum thickness and capacity markings. Commenters suggested that a thickness marking be required on all drums and jerricans to give container users the ability to discern the container's reuse potential for transportation in the U.S.

RSPA does not agree that the only way to determine foreign drum reusability in the United States is with a thickness marking applied at the time of manufacture. RSPA believes that reconditioners can measure foreign drum thicknesses to determine compliance with § 173.28(b)(4), and if a drum is reusable, apply their own thickness marks. Some commenters contended there is no way to measure the thickness of a packaging, such as a closed head IAI, without destroying the drum. RSPA believes that the thickness of a metal or plastic drum or jerrican can be determined without an actual external marking. Ultrasonic thickness testing, for example, can be used as a non-destructive method of thickness determination.

There is no recommendation to mark minimum thickness in Chapter 9 of the U.N. Recommendations, nor is there such a requirement in European or other foreign certification processes, where reconditioning is usually determined in third party laboratories by drum type and use. RSPA believes that to require all foreign manufacturers and shippers to apply an additional marking that addresses a purely domestic concern would comprise a barrier to trade. However, § 178.503(a)(10) is adopted into the final rule to require the marking of thickness on drums intended for reuse, as proposed in Notice 87–4. RSPA encourages the U.S. industry, in its relationships with foreign suppliers, to voluntarily have thickness marks applied in addition to U.N.-required marks.

One commenter said that proposed paragraph (a)(4) was unclear as to whether the marked thickness for packagings intended for reuse is the required minimum thickness for reuse, or the actual thickness of the drum at the time of manufacture. The thickness marked on the packaging is the actual thickness of the packaging at the time of manufacture or reuse. Certain areas of a packaging tend to be thinner than other areas of the packaging. Prior to reuse of a drum or jerrican, known thin areas should be checked to ensure the minimum thickness requirements are met.

A number of commenters suggested that minimum thickness requirements be established for reuse, but that these minimums recognize current steel drum construction practices in both the U.S. and in the European transportation system. Specifically, commenters suggested that drums equivalent to the 20/18 gauge drums currently used in the U.S. be authorized for reuse. Similarly, some commenters recommended that a thickness tolerance be permitted. These commenters stated that such a tolerance is necessary because some steel specifications permit slight variations in the thickness of the steel supplied to the customer. For example, the German DIN steel specifications allow, for a 0.50 mm sheet, steel thicknesses from 0.44 mm to 0.56 mm. RSPA believes that a minimum thickness, rather than a permissible range of thicknesses, is desirable. Moreover, RSPA believes that the steelmaking industry today can produce steel to very close tolerances. However, RSPA agrees that certain 55-gallon steel drums of a thickness less than that proposed in Notice 87–4 have been shown to be adequate for reuse. Specifically, steel drums currently used in the U.S. with 18 gauge body and 20 gauge heads have proven to be adequate for transportation and reuse within the U.S. Also, drums constructed of 0.96 mm steel (all 19 gauge) have been manufactured and successfully used under DOT exemption for many years. For these reasons, the table in § 173.28(b)(4) permits reuse of steel drums of 220 liter capacity with a minimum thickness of 0.96 mm (0.0378 inches). A note to the table permits reuse of a steel drum of 220 liter capacity with body constructed of 0.82 mm steel (0.0324 inch) and heads constructed of 1.09 mm steel (0.0428 inch) as an alternative.

Commenters from the plastic drum industry characterized RSPA's attempt to establish minimum thicknesses for plastic drums for reuse as inappropriate. Commenters contended that these drums do not abrade easily and are not subjected to "physically punishing" reconditioning treatments like shot blasting. One commenter stated that plastic drums are still evolving in terms of both design and materials. The commenter stressed that the regulations should be flexible enough to permit alternative designs and materials which may produce drums with a thinner wall, but which still meet the performance requirements. As an alternative, the commenter recommended that a five-year limit be placed on the in-use lifetime of plastic drums and jerricans, in accordance with paragraph 9.6.7.2 of the U.N. Recommendations, to assure that plastic drums cannot be improperly reused. They stated that a five-year mandatory retirement should be viewed as an outside limit on usefulness, not a guaranteed minimum.

RSPA does not believe that a five year limit on the in-use lifetime of plastic drums and jerricans is adequate to ensure that they are not improperly reused. RSPA believes that a five-year

life may be too long for plastic drums and jerricans used to transport some materials; however, there is no information to suggest that some plastic drums and jerricans cannot be safely used for longer than 5 years. Furthermore, Notice 87–4 did not propose a limit on the lifetime of plastic drums, and other interested parties did not comment on a possible limitation. In the absence of any specific information regarding criteria to be applied to determine the proper lifetime for plastic containers in various services, the final rule does not incorporate a 5-year limit on the in-use life of plastic drums or jerricans. However, RSPA would appreciate any information the industry can provide with regard to the performance of plastic drums and jerricans in transportation. Such information could be used at a later date to determine whether a limit should be placed on the in-use lifetime of plastic containers.

RSPA recognizes commenters' assertions that plastic drums do not abrade as easily as metal drums, and are not subjected to "physically punishing" reconditioning treatments. However, RSPA believes that chapter 9 of the U.N. Recommendations does not adequately address the abrasion and puncture resistance of plastic packagings. Therefore, a minimum thickness requirement for reuse of plastic drums and jerricans is included in § 173.28(b)(4). RSPA believes that the minimums specified are necessary to ensure that plastic drums and jerricans are sufficiently resistant to puncture and abrasion to be suitable for reuse. RSPA recognizes that technology is changing and there may be plastic resins available in the future which will produce thinner drums and jerricans which are suitable for reuse. When the plastic drum and jerrican industry realizes this technology, they should petition RSPA for a change in the minimum thickness requirements.

A commenter objected to the requirement proposed in paragraph (a)(5) of Notice 87–4, that for reuse, plastic inner receptacles of composite packagings must have a minimum thickness of 1.5 mm (0.059 inch). The commenter stated that a large percentage of existing inner receptacles of composite packagings do not meet this requirement. RSPA does not believe that a plastic inner receptacle with a thickness of less than 1.5 mm is suitable for reuse. These inner packagings are vulnerable to damage, such as creasing or puncture, during loading and unloading which may render them unreusable. The commenter did not present adequate justification for authorizing the reuse of plastic inner receptacles of composite packagings with a thickness less than 1.5 mm; therefore, paragraph (b)(5) is adopted as proposed in paragraph (a)(5) of Notice 87–4.

Several commenters pointed out that a provision to permit the reuse of certain packagings without reconditioning, for the shipment of hazardous wastes, was not incorporated into § 173.28 in Notice 87–4. Packagings marked NRC or STC have been authorized for reuse for the shipment of hazardous wastes by highway only to designated facilities, provided the package is held for 24 hours prior to transportation and inspected for leakage after the 24 hours. That provision was moved in Notice 87–4 to § 173.12(c), in the "Exceptions for waste materials," and is adopted in this final rule. For clarity, a reference to § 173.12(c) is included in § 173.28(b)(6).

A commenter suggested that paragraph (c) be clarified to indicate that performance tests are necessary only to verify the validity of the conversion of a packaging from one type or specification to another, and that testing for every converted drum is not required. RSPA's intent in paragraph (c) is to require that samples of each design type of remanufactured packaging be tested in accordance with part 178. Packagings fabricated by different manufacturers constitute different designs. Therefore, samples of each remanufactured packaging and each original packaging manufacturer must be tested in accordance with part 178 to the appropriate Packing Group level.

Several commenters recommended that RSPA add a requirement that reused packagings which have not been reconditioned be marked "RU", to show that someone made a determination that the packaging was suitable for reuse without reconditioning. They recommended that the name or symbol of the person marking "RU" also be marked on the packaging. As written in this final rule, any packaging which is leakproofness tested in accordance with § 173.28(b)(2) or reconditioned in accordance with § 173.28(c) must be marked with the letter "R" and the name and address of the "reconditioner." RSPA believes that a marking "RU" would not be consistent with the U.N. Recommendations, may interfere with the required markings and may be confused with the marking "R", which indicates that a packaging has been reconditioned. Further, RSPA believes that few non-bulk packagings will be reused without being "reconditioned" as defined in § 173.28(c). Therefore, no additional marking requirements for reused packagings have been included in this final rule.

Section 173.29. The section is adopted essentially as proposed in Notice 87–4. A provision has been added to paragraph (b)(1) to allow a hazardous material shipping name, identification number, hazard warning label or placard to remain on an empty package if securely covered while in transportation. A commenter recommended that paragraph (a) should be modified to not require that heater coil inlet and outlet pipes of empty tank car tanks be tightly closed. Another commenter suggested adding a new § 173.29(g) to specify that "it is the responsibility of each person tendering [an empty] tank car [tank] to ensure that each opening into the tank * * * [is] secured wrench tight and free from leakage of liquid and vapor." RSPA and FRA believe that these changes are outside the scope of this docket.

Section 173.31. As proposed in Notice 87–4 and Docket HM–181C, § 173.31 contained additional provisions applicable to the qualification, maintenance, and use of tank cars. In this final rule, the previous inadvertent deletion of paragraphs (a)(8), (a)(9), and (a)(10) in Notice 87–4 has been corrected and the paragraphs renumbered as (a)(14), (a)(15), and (a)(16). The proposed changes in the requirements that certain tank cars be equipped with coupler vertical restraint systems have been deleted, because those changes were promulgated in a final rule under Docket HM–166W. Based on the merits of comments received on this section, the minimum tank test pressure requirements in paragraph (a)(14) have been amended: (1) To permit the use of tanks whose tank test pressure was at least 133 percent (rather than 160 percent) of the sum of the lading vapor pressure at the reference temperature plus static head plus gas padding pressure; and (2) to exempt certain refrigerated or cryogenic liquids from the provisions of § 173.31(a)(15). The requirements proposed in (a)(9) and (a)(11), concerning the temperature of a hazardous material lading and the use of air pressure to load and unload a hazardous material, have been moved to § 173.24b, because these are general requirements pertaining to all bulk packagings. Paragraph (a)(15), addressing pressure relief devices, has been revised to clarify that: (1) Multi-unit tank car tanks may be equipped with non-reclosing devices; (2) single-unit tank car tanks carrying certain commodities may not be equipped with non-reclosing devices; and (3) single-unit

tank car tanks built before January 1, 1991, and equipped with non-reclosing devices may continue to be used. One commenter recommended that the prohibition on breather holes in frangible discs for tank car tanks transporting hydrofluoric acid and mixed acid be continued. In none of the previous notices in this docket was there any authorization for breather holes for those commodities. However, for clarity, § 173.31(a)(15) has been revised to include an explicit prohibition on the use of breather holes unless such holes are specifically authorized. The proposal in § 173.24b of Notice 87–4, addressing the heating coil requirement for tank cars, has been moved to paragraph (d) of this section because it applies only to tank cars.

Section 173.32. As proposed in Notice 87–4, § 173.32 contained additional provisions applicable to the qualification, maintenance, and use of portable tanks other than Specification IM portable tanks. The requirements addressing the temperature and density of a hazardous material lading and the use of air pressure to load and unload a hazardous material proposed in Notice 87–4 have been moved to § 173.24b because these are general requirements pertaining to all bulk packagings. In paragraph (a)(6), equivalency provisions are added to permit the use of DOT 51 portable tanks where DOT 56, 57, or 60 tanks are authorized and use of DOT 60 portable tanks where DOT 56 or 57 tanks are authorized. Based on the merits of comments, RSPA has revised the requirements which address the design pressure of a portable tank, for consistency with similar requirements for cargo tanks contained in § 173.33. Several commenters objected to the requirement to use portable tanks with a 25 psig design pressure for all ladings with multiple hazards. It was recommended that RSPA limit this requirement to commodities in Packing Groups I or II. RSPA agrees, and this requirement has been modified in paragraph (r) to apply to only those liquid ladings in Packing Groups I or II. With the exception of DOT Specification 56 and 57 portable tanks, RSPA is retaining the requirement, contained in paragraph (s), for the use of reclosing pressure relief devices on portable tanks used for Class 3, 4 or Division 6.1 materials (proposed § 173.24b(a) of Notice 87–4). However, this requirement will only apply to tanks manufactured and certified after January 1, 1992. The issue of required relief devices for DOT Specification 56 and 57 portable tanks, which under the international system are defined as intermediate bulk containers (capacities of 450–3,000 liters), will be addressed in a subsequent rulemaking on IBC containers. In the interim, RSPA is not revising any existing commodity assignment for DOT Specification 56 or 57 portable tanks.

Section 173.32c. As proposed in Notice 87–4, § 173.32c contained additional provisions applicable to the use of Specification IM portable tanks. RSPA is requiring the use of reclosing pressure relief devices on portable tanks used for Class 3, 4 or Division 6.1 materials (§ 173.24b(a) of Notice 87–4). However, this requirement will only apply to tanks manufactured and certified after January 1, 1992. Additionally, this section is revised editorially to implement inclusion of the IM Tank Table in § 172.102.

Section 173.32d. As proposed in Notice 87–4, this section is deleted. With the consolidation of the IM Tank Table into the Hazardous Materials Table the section is no longer needed and is removed.

Section 173.33. This section has been revised for consistency with requirements introduced under Dockets HM–163 and 183A. Notice 87–4 proposed the addition of new paragraphs (l) through (q). In this final rule, proposed paragraphs (l) and (p) are moved to § 173.24b, and proposed paragraphs (m) and (q) have been promulgated in a final rule under Docket HM–183. Proposed paragraphs (n) and (o) are now redesignated in this section as paragraphs (f) and (g), respectively. Equivalency provisions are addressed in paragraph (f) to permit an MC 331 to be used where an MC 306, MC 307, MC 312, DOT 406, DOT 407 or DOT 412 cargo tank is authorized and to permit use of an MC 307, MC 312, DOT 407 or DOT 412 where an MC 306 or DOT 406 cargo tank is authorized. Several commenters objected to having to use cargo tanks with a 25 psig design pressure for all ladings with multiple hazards. It was recommended that RSPA limit this requirement to commodities in Packing Groups I or II. RSPA agrees and this requirement has been modified to apply to only those liquid ladings in Packing Groups I or II. The requirements concerning the temperature and density of a hazardous material lading and the use of air pressure to load and unload a hazardous material have been moved to § 173.24b because these are general requirements pertaining to all bulk packagings. Therefore, paragraphs (b)(2)(ii) and (iii) are removed and reserved.

Section 173.40. This section, adopted as proposed in Notice 87.4, is added to implement general packaging requirements for use of cylinders for materials poisonous by inhalation. The requirements are similar to those contained in § 173.327.

3. Subpart C: Explosives

In Notice 87–4, RSPA stated that explosives would be a major factor in considering the desirability of performance oriented packaging standards to replace specification packagings. On May 2, 1990, RSPA published Docket HM–181A (Notice 90–5; 55 FR 18438) which supplemented the rulemaking initiated under Notice 87–4 by proposing to revise requirements of the HMR and by modifying certain proposals of Notice 87–4, applicable to explosives, based on the U.N. Recommendations. A correction notice on Docket HM–181A was published in the Federal Register on June 15, 1990 (55 FR 24350).

The U.N. explosives classification system has replaced the previous system in the HMR. Hazard class designations consist of two numbers, separated by a period, and followed by a letter. The first number denotes the Class number (Class 1 is for explosives) and the second number denotes the Division number within the class. The letter denotes the Compatibility Group. The combination of the two numbers and letter forms the classification code. For example, classification code 1.2B denotes Class 1, Division 2, Compatibility Group B.

A "packing method" is assigned to each explosive listed in the § 172.101 Table. Certain unique domestic packaging provisions have been accommodated in the § 172.101 Table.

Classifications for new explosives are based on the U.N. classification methodology, except for the definition of Division 1.4. This methodology includes sequential steps for classifying explosives, test methods, and criteria used for assigning classification codes.

Division 1.4 is based on the U.N. methodology; however, as proposed under Docket HM–181A the maximum quantity of detonating explosive authorized in a device in this division is limited to 25 grams (0.9 ounce) and the Division is limited solely to devices (i.e., no substances). Without this limitation, a large explosive device containing as much as 250 grams (8.8 ounces) of cast TNT could be classified as Division 1.4. RSPA believes such a classification is unacceptable for transportation. The HMR previously limited detonating devices which were Class C (i.e., the equivalent to the U.N. Division 1.4) to 25 grams of explosive materials. RSPA believes that the proper classification

for explosive devices containing more than 25 grams (0.9 ounce) of a detonating material is Division 1.1 or 1.2, depending on the hazard characteristics of the device. However, the 25 gram (0.9 ounce) limitation does not apply to devices containing deflagrating explosives.There were several commenters who objected to this proposal. The RSPA response to them can be found below under the discussion of § 173.50.

A section containing descriptions of terms for explosive materials and articles is provided for information.

Proper shipping names for explosives are based on those listed in Chapter 2 of the U.N. Recommendations. Many explosive materials are described using specific technical names for proper shipping names rather than by generic descriptions, such as "high explosive", "low explosive", or "propellant explosive".

Certain explosive materials are unique to the U.S. explosives industry. Shipping descriptions, classifications, and handling requirements for these materials have been retained, although authorized for domestic transportation only. One commenter objected to those shipping names in the § 172.101 Table that are not found in the U.N. Recommendations. The commenter stated that the § 172.101 Table should only contain proper shipping names that are recognized by the applicable international regulations. RSPA does not concur because there are explosives that are unique to the U.S. (e.g., ANFO) that are more appropriately classed, described and packaged by their domestic shipping description.

Several commenters objected to the 1.1A classification for PETN and mannitol hexanitrate. The commenters requested that the classification for these materials be 1.1D which is the classification given by the U.N. Recommendations. It is RSPA's opinion that these two materials should be classed as 1.1A because of their extreme sensitivity to mechanical impact. In the Bureau of Explosives impact tester, these materials explode under a drop of less than 4 inches. The U.N. Recommendations require that both of these materials be shipped wet with water, indicating that they are too sensitive to ship dry. Both of these materials have been considered as initiating explosives for many years in the U.S. Therefore, RSPA has classified these materials as 1.1A.

Hazard communication requirements are consistent with those of the U.N. Recommendations.

"EX numbers" are now required on the outside of each package of Class 1 material. Discussion of the comments in response to the proposal to require EX-numbers on packages can found under the discussion of § 172.320.

RSPA received 21 comments in response to Docket HM–181A. The majority of the comments were in support of the general proposal to align the HMR explosive regulations with the U.N. Recommendations. Some commenters took issue with some of the more specific proposals which are discussed below under the appropriate section headings. Comments were also received to other sections of the regulations which Docket HM–181A affected (e.g., § 172.320). Discussion of these comments can be found under the appropriate section headings.

Several commenters requested further guidance on the reclassification of already approved explosives. Commenters were concerned that an explosive that had already gone through the expense of testing and classification under the HMR, would have gone through further testing in order to receive a new classification and shipping description under the new regulations.

As stated in Docket HM–181A, RSPA will, upon request, provide a new classification for those explosives that had been classified under the old system. In order to be transported, any explosive that has been approved by RSPA prior to the effective date of this final rule, will need to be reclassified into the new system prior to the compliance date of the communication requirements of this final rule (i.e., October 1, 1993). RSPA will need a letter requesting the reclassification, and the applicable "EX-number", 1280 number or Bureau of Explosives report. RSPA believes that it will be able to reclassify explosives based the data it already has on file. Except in some very rare situations, RSPA does not foresee that already approved explosive devices or material will require additional testing.

In addition, all existing explosives competent authority approvals will become invalid on October 1, 1993, the compliance date of this final rule. Therefore, it will also be necessary for those who ship explosives under the ICAO Technical Instructions to receive a new competent authority which identifies the product with its newly adopted shipping classification. It is recommended that this request accompany the request for reclassification. Because of the large number of reclassification requests that RSPA anticipates, it is necessary that such requests are submitted in timely manner to allow RSPA sufficient time to respond.

Section 173.50. This section, which is adopted essentially as proposed under Docket HM–181A, defines explosives and each division for explosives. In the new classification system, explosives are Class 1 and are further divided into six divisions, namely Divisions 1.1, 1.2, 1.3, 1.4, 1.5, and 1.6. Each division, except for Divisions 1.4 and 1.6, covers explosive substances as well as explosive devices and articles.

Several commenters objected to the entries in the § 172.101 Table for Ammonium nitrate (UN 0222) Division 1.1D and Ammonium nitrate fertilizer (UN 0223) Division 1.1D. Commenters were concerned about the perception that these classifications could give to enforcement authorities and codes and standards organizations. Commenters were concerned that these organizations would apply the 1.1D classification to all ammonium nitrate fertilizers. RSPA believes that a real problem could exist if ammonium nitrate fertilizer (UN 0223) was left in the § 172.101 Table, though it does not believe such a problem exists for ammonium nitrate. Therefore, in response to these comments, RSPA has deleted ammonium nitrate fertilizer (UN 0223) from the § 172.101 Table. However, RSPA has not deleted Ammonium nitrate (UN 0222) from the § 172.101 Table.

Several commenters to Docket HM–181A objected to the proposal of limiting devices containing detonating explosives in Division 1.4 to 25 grams of detonating explosive material and not including substances in the Division. Commenters argued that in order to maintain consistency with the U.N. Recommendations, RSPA should not limit Division 1.4 to 25 grams of detonating material. Commenters stated that RSPA did not provide any technical reason to eliminate articles or substances over 25 grams and that RSPA currently approves explosives as Class C (the functional equivalent to Division 1.4) when they contain more than 25 grams of explosives material.

In this final rule, RSPA has decided to amend the HMR so that it is aligned with the U.N. Recommendations. Several reasons have already been given for these changes some of which are to enhance safety through better classification and packaging and to promote flexibility and technological innovations in packaging. However, it has never been RSPA intention under these Dockets to reduce the level of safety previously provided by the HMR. It is RSPA's opinion that the level of safety currently afforded the public would be decreased if Division 1.4 explosives were allowed to be shipped

containing more than 25 grams of detonating explosive per device. The following are several examples of how some very powerful explosives could be classed as Division 1.4.

A military demolition block usually consists of a half pound block of cast TNT with a cap well in it. These blocks cannot be initiated with a number 8 blasting cap (They can be initiated with an engineers' cap). Thus, in test 6a, a negative result would be obtained and it would not be necessary to run test 6b. The blocks would just burn without explosion in test 6c and would then be candidates for Division 1.4. It is highly questionable whether devices containing a half pound of TNT should be in Division 1.4. A whole truckload of these could move as Division 1.4.

A similar situation exists with what are called "oil well cartridges" in 49 CFR and "charges, shaped, commercial" in the U.N. Recommendations. In 49 CFR, the maximum quantity of explosive allowed in one device is 350 grains, or 22.7 grams. We have allowed as much as 38 grams in a device under the provisions of an exemption. However, we do not know the maximum quantity which can be in one of these devices and still pass through the test procedure and exit as Division 1.4. It would depend on the packaging. If the devices were sufficiently separated from each other, they could pass the 6a test and test 6b would not be necessary. They would burn off in test 6c without explosion. This might allow devices containing 2 pounds or more of high explosive to be transported as Division 1.4.

The present "Detonating fuzes, Class C" provides another example. If the fuzes are packaged so that the detonation of one in the package will not cause "propagation", the package passes the 6a test. The 6b does not have to be run and if the fuse is of the "safe and arm" type, it is quite possible that the aluminum screens will not be perforated in the 6c test. Here again, relatively large fuses could be classed Division 1.4.

Mild detonating fuzes in 49 CFR (cord, detonating, mild effect in the U.N. Recommendations) has quantity restrictions limiting the amount of explosive in one unit to 25 grams. The U.N. Recommendations testing procedure could allow much larger unit quantities to be shipped as Division 1.4.

Commenters also made the point that limiting the quantity of explosives would put them at a competitive disadvantage with foreign producers. They did not, however, provide any specific examples of this having happened. Also, this limitation has been in 49 CFR for many years and if it were causing loss of business in foreign countries, the U.S. producers could have petitioned RSPA, or the ICC, for a change a long time ago.

In order to maintain the level of safety provided by the shipping requirements for Class C explosives under the previous regulations, RSPA finds it necessary to deny the commenters' request to delete the proposed limitation of 25 grams of detonating explosives and to allow substances into Division 1.4.

Section 173.51. This section, which is adopted essentially as proposed under Docket HM–181A, requires that all explosives be tested and approved as specified in the HMR prior to shipment.

Section 173.52. The compatibility group letters and classification codes for explosive articles and substances are included in this section, which is adopted essentially as proposed under Docket HM–181A. Except for Division 1.4 Compatibility Group S (1.4S), the compatibility group letter of an explosive item is assigned by definition, as specified in Table 2 of this section. The division numbers are based on the results of the testing of the explosive. Altogether there are 35 classification codes in this new system as compared to only four categories in the current classification system.

Section 173.53. The previous classification system served as a basis for categorizing hazardous materials outside of the transportation environment. This is particularly true for explosives. Thousands of state and local governments have issued requirements for the handling, storage and use of explosives using the previous classification system and descriptions for explosives, particularly in ordinances or codes related to fire safety for storage facilities. Therefore, RSPA is adding § 173.53 to provide a cross reference between the new classification codes and the old classifications for explosives. This will provide for the continued use of the existing classifications for explosives in non-transportation situations.

Section 173.54. This section, which is adopted essentially as proposed under Docket HM–181A and which is equivalent to old § 173.51, lists those categories of explosives which must not be transported.

Section 173.56. This section, which is adopted essentially as proposed under Docket HM–181A, contains the definition for a new explosive. As defined, the definition of a new explosive, which is essentially the same as it was previously defined in § 173.86, is broken into two parts. First, any explosive that has not been approved by the Associate Administrator for Hazardous Materials Safety for the specific manufacturer thereof is considered a new explosive, even though the explosive has been produced previously. A common misunderstanding has been that if a given explosive has been manufactured or used for some period of time, then it is not a new explosive. This is not correct. For example, "black powder" is a well known explosive. However, black powder may not be offered for transportation by anyone unless the manufacturer thereof has obtained an approval from the Associate Administrator for Hazardous Materials Safety. One manufacturer's approval may not be used by another. Secondly, any explosive whose formula or manufacturing process has been modified that results in an alteration of any of the properties of that explosive, is considered a new explosive. To reduce the compliance burden, RSPA has added a provision for designated laboratories to determine if the changes made by a manufacturer actually alter the properties of an explosive to such an extent as to affect safety and to warrant testing of the explosive as a new explosive.

This section also provides procedures which are equivalent to those found in the previous § 173.86 for examination, classifying, and approving new explosives. Two laboratories, the Bureau of Explosives and the Bureau of Mines, are designated as authorized to examine and recommend classification codes for explosives. The Department of Defense (DOD) and the Department of Energy (DOE) are authorized to classify those explosives made by or under the supervision of DOD or DOE. Included in this section are provisions allowing for the shipment of explosive samples to testing laboratories for the purposes of testing and evaluation.

One commenter requested that a weight limitation be put on the shipment of explosive samples to testing agencies. RSPA believes that the testing agency (e.g., Bureau of Explosives) should inform the manufacturer of the quantity limitation of an explosive sample in conjunction with issuing a tentative approval for shipping samples for testing.

Section 173.57. This section, which is adopted essentially as proposed under Docket HM–181A, contains criteria for specific tests required for substances to be classed as new explosives. Tests for ammonium nitrate-fuel oil mixtures are also included. Additional criteria for determining if a substance is a forbidden explosive are also provided.

Section 173.58. This section, which is adopted essentially as proposed under

Docket HM-181A, prescribes the specific tests and criteria which must be satisfied for assigning a classification code to a new explosive.

Section 173.59. This section, which is adopted essentially as proposed under Docket HM-181A, provides nomenclature clarification and descriptions for certain terms and types of explosives. This listing is provided for general information and should not be used as a determining factor when selecting proper shipping descriptions for explosives.

Section 173.60. This section, which is adopted essentially as proposed under Docket HM-181A, provides general packaging requirements for all explosives.

Section 173.61. This section provides conditions under which explosive substances are authorized to be packaged with other materials. This section has been modified from the proposal in Docket HM-181A in order to utilize the compatibility group letters for determining appropriate mixed packaging and loading requirements.

Section 173.62. Specific packaging requirements for each explosive are provided in this section, which is adopted essentially as proposed under Docket HM-181A. The section is divided into three parts; the first part sets forth a table of explosives, in which each explosive is listed in numerical order by its identification number followed by a packing method. The second part provides the detailed packing requirements for each packing method and the third part provides additional packing requirements or exceptions to each packing method, if appropriate.

Several commenters to Docket HM-181A were concerned about RSPA's proposal to identify packing methods in a different manner than that of the U.N. Recommendations. Commenters stated that the U.N. Recommendations system of identifying packing methods are well established and that converting to a "U.S." system could only lead to errors in conversion and reference. RSPA concurs with the commenters and has removed most of the "U.S." identifiers in § 173.62(c). However, there are a few packing methods that are unique to the U.S. and, since there are not any equivalent U.N. Recommendation packing methods, have been prefixed by the letters "U.S.".

Section 173.63. This section, which is adopted essentially as proposed under Docket HM-181A, provides exceptions for packaging and transporting certain explosives domestically, where the equirements are different from those specified in the U.N. Recommendations.

As stated above, this section has been adopted essentially as proposed under Docket HM-181A. However, several paragraphs have been moved, though the intended effect of the section has not changed. Paragraph (c), which discussed the reclassification of smokeless powder as a flammable solid, has not been adopted because there is proper shipping name and classification in the § 172.101 Table which refers the reader to § 173.171. Section 173.171 covers the issues that had been proposed under paragraph (c) of § 173.63. Proposed paragraph (f), the ORM-D exception for cartridges, small arms, has not been adopted because the general ORM-D section in § 173.230 already handled that exception. In its place can be found an exception for detonators which had been proposed as a particular packaging requirement/exception in § 173.62(d). In response to comments, RSPA has moved that exception to § 173.63. Proposed paragraph (g) has not been adopted because those requirements can now be found in packing method US073 in § 173.62(c). In its place can be found another exception for detonators that had been proposed as a particular packaging requirement/exception in § 173.62(d). This exception has been moved to § 173.63 in response to comments received to Docket HM-181A.

4. Subpart D: Definitions, Classification, Packing Group Assignments and Exceptions for Hazardous Materials Other than Class 1 and Class 7

Subpart D is revised to contain definitions, packing group assignments, and exceptions for all of the hazard classes, excluding explosives and radioactive materials. For the most part, hazard class definitions are based on the U.N. Recommendations.

a. Class 2—Gases

Section 173.115. RSPA is dividing Class 2 into three divisions as follows: Division 2.1 flammable gases, Division 2.2 non-flammable, non-poisonous compressed gases, and Division 2.3 poisonous gases. This approach is consistent with the IMDG Code which subdivides Class 2 into these same divisions for storage and segregation purposes (see 5.1.2 of the IMDG Code). While the current U.N. Recommendations do not address divisions for gases, the U.N. is expected to adopt an approach very similar to this final rule.

Paragraph (a) defines Division 2.1 (flammable gases) as: (1) A gas under ambient conditions (i.e., 101.3 kPa (14.7 psia) and 20 °C (68 °F)), and (2) flammable. The flammability criteria referring to flammability limits come from existing regulations (§ 173.300(b)(1)). The test methods listed in paragraphs (b)(2), (b)(3), and (b)(4) of § 173.300 have been replaced by ASTM E681-85 Standard Test Method for Limits of Flammability of Chemicals.

Paragraph (b) defines Division 2.2 (non-flammable, non-poisonous compressed gases) in terms of the pressure that a gas exerts on the container. The defining pressure level is 280 kPa (41 psia) at 20 °C (68 °F). The definition applies to gases that do not meet the definition of Division 2.1 or 2.3.

A Division 2.3 poisonous gas is defined in paragraph (c) as (1) a gas at ambient conditions (as in the case of Division 2.1) and (2) toxic. The toxicity of a Division 2.3 material is based either on known human experience, or on laboratory tests on unspecified animals. It either is listed in the chemical literature, or is revealed through testing, as having a lethal concentration (LC)-50 not exceeding 5,000 parts per million (ppm). Paragraphs (d), (e), (f), (g), (h), (i) and (j) define other terms used in the classing of gases, and are adopted essentially as proposed in Notice 87-4.

Commenters to Notice 87-4 supported RSPA's proposed three-division approach to Class 2, saying that it makes sense to accept the three-division precedent (2.1, 2.2, 2.3) established by the IMO in the IMDG Code. However, a number of commenters suggested that the "POISON" label used for toxic gases should "really stand out" in Docket HM-181 by sharply distinguishing truly poisonous gases from other toxic gases. They recommended that gases grouped in Division 2.3 should be restricted to those exhibiting LC50 values of 1,000 ppm or less where the mechanism causing death is a less significant factor. They recommended that gases showing LC50 values between 1,001 and 3,000 ppm would be classed according to whether they cause systemic poisoning or corrosive action to pulmonary tissue. A gas causing systemic poisoning would then get a subsidiary risk "POISON" label; and a gas causing corrosive action would get a subsidiary "CORROSIVE" label. Gases exhibiting LC50 readings greater than 3,001 ppm would be classed "flammable" or "non-flammable" with no subsidiary risk labeling.

RSPA disagrees with the commenters' recommended scheme of classification. In comments to Notice 87-4, industry did not conclusively show why 3,000 ppm is a logical cut-off point for the classification of toxic gases. RSPA believes that a 1,000 ppm cut-off for poison gas as a primary hazard and 3,000 ppm for the remaining toxic gases fails to account for a number of

materials considered to be very hazardous, including carbonyl sulfide, boron trichloride, hydrogen bromide, and hydrogen chloride. The 5,000 ppm upper limit for gases proposed in § 173.115(c)(2) is consistent with the U.N.'s 5,000 ppm cutoff for Packing Group III liquids. RSPA maintains that 5,000 ppm is a logical breakpoint for gases. The hazard presented by the dispersability of gases is greater than that of liquid vapor. Thus, for this final rule, RSPA is retaining the 5,000 ppm LC50 upper limit in the definition of Division 2.3 toxic gases in § 173.115(c)(2). The Compressed Gas Association and other commenters strongly supported the development of an industry consensus on the toxicity values of common "pure" gases, to be published by RSPA as an appendix to part 173 in Docket HM-181. They claimed that precise knowledge of LC50 data for pure gases would enable shippers of industrial gases to calculate the toxicity of thousands of gas mixtures, eliminating full LC50 testing for every gas mixture, using animals.

RSPA believes that the development of an industry consensus on LC50 values for pure gases would produce much useful information on the classification of pure gases and mixtures and that the data deriving from this effort should be widely shared. RSPA particularly encourages industry to update existing general sources of LC50 data, such as the National Institute of Occupational Safety and Health's *Registry of the Toxic Effects of Chemical Substances* (RTECS), with new information. If industry reaches a consensus on LC50 standards for Division 2.3 gases, RSPA will consider incorporating the results.

The Hazardous Materials Advisory Council (HMAC) suggested in comments to Notice 87-4 that RSPA split Division 2.2 into two subdivisions: "asphyxiant" and "oxidizer" to account for hazards resulting from container breaches that could asphyxiate workers in a confined work space. HMAC also argued that no account was taken in Notice 87-4 of the volatility of an oxidizing gas that has breached containment.

RSPA finds no conclusive reason to subdivide Division 2.2 into "asphyxiant" and "oxidizer". RSPA also concludes that a primary "oxidizer" hazard class should not precede the primary "poison" hazard class of such gases as chlorine or fluorine that are both poisons and oxidizers. In this final rule, RSPA requires subsidiary "oxidizer" labels for "oxidizing" gases as specified in Column 6 of the § 172.101 Table. One commenter recommended that RSPA revise paragraph (a)(2) to require use of the most current ASTM method for determining flammability ranges. RSPA agrees and has revised this section accordingly.

Proposed classification criteria for poisonous gases in Notice 87-4 resulted in over 1,100 comments. Most of these were directed at the proposal to change the classification of anhydrous ammonia from a non-flammable gas to a poison gas. Hundreds of farmers, state and local farm bureaus, cooperatives, fertilizer producers and other industries using ammonia in their processes claimed that reclassification of anhydrous ammonia to a poison gas would substantially increase transportation and insurance costs. Commenters also pointed out that transportation and uses of anhydrous ammonia products are essentially safe. As a result, RSPA published a supplemental notice on November 14, 1988 to clarify the proposal, suggest possible regulatory alternatives and request further comment. RSPA considered the following options: (1) Leave anhydrous ammonia as a non-flammable gas; (2) retain the poison gas classification as proposed in Notice 87-4; (3) classify anhydrous ammonia as a corrosive gas, similar to Canada's corrosive gas classification; or (4) keep anhydrous ammonia a non-flammable compressed gas, but identify a subsidiary hazard. RSPA rejected the option of reclassifying anhydrous ammonia a corrosive gas because it would create an important inconsistency with the U.N. system, complicate the total classification system and would require creating a new classification category that may affect the classification of other materials. RSPA also believes a reclassification of anhydrous ammonia to corrosive gas may foster similar perceptions of health hazards resulting in increased insurance and transportation costs.

RSPA carefully analyzed available literature to determine if the reclassification of anhydrous ammonia is warranted. Although such data as RTECS indicates that anhydrous ammonia has an LC50 below the 5,000 ppm, others do not. The data shows a range of LC50 values from about 4,000 ppm to 16,500 ppm. In addition, RSPA's Hazardous Materials Incident Report data from 1971 through March 1989 show 19 deaths and 533 injuries resulting from incidents involving anhydrous ammonia.

Based on its review, RSPA believes a poison gas classification would be the best way to communicate the hazards of anhydrous ammonia. However, given the extremely large volume of anhydrous ammonia that is transported in the U.S. and the extensive worker knowledge of its hazards, RSPA allows that classifying anhydrous ammonia as a non-flammable gas linked with a requirement of an inhalation hazard label would provide adequate hazard communication, at substantially less cost and disruption to the agricultural and industrial users of this material. Thus, RSPA is classifying anhydrous ammonia a Division 2.2 non-flammable, non-poisonous compressed gas for domestic shipments. Anhydrous ammonia is classified as a Division 2.3 poison gas for international shipments. Because of the documented inhalation hazards of anhydrous ammonia when released in large quantities, RSPA also is requiring the words "INHALATION HAZARD" on packages and shipping papers, in addition to other current hazard communication requirements.

Section 173.116. In this section, four hazard zones based on levels of toxicity replace the packing group assignments proposed in Notice 87-4 for Division 2.3 poisonous gases. The four Hazard Zones A through D, numerically referenced in the § 172.101 Table, indicate special packaging, operating and communication provisions for these materials.

Commenters noted that the packing groups proposed in Notice 87-4 appear to serve little purpose since there are no packing groups (or even divisions) for gases (Class 2) in the U.N. Recommendations, IMO's IMDG Code or ICAO's Technical Instructions. RSPA agrees that retaining actual packing groups for Division 2.3 gases would be inconsistent with the U.N. system. However, RSPA believes that, for domestic operations, a hazard ranking method similar to packing group assignments is required to ensure that appropriate packaging and communication provisions are maintained. Therefore, RSPA is establishing four Hazard Zones for Division 2.3 gases: Hazard Zone A for gases with an LC50 value of less than or equal to 200 ppm; Hazard Zone B for gases with LC50 values greater than 200 ppm and less than or equal to 1000 ppm; Hazard Zone C for gases with an LC50 value greater than 1000 ppm and less than or equal to 3000 ppm; and Hazard Zone D for gases with an LC50 value greater than 3000 ppm and less than or equal to 5000 ppm.

RSPA also is removing Packing Group notations from Division 2.3 poison gas descriptions in Column 5 of the Hazardous Materials Table in § 172.101. Specific packaging instructions for Division 2.3 materials for the four groups

of gases are numerically referenced by commodity (1 for Hazard Zone A; 2 for Hazard Zone B; 3 for Hazard Zone C; 4 for Hazard Zone D) in the Special Provisions Column (7).

b. Class 3—Flammable Liquids

Section 173.120. This section contains definitions of liquids classed as "flammable" in Class 3 and described as "combustible", based on the flash point of liquid materials. This section also sets forth testing methods for determining the flash point of liquid materials. Paragraph (a) defines "flammable liquid" as a material with a flash point of not more than 60 °C (140 °F) and provides exceptions for materials meeting one of the definitions in § 173.115, certain flammable liquid mixtures, and distilled spirits. Paragraph (b) defines "combustible liquid" as a liquid material with a flash point at or above 60 °C (140 °F) and below 93 °C (200 °F). An optional domestic exception is established allowing shippers to reclassify a flammable liquid with a flash point between 38 °C (100 °F) and 60 °C (140 °F) as "combustible liquid". The definition of flash point is given in paragraph (c) with test protocols for determining the flash point of pure liquids and liquid mixtures. These paragraphs are adopted essentially as proposed in Notice 87–4.

Comments to Notice 87–4 regarding proposals in § 173.120 to extend the upper flash point criteria for defining a flammable liquid were largely divided between supporters favoring adoption of the U.N. flammable liquid definition and those who opposed elimination of the combustible liquid classification. Most major export shippers backed RSPA's proposal to achieve regulatory uniformity and facilitated trade by extending the flash point range for flammable liquids to the U.N. standard of 60 °C (140 °F). RSPA is adopting the U.N. definition of flammable liquid in § 173.120(a) as proposed.

A number of commenters contended that expanding the flammable definition without maintaining a domestic exception for combustible liquids would subject many materials to Federal, state and local fire code regulations for the first time, thereby seriously impairing domestic commerce. A domestic exception provides shippers the option of reclassifying materials as "combustible" in the 38 °C (100 °F) to 60 °C (140 °F) flash point range thereby maintaining the current transport provisions for these materials. Commenters opposing the combustible liquid reclassification exception warned of needless complication if RSPA were to maintain dual domestic/export-import standards.

A commenter asserted that a domestic exception continues the present confusion between U.S. and international regulation and increases the potential for non-compliance. The American Association of Railroads (AAR) said, "It makes more sense to exempt all flammable liquids with flash points above 38 °C (100 °F) from the appropriate regulations to ensure consistency." Other commenters generally supported the domestic exception, but opposed the combustible liquid reclassification option. The Airline Pilots Association opposed the exception because packages of 38 °C (100 °F) to 60 °C (140 °F) flash point materials could inadvertently enter the air cargo network if shippers misinterpret the set of options.

Other commenters opposed the domestic exception because they said it would lead to identical materials being classified differently, confusing shipping clerks and enforcement and emergency response personnel. Although different classifications for the same materials occur under the exception, RSPA believes the domestic exception creates little or no confusion on the part of those already dealing with a dual packaging and marking system. The exception will not hamper enforcement or emergency response personnel who are trained in the use of the HMR, U.N. identification numbers, the identification of materials using DOT's placarding scheme, and the DOT's Emergency Response Guidebook.

RSPA is aware of the concerns of commenters who stated that the domestic exception violates an intent of Docket HM–181 to achieve regulatory harmony. However, RSPA believes this variance from U.N. Recommendations is necessary. To the extent possible, Docket HM–181 should not disrupt shipping and in-transit storage practices geared to Federal, state, local and industry fire code regulations and standards based on DOT rules and definitions in existence since 1974. The option to reclassify 38 °C (100 °F) to 60 °C (140 °F) flash point liquids as combustible liquids is consistent with the way these materials have been regulated, transported, and stored for years and should cause no confusion. Therefore, in the interest of minimizing economic impacts, while maintaining an existing level of domestic safety, RSPA is retaining the exception in § 173.120(b)(3). RSPA emphasizes that 38 °C (100 °F) to 60 °C (140 °F) flash point materials may be shipped as a flammable liquid (as required for international shipment) or be reclassified as a combustible liquid for domestic shipments.

Several commenters supported the elimination of DOT's combustible class altogether. Commenters noted that the U.N. classification system has no combustible liquid category, and that combustible liquids do not present a problem in rail transport. Other commenters either supported the continued regulation of 60 °C (140 °F) to 93 °C (200 °F) flash point liquids as combustible and suggested that DOT petition the U.N. to add the combustible liquid class, or they recommended that RSPA refrain from maintaining this class in Docket HM–181 until the U.N. considers a DOT petition and agrees with it.

RSPA disagrees with commenters who would eliminate the combustible class altogether. The significant number of traditionally regulated materials having flash points between 38 °C (100 °F) to 93 °C (200 °F) cannot be ignored. When this classification was proposed in Docket HM–102 in 1974, the Materials Transportation Bureau agreed with a number of commenters to that docket that, although materials in this class have flash points higher than "credible" ambient temperatures, and are less likely to ignite than regulated flammable liquids, their vapors can ignite when exposed to elevated temperatures. Thus, RSPA is retaining the combustible liquid class description both as a domestic option for liquids with flash points between 38 °C (100 °F) and 60 °C (140 °F) and as a requirement for liquids with flash points between 60 °C (140 °F) and 93 °C (200 °F). Retaining the combustible class description should also help to eliminate confusion regarding use of Class 3 for materials which are classed as flammable liquids and those that are described as combustible materials.

Several commenters urged RSPA to eliminate the proposal in § 173.120 (b)(1)(ii) and (b)(2) to regulate liquids with flash points over 93 °C (200 °F) as combustible if they are shipped at or near their flash point temperatures. Subsequent to the publication of Notice 87–4, RSPA issued a proposed rulemaking addressing the shipment of materials at or above their flash points as well as other "elevated temperature" materials. Thus, because the proposal in (b)(1)(ii) and (b)(2) is addressed in another rulemaking, it is removed from this final rule.

Section 173.121. This section contains assignment of packing groups for materials in Class 3, based on their volatility and ignitability. Paragraph (a) assigns packing groups to Class 3 materials using the flash point and

boiling point criteria found in the U.N. Recommendations. Special procedures for classing and assigning packing groups to viscous liquids, found in the U.N. Recommendations, are contained in paragraph (b). These paragraphs are adopted as proposed in Notice 87–4.

c. Class 4 and Class 5—Flammable Solids, Oxidizers, and Organic Peroxides

This final rule expands and improves the definitions of materials in Classes 4 and 5. It describes methods and criteria for classifying a material into Class 4 or 5 and assigns packing groups. Shipping names within Division 5.2 (organic peroxides) are revised to conform with the U.N. Recommendations. Requirements for self-reactive materials are added. Organic peroxides requirements are revised.

Two classification systems are adopted in this final rule. They are in the form of appendices to the HMR part 173. Each system provides tests and criteria for the assignment of a material to a division within a class and to a packing group. The methods used to classify a material are based on the U.N. Recommendations, chapters 11 and 14, for Division 5.1 solids and Class 4 materials, respectively.

An additional classification system is adopted for Division 5.2 materials. Since Notice 87–4 was published in 1987, the United Nations has introduced "generic" shipping descriptions. Now, when a new organic peroxide is introduced into commerce, its transportation hazards are determined using standard tests. A competent authority, as defined in accordance with § 171.8, then assigns the new organic peroxide to a generic type description based on the test results. By using this procedure, it is not necessary to go through the lengthy process by which the importing and exporting countries reach agreement on packaging requirements or the assignment of a U.N. identification number whenever a new organic peroxide product comes on the market. More importantly, because the classification system is based on hazard considerations, its implementation will help effect uniform safety standards. Included as part of these safety standards is a new method for specifying Division 5.2 packaging. To accommodate the large number of special packaging provisions for self-reactive substances (Division 4.1) and organic peroxides (Division 5.2), this final rule includes two packaging sections, §§ 173.224 and 173.225, respectively.

This final rule adopts seven subgroupings for the classification of flammable solids. These subgroupings generally agree in principle with the definitions of Class 4 materials in the U.N. Recommendations. Definitions, tests and criteria for classifying oxidizers that were being considered under Docket HM–179 are partially incorporated in this final rule. The portion applying to solid oxidizers has been incorporated into the U.N. Recommendations and are contained in appendix F to part 173. RSPA believes regulation addressing liquid oxidizers should await adoption of criteria in the U.N. Recommendations.

Definitions of flammable solids, combustible materials and materials that are dangerous when wet (Class 4) are clarified in § 173.124. Criteria by which a material is classified in Class 4 are explained in appendix E to part 173. This final rule offers two test methods for determining Class 4 materials:

(1) Step-by-step protocol tests to evaluate specific characteristics of materials which may be experienced during transportation; and

(2) A comparison of materials.

The sections in Notice 87–4 addressing materials in Divisions 5.1 and 5.2 are extensively revised in this final rule. Revisions to Division 5.2 (organic peroxides) include 20 new generic shipping descriptions in the § 172.101 Table that replace 156 existing Table entries, a classification system for assigning generically described materials to packing groups and packaging requirements that accommodate the unique characteristics of organic peroxides. A listing of technical names for organic peroxides appears in a new Organic Peroxides Table in § 173.225. This table is to be used to determine the applicable generic shipping name, packaging and other requirements for known organic peroxides. Materials not identified by technical name, or formulations of identified materials, must be approved by the Associate Administrator for Hazardous Materials Safety.

Section 173.124. The definitions for the divisions in Class 4 are expanded for clarity. Explanations or examples are added so that the type of materials identified by name can be understood. As revised, the general term for matches and similar materials has been shortened to "materials which cause a fire through friction". In paragraph (a)(3), (i) is removed and (ii), (iii), and (iv) are redesignated (i), (ii), and (iii) respectively.

Section 173.125. This section is revised to show the criteria for assigning packing groups for Class 4 materials. In Notice 87–4, RSPA proposed to supply the U.N. Recommendations' test methods and criteria for assignment of packing group. This is provided in appendix E. Placing those criteria in the regulations makes them more accessible.

Section 173.127. This new section contains the definition and packing group assignment for Division 5.1, so that definitions terms for Divisions 5.1 and 5.2 will be located in separate sections. The definition of Division 5.1 has been amended by deleting examples of specific anions which may contribute to a fire. The examples are no longer needed because of the revised definition and addition of test methods in the new appendix F.

Section 173.128. The definitions for organic peroxides are expanded to conform with changes to the U.N. Recommendations made since publication of Notice 87–4. The definitions appear in paragraph (a). An exception, based on available oxygen, appears in paragraph (a)(4). Seven generic types of organic peroxides are defined in paragraph (b). The procedure for assigning a specific organic peroxide to a generic type is set forth in paragraph (c). If an organic peroxide is identified by technical name in the Organic Peroxides Table in § 173.225, the generic type is assigned in that Table. Otherwise, the type is assigned by the Associate Administrator for Hazardous Materials Safety based on submission of test data. Test procedures are incorporated by reference to Part III of the U.N. Recommendations on the Transport of Dangerous Goods, Tests and Criteria, in paragraph (d) of § 173.128, and a specific testing protocol is set forth. Questions have been raised by commenters concerning how organic peroxides and peroxide mixtures which have been shipped for some time, but are not listed in the Organic Peroxide Table in § 173.225, will be addressed. A transition period of two years is provided in this final rule; during this time any organic peroxide not in the Organic Peroxide Table must be evaluated in accordance with the method specified in § 173.128(d) so that the proper generic shipping name can be assigned.

Section 173.129. This section is revised to address Division 5.2 because assignment of packing groups for Division 5.1 materials is now located in § 173.127. All Division 5.2 materials are assigned to Packing Group II; the rationale is that all Division 5.2 materials represent at least a moderate danger. Materials that might be in Packing Group I would pose an even greater hazard if not permitted to vent should decomposition begin. In other

words, a packaging failure due to decomposition would be a much greater hazard in a Packing Group I packaging than the failure of a Packing Group II packaging because more pressure would have built up within the former.

d. Class 6—Poisonous Materials and Infectious Substances

Class 6 contains two divisions: Division 6.1 for poisonous (toxic) materials and Division 6.2 for infectious substances.

Section 173.132. Paragraph (a) of this section defines Division 6.1 materials as materials, other than gases (toxic gases are in Class 2), that are known to be so toxic to humans as to afford a hazard to health during transportation. In the absence of data, specific criteria is stated based on animal tests for each of the three sources of exposure—oral, dermal and inhalation. Paragraph (b) describes the animal tests which are used to determine the threshold toxicity levels of materials when their toxicity is not known. Paragraph (c) authorizes the Associate Administrator for Hazardous Materials Safety to make discretionary determinations on the classification of Division 6.1 materials. These paragraphs are essentially adopted as proposed in Notice 87–4.

Proposals to adopt U.N. Division 6.1 definitions, criteria and Packing Group assignments in §§ 173.132 and 173.133 were generally supported by commenters to Notice 87–4. They agreed with proposals to carry over slightly modified criteria for the determination of inhalation toxicity from the existing § 173.3a (Docket HM–196) and to employ more rigorous standards than those existing under the Poison B definition in § 173.344 for determining oral and dermal toxicity. However, several commenters noted that RSPA's proposed Division 6.1 definitions, aligned with U.N. Recommendations, do not agree with other Federal agency definitions of "highly toxic materials", such as those maintained by the Occupational Health and Safety Administration (OSHA) and the Environmental Protection Agency (EPA). Other commenters urged RSPA to consider better test protocols for determining Division 6.1 materials and Packing Groups. One toxicologist said restricting data to white rats, as proposed in paragraph (b) for the definition of inhalation toxicity, and recommended by the U.N., "artificially limits the number of chemicals that can be assessed." Another commenter suggested EPA's approach, i.e., using "the most sensitive mammalian species" to better represent the susceptibility of humans to chemical toxicity. RSPA disagrees. The use of rats is a generally accepted practice, and RSPA is maintaining definitions in § 173.132 describing their use in testing. RSPA also disagrees with commenters who recommended revisions to proposed inhalation toxicity criteria that reflect LC50 values derived from higher saturated vapor concentrations. In (a)(3)(ii), RSPA proposed to align acute inhalation toxicity criteria (vapors) for Packing Group III with the U.N. Recommendations at 5,000 parts per million (ppm) at a saturated vapor concentration (SVC) of more than ⅒th the LC50 value. RSPA regards this criterion to be a reliable indicator of toxicity in a test situation when the LC50 value cannot otherwise be determined because the test chamber has reached full saturation.

Any major revision to Division 6.1 criteria and test protocol at this time would contravene RSPA's intent in Docket HM–181 to achieve regulatory consistency, and is considered beyond the scope of this final rule. Efforts toward developing more exact definitions for the transport of highly poisonous liquids should be considered during future sessions of the U.N. Subcommittee and full Committee of Experts. Regarding criteria differences among Federal agencies, RSPA believes that DOT's lead in establishing acute toxicity criteria usually has been followed in the past, and it is reasonable to expect that uniform criteria among all agencies eventually will be similar to those adopted in Docket HM–181.

Some adjustments to final regulatory text have been made in response to commenter suggestions to clarify criteria and the suggested limit test protocol. RSPA has clarified language in (b)(1) defining the use of male and female young albino rats to reflect the importance of sex difference in interpreting LC_{50} test results. One commenter's suggested use of the phrase "shaved intact skin (avoid braiding)" instead of "bare skin" in (b)(2) for dermal LD_{50} testing is adopted. RSPA also is adopting a commenter's suggested revision of (b) (1) and (2) to refer to the appropriate number of animals used in Division 6.1 testing as producing "statistically valid results."

Section 173.133. This section establishes packing group and hazard zone assignments for Division 6.1 materials based on specific oral, dermal and inhalation toxicity criteria. The four hazard zones, A through D, established in this section are similar to those utilized in § 173.116 for Division 2.3 poisonous gases. RSPA notes that there are a number of materials that meet U.N. packing group criteria for higher hazards that are currently classified in lower hazard classes and packing groups. Since RSPA is adopting the U.N. packing group system for international consistency, hazard zones are employed to more accurately indicate the hazards of Division 6.1 materials than can be deduced from packing groups alone. RSPA believes that the use of the hazard zone system can ensure appropriate packaging and operating controls for the shipment of poison materials.

Paragraph (a) aligns inhalation toxicity criteria with packing group and hazard zone assignments in the form of a graph based on section 6.5(c) of the U.N. Recommendations. Two methods of evaluating mixtures for inhalation toxicity are given in paragraph (b). The first method provides for the numerical estimation of the LC_{50} of a mixture when the concentrations of its individual constituents are known. The second method allows the use of simplified threshold tests with animals when the data are unavailable to conduct the numerical estimation.

RSPA emphasizes that any credible human experience or LD_{50} and LC_{50} data can be used to determine the classification of Division 6.1 materials and appropriate packing groups and hazard zones. Animal tests are never to be used to invalidate human experience. But RSPA recognizes that some testing, especially for mixtures, is needed to make Division 6.1 classification and packing group and hazard zone determinations. Therefore, to substantially reduce the number of animals used in testing, RSPA encourages the use of the formula in (b)(1)(i) to determine the packing groups and hazard zones of Division 6.1 mixtures when LC_{50} data is available. When data is not available, § 173.133(b)(2) authorizes the threshold toxicity (limit) test which minimizes the number of animals required for evaluation.

Following a commenter's recommendation, RSPA is revising the term "pi" in the volatility calculation for mixtures in (b)(1)(ii) to read: "partial pressure may be calculated according to Raoult's Law using appropriate activity coefficients. Where activity coefficients are not available, the coefficient may be assumed to be 1.0." RSPA accepts another commenter's suggestion that the term "vapor concentration" should replace "vapor pressure" in (b)(2)(iv)(B) to clarify the limit test calculation for Packing Group III mixtures. RSPA also accepts a commenter's suggestion that shippers calculating LC_{50}s of low volatility mixtures and mixtures of dissimilar toxological effects could be

better served by providing for more appropriate estimates of equivalent mixture LC_{50}s than is offered by the limit test in (b)(1). Thus, alternate calculations can be made with the approval of the Associate Administrator for Hazardous Materials Safety.

Complex revisions to the limit test proposed in (b)(2) recommended by some commenters are considered beyond the scope of this rulemaking. For example, several commenters urged RSPA to adopt a more conservative approach for classifying mixtures if there are known or suspected synergistic or potentiating interactions between two or more components of a mixture.

RSPA disagrees with commenters who recommended that Division 6.1 Packing Group III labeling ought to be optional for domestic shipments. RSPA believes there is a need to be consistent with U.N. Recommendations (6.7) and ICAO Technical Instructions which require the identification of materials presenting lower level but not insignificant hazards, especially to prevent these materials from being mixed with foodstuffs in the same shipments.

Division 6.2. Infectious Substances. Revisions concerning infectious substances (etiologic agents) have been made in §§ 173.134 and 173.196, and a new § 178.609 is added. These revisions are based on comments to this docket, recent developments within the U.N. Subcommittee on the Transport of Dangerous Goods (U.N. Subcommittee) concerning recommendations for infectious substances, and a final rule on etiologic agents issued under Docket HM-142A.

The definition for an infectious substance has been revised and expanded to include agents that have the potential to cause severe, disabling or fatal disease, agents that affect animals only, and these agents listed in 42 CFR 72.3 of the Department of Health and Human Services. The acquired immune deficiency syndrome (AIDS) virus and Lyme disease are examples of agents that are not listed in 42 CFR 72.3, but are addressed in the revised definition.

Adjustments have been made to the format in § 173.196. References to test requirements for outer packagings in §§ 173.465 and 173.466 which are designed for Type A radioactive materials packagings have been deleted. More appropriate tests for packages based on the U.N. Recommendations for infectious substances are incorporated into this final rule in § 178.609. These test requirements for packagings for infectious substances were taken from the Sixth revised edition of the U.N. Recommendations. In addition, the exception for "cultures of etiologic agents of 50 milliliters or less total quantity in one outside package" has been deleted by the final rule on etiologic agents issued under Docket HM-142A.

Work on recommendations for infectious substances by the U.N. Subcommittee is still in progress. During the current two-year cycle (1989-1990), the Subcommittee is considering several proposals, which include: (1) Revising the definition for infectious substances; (2) adding recommendations for diagnostic specimens and biological products; and (3) improved performance test requirments for packagings. The regulations herein will reduce the risk associated with the transportation of infectious substances and bring the current regulations for "etiologic agents" into harmony with the U.N. Recommendations for "infectious substances."

Section 173.134. The section is adopted essentially as proposed in Notice 87-4. However, the definition of "infectious substance" in paragraph (a)(1) has been revised and is no longer limited to agents listed in 42 CFR 72.3. It is expanded to include any agent that could cause severe, disabling, or fatal disease, or agents causing disease only in animals. Paragraph (a)(3) is revised to update references to 9 CFR and 21 CFR.

e. Class 8—Corrosive Materials

In the U.N. Recommendations, corrosive materials are placed in Class 8. There are no divisions in Class 8, but there are three packing groups.

Section 173.136. This section is adopted essentially as proposed in Notice 87-4. Class 8 is comparable to the corrosive material hazard class in the previous regulations, with one exception. In the previous HMR, a corrosive material was one which causes destruction of human skin tissue or which has a severe corrosion rate on steel. A U.N. Class 8 material is one which destroys human skin tissue, or has a severe corrosion rate on steel *or aluminum*. A material which corrodes aluminum usually has been classed in the HMR as an ORM-B (Other Regulated Materials, category B) material. Thus, the U.N. Class 8 definition combines the corrosive material definition and the ORM-B definition. Under this rule, the ORM-B hazard class is eliminated and the U.N. definition for corrosive material is adopted.

The HMR references a rabbit skin test in the definition of the corrosive material hazard class to demonstrate destructiveness to human skin, and a corrosion test on steel to demonstrate corrosivity to this metal. The Class 8 definition contains both of these tests plus a corrosion test for aluminum similar to the steel test. It should be noted that the Class 8 definition in the U.N. Recommendations does not contain any of these tests, but the criteria for packing group assignment do reference the two metal corrosion tests. It should also be noted that, in order to reduce the number of animals used in the rabbit skin test, RSPA encourages the use of one group of animals.

Section 173.137. Section 173.137 contains the packing group assignments for Class 8 materials. The section is adopted essentially as proposed in Notice 87-4. The Packing Group I criterion specifies an animal skin test where necrosis occurs within a period of three minutes or less.

The Packing Group II criterion is a skin test with necrosis appearing in more than three minutes but not more than 60 minutes.

Packing Group III criteria for Class 8 materials contain three elements: a skin test, as in the case of Packing Group I and II materials, but with necrosis appearing in not more than four hours; or a corrosion test on steel with a rate greater than 6.25 mm (0.246 inches) per year at a temperature of 55 °C (131 °F); or, a corrosion test on aluminum with a rate greater than 6.25 mm per year at 55 °C (131 °F). Materials which are only corrosive to metals and not to skin are assigned to Packing Group III.

f. Class 9—Miscellaneous Hazardous Materials

Section 173.140. In the U.N. system, Class 9 is reserved for miscellaneous hazardous materials, e.g., materials which experience has shown need to be regulated but which do not fit any other hazard class definition. The hazard class definition for Class 9 in this rule includes the general wording of the U.N. Class 9 definition and, in addition, includes the definitions retained from the current HMR for ORM-A and ORM-E materials. An ORM-A material was defined in the HMR as a material with irritating or noxious effects that might cause hazardous situations in enclosed spaces, especially in aircraft. In this rule, the ORM-A hazard class is removed; some ORM-A materials are now classed as Division 6.1, Packing Group III materials; others are regulated in Class 9. DOT is obligated to designate hazardous substances and hazardous wastes as hazardous materials under regulations issued by EPA pursuant to the Comprehensive Environmental Response, Compensation, and Liability

Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). In this final rule, those hazardous substances and hazardous wastes which do not satisfy any other hazard class definition are now regulated in Class 9. The ORM–E hazard class definition is removed. In a December 1986 meeting, the U.N. Committee of Experts on the Transport of Dangerous Goods adopted shipping descriptions for environmentally hazardous substances (specifically, "Environmentally hazardous substances, solid, n.o.s., Class 9, UN 3077" and "Environmentally hazardous substances, liquid, n.o.s., Class 9, UN 3082"). RSPA is adopting these shipping descriptions for use when describing a hazardous substance or hazardous waste which does not meet any other hazard class definition.

The ORM–C hazard class is also removed. A material previously classed as an ORM–C, which does not meet a U.N. class definition, is now regulated in Class 9.

Section 173.144. Section 173.144 defines the ORM–D hazard class. The ORM–D hazard class definition, which covers consumer commodities and cartridges, small arms, and cartridges power devices, is essentially unchanged, and is the only ORM class that is retained from the HMR. It is retained because the U.N. system either does not regulate these materials and DOT does (because of a statutory requirement or experience), or the level of regulation under the U.N. system is inappropriate because of the form or quantity of the materials as shipped.

Section 173.145. This section is revised to explain that packing groups are not assigned to ORM–D materials.

g. Exceptions

Sections 173.150 through 173.156. These sections contain exceptions from packaging requirements and other requirements of the regulations for Classes (or Divisions) 3, 4.1, 5.1, 5.2, 6.1, 8, 9, and ORM–D. The sections are adopted essentially as proposed in Notice 87–4. In each section, under "Consumer commodities", a statement is added to clarify that the shipping paper exception does not apply to hazardous substances or hazardous wastes.

As is presently the case, exceptions are provided for a specific material only if the entry for that material in the § 172.101 Table (specifically, Column 8a) contains a reference to one of the aforementioned sections. In general, exceptions are not provided for Packing Group I materials.

The exceptions are based on provisions in the HMR, but are somewhat more restrictive. For example, for materials packaged under "limited quantity" provisions, there previously were no weight restrictions on outer packagings for many of the materials such as flammable liquids, corrosive materials and poisons. In this final rule, a per package limit of 30 kg (66 pounds) is adopted for most materials shipped under limited quantity provisions.

Section 173.150. Section 173.150 contains exceptions for Class 3 flammable and combustible liquids. Paragraph (a) sets forth general requirements for exceptions in this section. Paragraph (b) establishes a per package limit of 30 kg (66.1 pounds) gross weight for flammable liquids and authorizes use of non-specification combination packaging with inner packaging capacity limits geared to the degree of hazard presented by materials in Packing Groups I, II and III. The limited quantity provision in § 173.150 provide an exception from specification packaging requirements, labeling (except for transport by aircraft), placarding and the carrier requirements of parts 174 and 177 (except those related to shipping papers). Paragraph (c) authorizes a material which conforms to the limited quantity provisions in paragraph (b), and which meets the definition in § 171.8 for a consumer commodity, to be reclassed as an ORM–D material and renamed "Consumer commodity". The consumer commodity provision provides an exception from shipping paper requirements and certain other minor exceptions in addition to those provided for limited quantities. Existing exceptions for alcoholic beverages and aqueous solutions of alcohol are retained in paragraphs (d) and (e) as are existing exceptions for combustible liquids in paragraph (f). A provision is added in paragraph (f) whereby a flammable liquid with a flash point at or above 38 °C (100 °F) may be reclassed as a combustible liquid, except for transport by aircraft or vessel.

For combustible liquids which are hazardous substances or hazardous wastes, RSPA is requiring packagings capable of meeting Packing Group III performance testing. RSPA also is eliminating exceptions in § 173.118(b) for high flash point 23 °C (73 °F) flammable liquids. These materials are now subject to Packing Group III packaging requirements.

Section 173.151. This section provides limited quantity and consumer commodity exceptions for flammable solids (Division 4.1) in Packing Groups II and III. The section is adopted essentially as proposed in Notice 87–4. Outer packagings are limited to 30 kg (66 pounds) gross weight. Inner packagings are limited to 1 kg (2.2 pounds) net capacity each for Packing Group II materials and 5 kg (11 pounds) for Packing Group III. The relief provided is the same as for flammable liquids (i.e., packaging, labeling, placarding, etc.).

Section 173.152. This section provides limited quantity and consumer commodity exemptions for oxidizers (Division 5.1) and organic peroxides (Division 5.2) in Packing Groups II and III. The exceptions generally are the same as those proposed in Notice 87–4 and Docket HM–181D. In this final rule, paragraph (b) is revised to remove the reference to Packing Groups II and III for Division 5.2 materials, because all Division 5.2 materials are assigned to Packing Group II.

Section 173.153. This section provides limited quantity and consumer commodity exceptions for poisonous materials (Division 6.1). The section is adopted essentially as proposed in Notice 87–4. Limited quantity provisions are limited to Packing Group III materials and do not include a labeling exception. Consumer commodity provisions are provided for limited quantities and for drugs and medicines, irrespective of packing group.

Section 173.154. This section provides limited quantity and consumer commodity exceptions for corrosive materials in Packing Groups II and III. The section is adopted essentially as proposed in Notice 87–4. Additional exceptions are provided for materials classed as Class 8 Packing Group III solely because they are corrosive to aluminum or steel. Materials having a corrosive effect on aluminum are not subject to the HMR when transported by motor vehicle or rail. Materials having a corrosive effect on steel are not subject to the HMR when transported in bulk packagings by motor vehicle or rail.

Section 173.155. This section provides limited quantity and consumer commodity exceptions for miscellaneous hazardous materials (Class 9). The section is adopted essentially as proposed in Notice 87–4. These materials are generally in Packing Group III. Exceptions from packaging requirements are provided for outer packagings not exceeding 30 kg (66 pounds) gross weight and inner packagings with net capacities not over 4 L (1 gallon) for liquids or 5.0 kg (11 pounds) for solids.

Section 173.156. This section contains additional exceptions applicable to ORM–D materials when transported by a private or contract motor carrier from a distribution center to a retail outlet.

The section is adopted as proposed in Notice 87–4.

5. Subpart E: Non-bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

A shift to the non-bulk packaging standards of the U.N. Recommendations is one of the original goals of Docket HM–181. The advantages of that system are discussed earlier in this rulemaking and are not repeated here, except to say that two principles from those arguments have been used in the development of the non-bulk packaging authorizations. Those principles are: (1) Materials of similar hazard are, in general, packaged in the same manner, and (2) any packaging which is suitable for a material because of the chemical and physical properties of the material is authorized for that material. In this rule, packagings are authorized even though they are not economical for use. Also, an attempt is made to avoid the practice of only authorizing those packagings which shippers have petitioned the Department to use. This happened extensively in the past as exemptions were converted into regulations. Exemption packagings often were suitable for other materials not covered by the exemption; but because those materials were not mentioned in the exemption, those packagings were not authorized for them when the exemption later was converted to a regulation. In keeping with these principles, the majority of materials in the § 172.101 Table, when shipped in non-bulk packagings, are accommodated by eight packaging sections: three for liquids, three for solids, a general non-bulk section for material not requiring DOT specification or U.N. standard packagings, and a packaging section for high hazard liquids which authorizes only DOT specification gas cylinders. The three general sections for liquids include one each for Packing Groups I, II, and III, and the three general sections for solids include one each for Packing Groups I, II, and III. Packing Group II materials (liquid or solid) can be packaged in accordance with either the Packing Group I or II sections, and Packing Group III materials can be packaged in either Packing Group I, II, or III packagings. (Note that for air shipments, Packing Group III materials must be placed in packagings that meet Packing Group II performance levels.)

A unique packaging section for a particular hazardous material has been added where the general packaging sections, even modified by special provisions, are not adequate to safely package the material. There are approximately 42 sections between §§ 173.158 and 173.229 which cover the non-bulk packaging authorizations for particular materials or classes of materials or devices. Section 173.158, for example, specifies the authorized non-bulk packagings for nitric acid. Because of its special corrosive and oxidizing qualities, nitric acid requires special packaging materials. Stainless steel drums are one of the packagings authorized, and different alloys of stainless steel or different heat treatments of the same alloy are required for different strengths of nitric acid. Section 173.158 lists these different requirements. Machines and devices containing hazardous materials and the packagings for them are covered by special packaging sections because they usually cannot be packaged in ordinary hazardous material packagings, such as drums and boxes. For example, § 173.174 covers refrigerating machines.

Sections 173.158 through 173.172. These sections are adopted essentially as proposed in Docket HM–181. In § 173.159, a packaging authorization for fiberboard boxes is added in new paragraph (c)(7) consistent with the requirements previously contained in § 178.205–28a. Paragraphs (a) and (c) of § 173.171 are revised to reference § 173.56 for the examination and approval of smokeless powder and its packagings, rather than the repetitive listing of organizations that perform these examinations.

Section 173.173. Many commenters from the paint and coatings industry stated that no existing DOT–37 series removable head drum will pass the required performance tests. They indicated that the cost to the industry in converting to a drum that will withstand the tests is not justified, since there is a history of safe transportation using the DOT 37-series drums. Commenters conceded that the requirements proposed in Notice 87–4 will encourage substantial technological innovation through performance protocols in the future. However, these commenters argued that since these innovations have not yet been made, the only alternative for these shippers is to use DOT–17 series drums. One commenter quoted a cost in excess of $500,000 per year for their company alone to switch to DOT–17 series drums. Most commenters suggested that the DOT–37 type removable head drums be authorized for shipment of paints on the basis of successful transportation rather than on testing results.

An exception has been incorporated into the packaging requirements for paint, paint-related material, adhesives, and inks in Packing Groups II and III. This exception permits the transportation of these materials in metal packagings of not over five liters each, packed in a strong outer packaging. These packagings are not required to conform to the performance testing requirements of part 178. The exception is consistent with special provision 187 of the U.N. Recommendations, which also excepts paint and paint-related materials from the packaging testing requirements for metal or plastic packagings of five liters or less capacity, if they are in palletized loads or in outside packagings. This exception eases the burden on the paint and paint-related materials industry in converting from a DOT specifications system to a performance-based system. The transition period will give this industry ample time to develop economically sound packagings which are capable of passing the required performance tests. RSPA is retaining the requirement that packagings for paint and paint related materials, with capacities greater than five liters, be capable of withstanding performance tests.

Section 173.174 through 173.184. These sections are adopted essentially as proposed in Notice 87–4, with the exception of § 173.180 which has been removed and reserved.

Section 173.185. This section is revised to incorporate the majority of changes which have been agreed upon in the U.N. deliberations since 1987. Shipping names have been provided to accommodate batteries with liquid and solid cathodes, the hazard class has been changed to Class 9, and the MISCELLANEOUS label required. Rechargeable cells and batteries have not been considered by the U.N. groups yet and they are still required to be approved by the Associate Administrator for Hazardous Materials Safety under this section. Devices containing lithium cells and batteries are also subject to approval by the Associate Administrator for Hazardous Materials Safety because the rapidly expanding use of lithium cell is expected to create many unforeseen configurations that it is considered impracticable to control them under a specific regulation at this time. In addition, RSPA believes the tests required on the cells and batteries may not always fully evaluate their hazards when used in electronic equipment.

RSPA agrees with the only comment on this section, which suggested that the detailed chemistries of the lithium cells and batteries are unnecessary. Therefore, the chemistries have been deleted from paragraph (a). The

commenter also recommended that the "NEMA STANDARD FOR TRANSPORTATION OF LITHIUM CELLS AND BATTERIES" be used as a basis for exempting certain cells and batteries from regulation. RSPA is not adopting the NEMA standard as a basis for exempting certain cells and batteries because we do not believe it adequately evaluates all the hazards of lithium cells and batteries. RSPA plans to initiate a project to develop comprehensive test methods to evaluate the hazards of lithium cells and batteries.

Sections 173.186 through 173.195. These sections are adopted essentially as proposed in Notice 87–4. In § 173.192, an immersion bath test for cylinders containing phosgene has been added in paragraph (c). This test was not included in the proposals of Notice 87–4.

Section 173.196. This section is adopted as proposed in Notice 87–4, except for the following changes. Paragraph (a)(2) is revised to add a requirement that an outer packaging must be of adequate strength for its capacity, mass, and intended use. Paragraph (f)(3), as proposed in Notice 87–4, has been removed based on a final rule issued under Docket HM–142A. Paragraphs (b), (c), (d), (e), and (f) are redesignated paragraphs (d), (e), (f), (g), and (h), respectively. A new paragraph (b) is added to reference package testing requirements in § 178.609. A new paragraph (c) is added regarding the minimum size for packagings consigned as freight.

Section 173.198. This section specifies packagings for nickel carbonyl and is adopted as proposed in Notice 87–4.

Sections 173.201–203 and 173.211–213. Most liquid and solid hazardous materials are referred to the generic packaging sections in subpart E and are adopted essentially as proposed in Notice 87–4. The packaging sections for liquids are §§ 173.201, 173.202, and 173.203 for Packing Group I, II, and III materials, respectively. Similarly, the packaging sections for solids are §§ 173.211, 173.212, and 173.213 for Packing Group I, II, and III materials, respectively. Each section offers a number of combination and single packagings that provide roughly equivalent levels of packaging and that, in general, can be used for packaging a material of the packing group referenced by the section. Other restrictions might apply either through the special provisions in the § 172.101 Table or through the general packaging requirements of subpart B of part 173. Also, for transportation aboard passenger-carrying aircraft, single packagings are not authorized for Packing Group I or II materials.

As pointed out, each of the six general sections is targeted for a particular packing group and offers an array of packagings of an equivalent level of packaging integrity. (For example, § 173.201 authorizes packagings for liquid materials in Packing Group I). The equivalency among the various packagings is established by the performance tests which all of these packagings must meet. For other than cylinders, packagings authorized in § 173.201 must meet the performance tests in subpart M of part 178 at the Packing Group I level. For materials with a specific gravity of 1.2 or less, the Packing Group I performance level consists of a drop test at 1.8 meters (5.9 feet), a stacking test, a leakproofness test, and a hydrostatic pressure test with the pressure determined by the vapor pressure of the material or a specified minimum. Similarly, in §§ 173.202 and 173.203, equivalency is established for the authorized array of liquid packagings at the Packing Group II and III levels, respectively, by the performance tests at those levels. For example, the drop test height for Packing Group II is 1.2 meters (3.9 feet) and for Packing Group III is 0.8 meters (3 feet). The same principles would apply to solid materials in §§ 173.211, 173.212, and 173.213.

Not all possible packagings that could be used for these materials are enumerated in each section. However, in this final rule, RSPA is expanding the list of authorized packagings in §§ 173.201–203 and §§ 173.211–213 to include non-removable head drums to provide for greater drum use versatility. RSPA also is adding 1N1 and 1N2 metal drums to the list of approved outer packagings in § 173.201. RSPA essentially is retaining authorized drum use patterns for liquids proposed in Notice 87–4. For example, §§ 173.201, 173.202, and 173.203 authorize the 1A1 drum as a single-unit packaging, but the wooden barrel, 2C2 is authorized for §§ 173.202 and 173.203 only. Similarly, §§ 172.212 and 173.213 authorize both the 4G fiberboard box and the 1G fiber drum, as single unit packagings for solid materials, but neither is authorized by § 173.211. In this final rule, 5H4 plastic film bags are authorized as single packagings for Packing Group II and III solid hazardous materials in §§ 173.212 and 173.213.

The non-bulk packaging authorizations assigned in Column 8b of the § 172.101 Table usually refer to one of the generic packagings sections (i.e., § 173.201, 173.202, 173.203, 173.211, 173.212, or § 173.213) based on the physical characteristics of the hazardous material and the assigned packing group. These packaging authorizations are not based on the material's hazard class, except to the extent that the hazard class reflects the physical state. For example, Class 3 materials are liquids and are not authorized in those packaging sections (§§ 173.211, 173.212, and 173.213) reserved for solids.

Section 173.201. This section authorizes non-bulk combination and single packagings for Packing Group I liquids, and is adopted essentially as proposed in Notice 87–4. Paragraph (a) establishes general packaging requirements. Authorized combination outer and inner packagings are listed in paragraph (b) and single packagings in paragraph (c). Packagings inadvertently omitted in Notice 87–4 are accordingly added to the lists of approved outer packagings in §§ 173.201–203 and §§ 173.211–213. They include the 1A1, 1B1, 1N1, 1H1, 3A1, 3H1 and 1N2.

Section 173.202. Generic non-bulk packaging requirements for hazardous liquids in Packing Group II are contained in this section, and they are adopted essentially as proposed in Notice 87–4. General packaging requirements for Packing Group II liquids are set forth in paragraph (a). Paragraph (b) contains lists of authorized combination outer and inner packagings. Authorized single packagings are listed in paragraph (c).

Based on a lack of supporting data, RSPA declines commenter requests to add the coated or lined 1G fiber drum to the single packaging lists in §§ 173.202 and 203 for Packing Group II and III liquids and § 173.211 for Packing Group I solids. The 1G drum already is authorized as an outer combination unit for all hazardous liquids and solids, but not as a single packaging. The composite 6HG1 fiber drum with a plastic receptacle is authorized as a single packaging for Packing Group II and III liquids and for all solid hazardous materials.

Section 173.203. This section contains generic non-bulk packaging authorizations for liquids in Packing Group III and is adopted essentially as proposed in Notice 87–4. General requirements are established in paragraph (a). Authorized combination outer and inner packagings and single packagings are listed in paragraphs (b) and (c), respectively.

Section 173.204. This section, adopted as proposed in Notice 87–4, addresses liquid or solid materials which do not require packaging in conformance with any of the U.N. standards; that is, non-specification or non-standard packaging is authorized. This provision applies to

certain low hazard materials for which even Packing Group III performance levels are not considered necessary. The packaging restrictions for these materials are contained in subpart B of part 173, primarily § 173.24. These restrictions are similar to those that now apply to use of non-specification packagings and for limited quantities.

Section 173.205. This section requires liquids needing a high level of package integrity, to be packaged in DOT specification gas cylinders, and is adopted as proposed in Notice 87–4. Based on the merits of several comments, RSPA is adding a reference to § 173.201 for Packing Group I liquids.

Section 173.211. This section authorizes combination and single packagings for solid hazardous materials in Packing Group I and is adopted essentially as proposed in Notice 87–4. Paragraph (a) sets forth general requirements for the generic packaging assignments contained in this section. Authorized combination outer and inner packagings are contained in paragraph (b) and authorized single packagings are listed in paragraph (c). Based on the merit of a comment on this section, RSPA is adding an "N" note in § 172.102(c)(5) allowing use of the 1G fiber drum for calcium cyanide.

Section 173.212. Non-bulk packagings for solid hazardous materials in Packing Group II are authorized in this section which is adopted essentially as proposed in Notice 87–4. Paragraph (a) establishes general requirements for package assignments in this section. Combination and single packagings are authorized in paragraphs (b) and (c), respectively. Based on the merits of comments, RSPA is adding the 5H4 plastic film bag to the list of authorized single packagings in §§ 173.212 and 173.213.

Section 173.213. This section authorizes non-bulk packagings for solid hazardous materials in Packing Group III, and is essentially adopted as proposed in Notice 87–4. General requirements for package assignments are set forth in paragraph (a). Authorized combination and single packagings are listed in paragraphs (b) and (c), respectively.

Section 173.214. This section addresses packagings which require approval by the Associate Administrator for Hazardous Materials Safety, and is adopted as proposed in Notice 87–4.

Section 173.216. All distinctions between "commercial" asbestos and "waste" asbestos have been removed. Paragraph (b) has been deleted and paragraphs (c) and (d) are redesignated (b) and (c), respectively. The section is otherwise adopted as proposed in Notice 87–4.

Sections 173.217 through 173.222. These sections are adopted essentially as proposed in Notice 87–4. In § 173.219, in the section heading and paragraph (a), the new description "Life-saving appliances" is consistent with a final rule published under Docket HM–166W and with the description in the ICAO Technical Instructions.

Section 173.223. The addition of this section was proposed in Docket HM–181D to set forth criteria for determining when temperature controls are needed. In response to comments received on Notice 90–12, the § 173.223 Table on Method of Determining Control and Emergency Temperature has been moved to § 173.21, and § 173.223 is removed and reserved.

Section 173.224. This section is added to specify packaging and temperature controls for self-reactive materials in Division 4.1. The section is adopted as proposed in Docket HM–181D. The packagings permitted for self-reactive materials are restricted, with two exceptions, to fiberboard outer packagings and plastic inner packagings. Furthermore, certain of these materials require temperature control. The most effective means of presenting these requirements is in a special section which is organized into two tables. The self-reactive materials table in paragraph (b) specifies, by identification number, the permitted packaging method(s) and the control and emergency temperatures, as appropriate, for the material being shipped. The table of packing methods in paragraph (c) specifies, by packing method, the types of packagings and package quantity limits. It should be noted that although these packagings are not in the U.N. Recommendations at present, RSPA anticipates inclusion of similar provisions in the U.N. Recommendations in the near future.

Section 173.225. The section is adopted essentially as proposed in Docket HM–181D. Typographical corrections have been made to the § 173.225(c) Table and § 173.225(d)(1) Table. A new paragraph (e)(3)(v) is added to authorize Specification 57 portable tanks for three organic peroxides that are currently authorized in 49 CFR.

The packaging system for organic peroxides proposed in Notice 87–4 is withdrawn and replaced with a new system which has been incorporated into the U.N. Recommendations. Paragraph (a) states that packaging for organic peroxides must conform to the provisions of the section. Paragraph (b) sets forth an Organic Peroxides Table which specifies the technical name for specifically identified organic peroxides, the identification number which is used to select an appropriate generic proper shipping name from the § 172.101 Table, specifications for concentrations of the peroxide or constituents of solutions, packing methods that may be used, temperature controls, and additional special provisions.

Paragraph (c) sets forth procedures for new organic peroxides and formulations of identified peroxides and samples. New organic peroxides and formulations of currently identified peroxides must be approved for transport under the provisions of § 173.128(c). Packaging is then prescribed, by generic type, in the Packing Method Table for Generic Types in paragraph (c)(3) of § 173.225. Paragraph (c)(4) contains provisions for shipping samples for testing or evaluation. Approval by the Associate Administrator for Hazardous Materials Safety is required only for those materials subject to the refrigeration requirements of § 173.21(f) (3).

Paragraph (d) sets forth two Tables of Packing Methods, for liquids and solids, respectively, specifying the types of packagings and quantity limits applicable to each packing method. Paragraph (e) specifies authorized bulk packagings for those organic peroxides for which bulk packagings are authorized in the Organic Peroxides Table in paragraph (b). Bulk packagings are authorized only for those organic peroxides which are Type F liquids, generally based on current packaging authorizations. The system is based on the hazard of the material as determined by the tests which are also used to assign it to a generic type. The greater the hazard posed by a chemical, the smaller the packaging in which it may be shipped. In this way, a weighted hazard (the product of the severity of the hazard multiplied by its quantity) is nearly constant for all of the generic types. For packing methods OP8A and OP8B, there is an additional consideration: for large amounts of either material, the structural integrity of the container may limit the quantity authorized per package. For example, an OP8A allows the contents of inner plastic drums and receptacles to weigh 200 kg when in an outer fiber drum, but only 75 kg when in an outer fiber box.

Section 173.226. Three types of high-integrity non-bulk packagings are authorized in § 173.226 for Division 6.1 Packing Group I liquids poisonous by inhalation that fall into Hazard Zone A of the inhalation toxicity Packing Group Borderline graph (see § 173.133). These liquids exhibit LC50 values of 200 parts

per million (ppm) or less. Paragraphs (a) and (b) authorize gas cylinders and drum-within-a-drum configurations, with both drums required to meet Packing Group I performance tests. Paragraph (c) authorizes U.N. standard combination packagings with an "inner packaging system" that must be capable of withstanding subpart M Packing Group I tests without benefit of the outer packaging. One commenter asked RSPA to exempt shippers of Hazard Zone A liquid samples in combination packagings containing sufficient absorbent cushioning and not exceeding one liter capacity from "POISON" labeling and placarding requirements. In this final rule, RSPA is employing a tougher hazard communication standard for materials poisonous by inhalation. Thus, the POISON label and placarding exceptions for small packagings do not apply to shipment of Hazard Zone A or B materials. The provisions in § 173.226 have otherwise been adopted essentially as proposed in Notice 87–4.

Section 173.227. This section authorizes packagings for Division 6.1 Packing Group I liquids poisonous by inhalation that fall into Hazard Zone B of the inhalation toxicity Packing Group Borderlines graph. These liquids exhibit LC50 values between 201 ppm and 1,000 ppm. Paragraph (a) authorizes for Hazard Zone B materials the packaging system established in § 173.226 for Hazard Zone A materials. Paragraph (b) sets forth drum-within-a-drum configurations, with both drums required to withstand Packing Group I performance tests. Based on the merits of numerous comments, RSPA is establishing minimum thickness and inner drum capacity requirements for three categories of the drum-within-a-drum configuration in paragraph (b). These include configurations with inner drum capacities of 30 liters or less, 31 to 120 liters and greater than 120 liters. Paragraph (c) permits the use of certain single packagings for Hazard Zone B materials if they are blocked and braced in a sealed transport vehicle moving from one origin to one destination without immediate pickup or delivery.

A number of commenters to Notice 87–4 contended that packagings approved by the Associate Administrator for Hazardous Materials Safety under Docket HM–196 for transporting liquid materials poisonous by inhalation are unjustifiably eliminated by Docket HM–181. They said proposals in §§ 173.226 and 173.227 do not provide the needed flexibility to package these materials and that Docket HM–181 eliminates many special approvals that are currently required for Hazard Zone A or B liquids. One commenter explained that many chloroformate chemicals meeting inhalation toxicity criteria are shipped in packagings approved by the Associate Administrator for Hazardous Materials Safety. "Docket HM–181 will significantly change the packaging requirements for these chemicals." Other commenters added that proposals in Notice 87– 4 "are unnecessarily restrictive and are not consistent with practices demonstrated to be safe." They recommended that RSPA allow continued use of all Docket HM–196-approved packagings for materials poisonous by inhalation.

Under Docket HM–196, RSPA permitted industry to use packages of lesser integrity on an interim basis because more appropriate packagings were generally unavailable. RSPA had no intent to maintain every Docket HM–196 approval in Docket HM–181. However, based on the merit of comments to Notice 87–4, at least for Hazard Zone B materials, RSPA is relaxing package thickness requirements to accommodate certain approval packagings. RSPA also is establishing a third category of the drum-within-a-drum configuration, authorizing inner packagings with capacities of 30 liters or less. Most packagings approved under Docket HM–196 are not authorized in this final rule because RSPA believes measures are required to provide additional crush protection and better puncture and fire resistance. Provisions in §§ 173.226 and 173.227 reflect RSPA's philosophy that bulk and non-bulk package survivability is the most effective way to reduce risk in the transport of materials poisonous by inhalation. For these materials, additional measures must be taken to increase the level of package integrity. Commenters noted that there are no provisions in §§ 173.226 and 173.227 as proposed in Notice 87–4 for authorizing plastic, inside packaging for materials poisonous by inhalation not compatible with metal containers. They contended that lack of authorized plastic inner packaging in these sections is inconsistent with proposed §§ 173.24(e) and 178.608(d) requiring packages to be compatible with their ladings. Commenters advised RSPA to allow continued use of Docket HM– 196-approval plastic packagings like the Specification 34 (1H1) drum or composite 6HA1 drum with plastic liner. RSPA recognizes these concerns and, based on experience gained under Docket HM–196 approvals, is authorizing the use of plastic non-removable head drum (1H1) as an inner packaging and the 6HA1 composite drum inside metal packaging for both Hazard Zones A and B materials.

Sections 173.228 through 173.230. These sections are adopted essentially as proposed in Notice 87–4. In § 173.230, the description "small arms ammunition" is replaced by the new description "cartridges, small arms, and cartridges power devices" for consistency with the new descriptions for Class 1 materials.

6. Subpart F: Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

a. Bulk Packaging Authorization

Several commenters to Notice 87–4 took exception to RSPA's creation of broad bulk packaging sections. The commenters believed this would allow the use of bulk packagings previously not authorized for a commodity and might have an adverse effect on safety. RSPA does not agree with the commenters and has retained the concept of broad bulk packaging sections in this final rule. The present bulk packaging authorizations in part 173 have evolved haphazardly throughout the years. Certain authorizations for particular materials provide a complete array of bulk packagings (tank car tanks, cargo tanks, and portable tanks). In some sections, materials with similar transportation hazards have not been authorized for similar bulk packagings due to oversight or because industry did not petition the ICC or DOT to authorize them. In these cases safety is not the issue. Other sections, which reflect special permit or exemption experience, are very specific and only allow a limited array of bulk packagings when other types are just as suitable. Some sections authorize bulk packagings which are inappropriate for certain high hazard materials, such as for materials which are poisonous by inhalation.

In this final rule, RSPA has developed a methodology whereby a particular hazardous material can be matched with a group of bulk packagings which provide roughly equivalent levels of packaging integrity (referred to as "equivalent packaging"). The matching of a material and a packaging is based on physical and chemical properties, hazard classification, secondary hazard assignment, and packing group. It is important to understand what is meant by equivalent bulk packagings and how this concept provides a means of easily matching a hazardous material with a package designed to safely contain the material in transportation. Utilizing this

concept, it is possible to arrange the currently authorized specification bulk packaging (including AAR tank cars and marine portable tanks (MPT)) into new regulatory sections. While there are inherent differences in the specifications for each packaging, these packagings can be grouped into categories that provide equivalent levels of packaging integrity. This concept begins by authorizing all bulk packagings for relatively low hazard materials and progressively eliminating those which are not suitable for the categories of hazardous materials which pose greater hazards.

While there are inherent differences in the individual specifications, RSPA believes that if a hazardous material can be safely carried in one type of cargo tank by highway, for instance, the authorization should be extended to all cargo tanks of similar or greater packaging integrity. A result of this type of packaging authorization is a general increase in the number of available authorized bulk packagings for a given material. For example, a shipper should be allowed to transport a flammable liquid in an MC 330 or MC 331 cargo tank rather than in an MC 306 cargo tank even though this may not be economical for all shippers.

Equivalent packagings are assigned to a hazardous material based on the material's hazard class, secondary hazard, and packing group. These assignments reflect what is currently authorized in the HMR, as well as up-to-date toxicity, compatibility and other material-specific information. The equivalent packaging sections will "fit" most hazardous materials listed in the current § 172.101 Table. Virtually all hazardous material entries would be accommodated by the general bulk packaging authorized in §§ 173.240 through 173.245. Additional material-specific tailoring of packaging authorizations, if necessary, is made through special bulk packaging notes in column 7 of the § 172.101 Table. These notes modify a particular packaging authorization based on material specific needs.

b. Rail Issues

Based on comments to Notice 87–4 concerning rail issues, RSPA and FRA published Docket HM–181C, which addressed tank car tank issues. These issues related to materials extremely poisonous by inhalation, shelf couplers, open top rail cars, watertight hopper cars, AAR specification tank car tanks, tank test pressure, special commodity requirements, inappropriate packagings, hydrogen fluoride, phosphorous pentasulfide, pressure relief device capacity, head protection, grandfathering, bottom outlets, heaters, hydrogen peroxide, placarding, and implementation. Comments were also received in the following four areas, which were not addressed in Docket HM–181C.

(1) Operating practices. RSPA and FRA have determined that recommended substantive changes to operating practices for rail shipments of hazardous materials are outside the scope of this final rule. One commenter suggested, for example, that railroad companies:

(1) Carry out training programs for railroad employees in such areas as the properties of the materials shipped and car securement,

(2) Provide training for emergency responders to deal with emergencies,

(3) Set maximum speeds for trains carrying loaded tank cars containing certain highly toxic materials,

(4) Require trains carrying certain highly toxic materials to hold track at meet and pass points, and

(5) Require drug and alcohol testing of railroad employees engaged in the handling of hazardous materials.

(2) Gaskets. Several commenters recommended that the current requirement for AAR Tank Car Committee approval of gaskets be deleted as the Committee is not expert on gaskets. RSPA and FRA agree, but are planning to make this change in a separate rulemaking.

(3) Safety relief devices. For certain materials that are poisonous by inhalation, this final rule would require that single unit tank car tanks be equipped with thermal protection and increased safety relief valve capacity. Alternatively, the tank could be equipped with a smaller relief valve and extra thermal protection. Several commenters recommended that, for materials poisonous by inhalation, the use of large safety relief valves should be prohibited. RSPA and FRA believe that this issue should be addressed in Docket HM–175A. However, § 179.105–7(c) has been modified in this final rule to allow the use of alternative valve sizing until this issue is resolved under Docket HM–175A.

(4) Bottom outlets. This final rule would generally prohibit the use of bottom outlets on tank car tanks carrying materials that are poisonous by inhalation, except that bottom outlets would be permitted for Division 2.3, Hazard Zone D materials. Bottom outlets would also be prohibited on tank car tanks transporting motor fuel anti-knock compounds. Several commenters recommended that there should also be prohibitions on bottom outlets transporting certain other materials. RSPA and FRA believe that this issue should be addressed in Docket HM–175A.

Sections 173.240 through 173.244. Except for the following changes, these sections are adopted essentially as proposed in Notice 87–4 and Docket HM–181C. In §§ 173.240(a), 173.241(a), 173.242(a), 173.243(a), and 173.244(a), Class DOT 107A and 113 tank car tanks are deleted from the list of bulk packagings authorized. Based on the final rule under Dockets HM–183 and HM–183A, authorizations for the DOT 400 series cargo tanks have been added to these sections, as appropriate. In § 173.242, "AAR Class 203W tank car tanks" is changed to "AAR Class 206W tank car tanks" to correct a typographical error. In §§ 173.242(a) and 173.243(a), a requirement is added that Class DOT 103, 104, and 111 tank car tanks used to transport flammable liquids must have manway closures so designed that pressure can be released automatically and safely in the process of removing the manway cover. This requirement is currently in §§ 173.119 and 179.201–1 of the HMR.

Section 173.244. Commenters noted that packaging standards proposed in Docket HM–181 for materials poisonous by inhalation are considerably more stringent than the packaging standards prescribed in the current HMR. The commenters recommended that RSPA continue to authorize existing DOT specification packagings which have proven safety records. RSPA agrees that the proposed packaging standards for materials poisonous by inhalation are considerably more stringent than the packaging standards prescribed in the current HMR, but believe that the toxicity of these commodities justify the more stringent standards. The tank car tanks required in this final rule are comparable to those presently required for Poison A materials and chlorine. These tank cars are also fitted with head shields which are required for tank cars transporting flammable gases and ethylene oxide. However, for certain materials which are poisonous by inhalation, RSPA has added a new B note (B77) in Column 7 of the § 172.101 Table which authorizes the Associate Administrator for Hazardous Materials Safety to approve other bulk packagings on an individual basis.

Section 173.245. In § 173.245, paragraph (a) is removed and reserved.

Section 173.248. This section is removed. The bulk packaging requirements for ethylene oxide have been consolidated into § 173.323, which

now addresses both bulk and non-bulk packagings for ethylene oxide.

Section 173.249. This section prescribes bulk packagings for bromine and is adopted as proposed in Notice 87–4.

7. Subpart G: Cases, Preparations and Packagings

Sections 173.300 through 173.308. These sections are adopted essentially as proposed in Notice 87–4. Section 173.300 is removed because the definitions for gases appear in § 173.115. Sections 173.300a through 173.305 and § 173.307 have not been changed. Section 173.306 is revised editorially and a new paragraph (h) is added containing consumer commodity provisions which are currently located in §§ 173.505 and 173.1200. The latter sections are deleted. In § 173.308, the section reference in paragraph (a) is changed from "§ 173.21(e)" to "§ 173.21(i)".

Section 173.314. Paragraph (a) is revised to correct the section reference for definitions of gases. Paragraph (b)(6) is revised and paragraph (i)(2) is deleted to correct the inconsistency between those paragraphs. In paragraph (c), entries are added for ethyl amine and methyl bromide to correct inadvertent omissions and entries are added for poisonous gases, not specifically provided for, to clarify the requirements for those gases. Typographical errors in the entry for ammonia, anhydrous have been corrected. For dimethylamine and methylamine the reference to an obsolete note has been deleted. Also in paragraph (c), Note 4 is revised to require excess flow valves on sampling valves and gauging devices and openings on protective housing covers on single unit tank cars carrying liquefied flammable gas. This change is to correct an inadvertent omission in Notice 87–4 and is equivalent to the current requirements of §§ 179.102–3(a)(1), 179.102–3(a)(2), and 179.102–6(a)(2). Note 12 of paragraph (c) is revised to require excess flow valves for liquid discharge valves on chlorine tank car tanks. This change is to correct an inadvertent omission in Notice 87–4 and is equivalent to the current requirements of § 179.102–2(a)(3). The entry for nitrosyl chloride is amended to clarify the requirements for that commodity. Paragraph (i) is amended to authorize chlorodifluoroethane; chloropentafluoroethane; chlorotrifluoromethane; dichlorodifluoromethane; difluoroethane; dimethylamine; dispersant gas, n.o.s. or refrigerant gas, n.o.s., classed as flammable gas; dispersant gas, n.o.s or refrigerant gas, n.o.s, classed as nonflammable gas; methylamine; and trimethylamine to have increased start-to-discharge safety relief valve settings. This change is to correct an inadvertent omission in Notice 87–4 and is equivalent to the current requirements of Note 29 of paragraph (c) of § 173.314.

Section 173.315. The section is adopted as proposed in Notice 87–4. Paragraph (a)(2) is added to provide for the shipment of gases, other than those listed in the table in paragraph (a) (1), in cargo tanks and portable tanks meeting the specified minimum design pressure requirements.

Sections 173.316 through 173.340. These sections are adopted essentially as proposed in Notice 87–4. Sections 173.316 through 173.320 have not been changed. Subpart G is extended beyond § 173.320 with the addition of ten new sections. These sections prescribe the authorized non-bulk packagings for specific gases, or categories of gases, as follows: § 173.321, Ethylamine; § 173.322, Ethyl chloride; § 173.323, Ethylene oxide; § 173.324, Ethyl methyl ether; § 173.334, Organic phosphates mixed with compressed gas; § 173.335, Gas generator assemblies; § 173.336, Nitrogen dioxide, nitrogen peroxide, and nitrogen tetroxide liquids; § 173.337, Nitric oxide; § 173.338, Tungsten hexafluoride; and § 173.340, Tear gas devices. The bulk packaging requirements for Ethylene oxide, as proposed in Notice 87–4, are removed from § 173.248 and consolidated into § 173.323. In § 173.323, paragraph (j) is added to continue the requirement that ethylene oxide tank car tanks be equipped with thermometer wells.

8. Subpart H

This subpart, which currently contains the definitions and packagings for poisonous materials and etiologic agents, is rendered obsolete by previously discussed changes and, therefore, is deleted.

9. Subpart I: Radioactive Materials

Requirements for radioactive materials remain essentially unchanged. As discussed in the preamble to subpart C of part 172, description requirements have been changed to reflect the numerical hazard class, Class 7, and some shipping descriptions have been changed to conform with the U.N. Recommendations. Definitions and packagings have not been changed, except as mentioned in the changes to § 173.417. References to IAEA Safety Series No. 6 have been modified to delete reference to the edition. Section 171.7 has been modified to reference the 1985 edition and the 1988 supplement of Safety Series No. 6. Therefore, until the compliance date of this rulemaking, or if modified by another rulemaking, radioactive materials may be exported in accordance with either the 1973 (as amended) or the 1985, as supplemented in 1988, edition of IAEA Safety Series No. 6. This issue, and other amendments to the HMR related to the 1985 edition of IAEA Safety Series No. 6 will be addressed under Docket HM–169A.

Section 173.416. This section, adopted as proposed in Notice 87–4, is revised to correct section references to radioactive materials packaging specifications which have been redesignated. See the preamble to part 178 for discussion concerning redesignation of specifications. In addition, paragraph (c) has been modified because of the new edition of IAEA Safety Series No. 6.

Section 173.417. This section, adopted as proposed in Notice 87–4, is revised to correct section references to redesignated packagings. Also, in subparagraph (a)(6) the reference to a specification 6J or 17H drum is changed to a 1A2 steel drum. Paragraphs (a)(5) and (b)(4) have been modified because of the new edition of IAEA Safety Series No. 6.

Section 173.421–2. This section has been revised editorially to remove references to ORM–A, ORM–B and ORM–C and replace them with references to Class 9.

Section 173.471. Paragraph (e) of this section has been removed because the Competent Authority is defined in § 171.8.

Section 173.473. The introductory paragraph of this section has been modified because of the new edition of IAEA Safety Series No. 6.

10. Subparts J, K, L, M, N, and O

These subparts, which address the definitions, preparation and packagings for ORM materials, are rendered obsolete and, therefore, have been deleted.

11. Appendices to Part 173

Appendix A. Appendix A has not been changed.

Appendix B. Appendix B is revised editorially to correct section references and to change the word "polyethylene" to "plastic" wherever it appears in the appendix.

Appendix C. A base-level vibration test appears as new Appendix C. The test is essentially the same test which appears in the HMR in §§ 178.16 and 178.19 for Specifications 35 and 34, respectively. As discussed in the preamble to § 173.24, this basic vibration test is applicable to all non-bulk packagings used for hazardous

materials. The test is neither sophisticated nor rigorous and is intended only to point out gross packaging deficiencies.

Appendix D. Appendix D is added to provide a test method to determine the acceptability of dynamite for transportation.

Appendix E. For ease of reference, the U.N. Recommendations' classification schemes for Class 4 materials are listed in appendix E. These materials have a wide range of properties, and, therefore, the nature of the classification tests is commensurately diverse. The testing is based on the behavior of a material under conditions in standardized tests, which are intended to predict the behavior of a material when exposed to conditions which may be encountered during transportation (e.g., heat, fire, air, or water). If, under the conditions of exposure to these elements, the materials cause or exacerbate a hazardous condition, they are then assigned to the appropriate packing group. Specifically, this appendix contains tests and criteria for readily combustible solids, pyrophoric materials, self-heating materials, and materials which are dangerous when wet. The tests have been devised so that they are simple, have minimal equipment requirements, and are economical to conduct. Tests for wetted-explosives are not included in this rulemaking. For a material to be classified as a wetted-explosive, it must be subject to the tests prescribed in Docket HM-181A. If it qualifies as an explosive when dry, but does not so qualify when wetted, it is classed in Division 4.1 and assigned to Packing Group I.

Currently, the United States is working with the UN to develop tests to classify self-reactive materials. However, until development of tests is completed, these materials will be classed based on comparisons with materials which are already considered to be self-reactive. In addition, there is no standard test for materials which can cause fire through friction. Because such materials (e.g., matches) have been intentionally designed with such a hazard, there is no need to determine if this hazard is present.

Appendix F. The classification and determination of packing group for oxidizers are based on the simple tests in appendix F. A principle underlying the tests is that an oxidizer may stimulate combustion differently, depending on how much oxidizer is present in proportion to any combustible material. For this reason, two ratios of combustible material to oxidizer are used: 1 to 1 and 1 to 4. The contribution that an oxidizer makes toward accelerating the rate of combustion is evaluated relative to the contribution made by standards containing, in turn, ammonium persulfate, potassium perchlorate, or potassium bromate. As soon as a material is found in both ratios tested to be less hazardous on average than any standard, the test may be concluded.

E-H: Parts 174 through 177: Carriers Requirements

RSPA stated in Notice 87-4 that changes to the regulatory text in parts 174, 175, 176 and 177 were not included due to time constraints. In order to harmonize current requirements for the acceptance and transportation of hazardous materials with those proposals set forth in Docket HM-181, revision of the modal regulations is necessary. RSPA believes if a final rule under Docket HM-181 was promulgated without corresponding modal revisions, the ensuing confusion could result in erroneous and uncoordinated application of the modal requirements. Therefore, on May 2, 1990, RSPA published a supplemental notice under Docket HM-181B entitled *Revision to Modal Regulations*, which addressed parts 174, 175, and 177. On May 21, 1990, RSPA and the United States Coast Guard (USCG) published another supplemental notice, *Transportation of Explosives by Vessel and Miscellaneous Amendments*, under Docket HM-204.

These notices proposed non-substantive revisions to the modal requirements in parts 174-177 for carriage by rail, air, vessel, and highway, respectively. The proposals specified both international and DOT equivalency for hazard classes (international numeric class and division number and the corresponding DOT hazard class), quantities (metric measures and U.S. standard unit equivalents), packagings (packing groups and DOT specifications), and certain other conforming changes, such as in section references. In addition, Docket HM-181B proposed revision of the Segregation and Separation Charts set forth in §§ 174.81(d) and 177.848(d) for the carriage of hazardous materials by rail and public highway, respectively. New explosives loading and storage tables were proposed as additions to 174.81 and 177.848 for use when different classification groups of Class 1 (explosive) materials are transported in the same rail car or transport vehicle.

Docket HM-204 proposed to amend the regulations pertaining to the handling, stowage, and transport of explosives by vessel to align those regulations with international regulations. In particular, Docket HM-204 proposed to consolidate the requirements applicable to the carriage of military explosives by vessel that were previously found in 46 CFR part 146 with the provisions for transporting commercial explosives by vessel in the HMR. The purpose of Docket HM-204 was to simplify, clarify, and remove duplicative requirements for the transport of explosives by vessel. The intended effect of these amendments is to make the regulations pertaining to explosives easier to use and enforce and to facilitate international commerce.

RSPA received 23 comments to Docket HM-181B from chemical manufacturers, carriers, and from associations representing both chemical companies and carriers. Almost two-thirds of the commenters addressed only the proposed Segregation Tables for Hazardous Materials in §§ 174.81 and 177.848. General comments addressed the reclassification of anhydrous ammonia, chlorine, and sulphur dioxide which is beyond the scope of this docket. Many commenters expressed concern that the proposed tables would result in increase product handling, with adverse economic consequences, and increased risk of a hazardous materials incident. Economic data was supplied by one commenter which estimated regulated industry cost per day to accommodate the proposed separation requirement between Class 3 materials and Class 8 (corrosive) liquids. Based on that information and the overwhelming opposition expressed by commenters to the proposal, RSPA has withdrawn the proposed segregation requirement between Class 3 materials and Class 8 (corrosive) materials.

Other commenters questioned why the proposed segregation tables did not address Division 6.1 liquids (PG II or III) materials, Division 6.2 (etiologic or infectious substances), or Class 8 (corrosive) solid materials. A statement in the instruction for the tables has been included to clarify that the absence of a hazard class or division indicates that no restrictions apply.

Misconceptions regarding segregation table applicability were expressed by several commenters. Limited quantities excepted from labeling do not require segregation in accordance with the tables. Consumer commodities do not require segregation because consumer commodities do not require labels. This is consistent with current segregation requirements because only labeled quantities are effected.

Commenters addressed the segregation of hazardous materials

within multi-compartmented cargo tanks with concern because the requirement as proposed was viewed as a relaxation of the requirement in § 173.33 under Docket HM-183. It was not RSPA's intent to propose a relaxation to that segregation requirement. Language has been adjusted to retain consistency with § 173.33.

Several commenters expressed concern regarding the distance separation and palletization concept for certain hazard classes. RSPA agrees that distance should not be the only criteria applicable to the separation of hazardous materials. Therefore, additional language has been added to allow for separation in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur.

A few commenters believed that RSPA was attempting to expand its jurisdiction regarding the storage of explosives. RSPA historically has had jurisdiction over the storage of explosives incident to transportation. Nothing in this final rule expands that jurisdiction.

Substantive issues other than the segregation tables that were raised by commenters to Docket HM-181B included the need for some method of identifying materials poisonous by inhalation in Hazard Zone A, which are subject to additional restrictions such as rail shipping paper notations, switching and train positioning requirements, as well as rail and highway segregation. RSPA agrees and has added a requirement to § 173.203(m) (3) that requires the notation of the appropriate hazard zone on a shipping paper for a material poisonous by inhalation.

Several commenters to Docket HM-181B expressed their concern that a Division 6.1, PG III material in a package bearing a KEEP AWAY FROM FOOD label is not excepted from the prohibition from loading with foodstuffs. Many materials that require the KEEP AWAY FROM FOOD label have not been previously regulated by rail and highway, and commenters stated that an additional requirement would impose operational and financial hardships on carriers, especially the LTL and small package operations. RSPA believes that these materials must be separated from foodstuffs, but a total prohibition from being loaded on the same motor vehicle or car with foodstuffs is not necessary. Therefore, a separation requirement for materials bearing the KEEP AWAY FROM FOOD label is being added to §§ 174.380, 174.480, 174.580, 174.680, 175.630 and 177.841.

RSPA received seven comments to Docket HM-204. Discussion of specific comments can be found under the applicable sections below. Elsewhere in this issue of the Federal Register, the reader will find the final rule published under Docket HM-204A which, in conjunction with this final rule, revokes the military explosive regulations in 46 CFR part 146.

Commenters stated that the proposed conversion of some of the customary unit measurements to metric or SI units throughout parts 174-177 creates confusion or difficulties. As provided in § 171.6, RSPA has adopted the SI unit as the regulatory standard and has included the customary unit for information only. Where practicable, RSPA has attempted to indicate an SI measurement that imposes the least restriction without compromising safety.

Throughout parts 174-177, the international numeric hazard class and division number, SI unit measures, and placard names are added where appropriate. References to DOT packagings are replaced with references to U.N. standard packagings. Hazardous materials descriptions are revised to align with the revised § 172.101 Table. All references to non-bulk packagings that are no longer authorized, such as carbons, are removed. Section references have been redesignated, and references to hazard warning labels changed to reflect the correct international hazard classification. The phrase "etiologic agent" is replaced with "etiologic or infectious substances". Based on comments to the supplemental notices, RSPA has adopted some suggestions for editorial corrections or slight changes in terminology. These revisions are made throughout parts 174-177 and are not specifically discussed further.

E. Part 174: Carriage by Rail

Section 174.25. The Table in paragraph (a) is revised from that proposed in Docket HM-181B by adding separate entries for materials poisonous by inhalation in Hazard Zone A; separating Class 4 materials into Divisions 4.1, 4.2, and 4.3; indicating when square background placards are required; and adding information for Class 9 materials, combustible liquids, ORM-D materials, and mixed loads of hazardous materials which are authorized to be placarded DANGEROUS. In addition, the measurement shown in paragraph (a)(2)(i) has been changed from "1 cm (0.4 inches)" as proposed in Docket HM-181B, to read "9 mm (0.4 inches)".

Section 174.67. In paragraph (k), the SI unit "1 meter (3.3 feet)" proposed in Docket HM-181B for wrench handles is changed to "0.9 meter (3 feet)" in response to information provided by rail commenters that 36" and "48" wrench handles are used but 39" wrench handles are not.

Section 174.81. To maintain consistency with the IMDG Code, several commenters recommended using the stowage and segregation requirements in § 171.12 instead of the proposed requirements of paragraph (d) of this section and §§ 176.83 and 176.144. Thus, paragraph (b) requires that hazardous materials must be stowed and segregated in accordance with § 171.12 when a rail car is to be transported by vessel, other than ferry vessel.

Commenters questioned why the proposed segregation table had no provisions for Division 6.1 (poisonous) liquid and solid materials of Packing Groups II and III, materials in Division 6.2 (etiologic or infectious substances), and Class 8 (corrosive) solid materials. None of these hazard classes are regulated under existing segregation requirements. Therefore, a statement that the absence of any hazard class or division, or a blank space in the segregation table indicating that no restrictions apply, has been added to the instructions for the segregation table.

In an attempt to further align the segregation table with the stowage and segregation requirements of the IMDG Code, RSPA requires Division 2.3 (poisonous gas) materials in Hazard Zone A and other than Hazard Zone A, and Division 6.1 PG I (poisonous) materials in Hazard Zone A be segregated from other hazardous materials. No other poisons require segregation. The segregation requirements for Division 6.1 PG I (poisonous) materials in Hazard Zone A are now the same, with one exception, as those for Division 2.3 (poisonous gas) materials in Hazard Zone A because of their similar hazards. Division 6.1 PG I (poisonous) materials in Hazard Zone A require separation from Division 2.1 (flammable gas) materials however, Division 2.3 (poisonous gas) materials in Hazard Zone A require segregation from Division 2.1 (flammable gas) materials.

Many commenters opposed the separation of Class 3 (flammable liquid) materials from Class 8 (corrosive) liquid materials. The rationale behind this separation requirement was based on the reclassification of certain hazardous materials, such as nitric acid and perchloric acid, from Division 5.1 (oxidizer) materials to Class 8 (corrosive) materials. However, RSPA agrees that separation and palletization

could impose an economic hardship that may not enhance transportation safety. Therefore, RSPA withdraws the proposed requirement to separate Class 3 (flammable liquid) materials from Class 8 (corrosive) liquid materials. The prohibition against loading Class 8 (corrosive) materials above Class 4 (flammable solid) materials or Division 5.1 (oxidizer) materials is retained in paragraph (e)(2) to correct an oversight in Docket NM–181B.

In paragraphs (e)(5)(i) and (ii), Note A clarifies the provisions previously contained in footnote (5), and Note B includes a new horizontal distance requirement for materials identified in the segregation table with the letter "O". Again, several commenters opposed this requirement stating it poses an economic hardship to the regulated industry which cannot be justified by any increase in transportation safety. RSPA agrees and will allow the use of other methods of segregation to insure that the contents of a leaking package will not commingle with other hazardous materials under conditions normally incident to transportation. One commenter pointed out that subsidiary risk labeling was not addressed in the segregation requirements proposed under Docket HM–181B. RSPA agrees that issue of subsidiary hazard classes must be addressed. Therefore, paragraph (e)(6) is revised to include provisions for subsidiary hazard classes consistent with § 176.83 (a)(6) and (a)(8) under Docket HM–204. When the segregation requirements for the secondary hazard are more restrictive than those of the primary hazard, the secondary hazard segregation requirements apply.

Several commenters opposed use of the word "handled" as it relates to the transportation of Class I (explosive) materials. RSPA selected the word "handled" as an alternative for the word "treated", as used in the U.N. Recommendations in section 4.6.3(b). RSPA agrees that the word "handled" is unnecessary, and it is removed throughout paragraphs (h) and (i).

Sections 174.82 through 174.93. General train handling, switching, and positioning requirements have been consolidated into subpart D. A new train positioning chart in § 174.85 incorporates current requirements of §§ 174.86 through 174.93.

Section 174.83. The section is adopted essentially as proposed in Docket HM–181B except that introductory text and a provision for the testing of hand brakes are added in paragraph (a).

Section 174.85. The section, including the train positioning table, is adopted essentially as proposed in Docket HM–181B, except for the following changes: (1) A new paragraph (d)(3) has been added to address articulated intermodel cars, based on suggestions of several commenters; (2) the references to PG I for Division 2.3 materials are deleted; and (3) the incorrect reference to Class 7 (corrosive) materials has been corrected to read "Class 7 (radioactive) materials".

Section 174.101. The section is adopted essentially as proposed in Docket HM–181B, except the SI unit is changed from 225 kg to 226 kg (500 lbs) to provide a less restrictive weight limit for the loading of Class 1 (explosive) materials.

Section 174.290. The section has been rewritten to clarify references to materials extremely poisonous by inhalation when shipped by, for, or to DOD.

Section 174.380. In addition to the change proposed in Docket HM–181B, the section is revised to require separation of a Class 3 (flammable liquid) material in a package bearing a KEEP AWAY FROM FOOD label from foodstuffs in the same car.

Section 174.480. In addition to the change proposed in Docket HM–181B, the section is revised to require separation of a Class 4 (flammable solid) material in a package bearing a KEEP AWAY FROM FOOD label from foodstuffs in the same car.

Section 174.580. In addition to the change proposed in Docket HM–181B, the section is revised to require separation of a Division 5.1 (oxidizer) material in a package bearing a KEEP AWAY FROM FOOD label from foodstuffs in the same car.

Section 174.600. The section has been rewritten to clarify the reference to materials extremely poisonous by inhalation and to add a reference to § 174.290.

Section 174.680. In addition to the change proposed in Docket HM–181B, the section is revised to require separation of package bearing a KEEP AWAY FROM FOOD label from foodstuffs in the same car.

Section 174.750. In addition to the changes proposed in Docket HM–181B, the last sentence in paragraph (b) is deleted, as the referenced Bureau of Explosives pamphlets are obsolete.

F. Part 175: Carriage By Aircraft

Section 175.10. Commenters addressing the changes proposed in Docket HM–181 to § 175.10 objected to the proposed metric change from the current limit of 75 ounces to the proposed limit of 2.2 kg or 2.2 L for personal medical or toilet articles carried in a passenger's or a crewmember's baggage. These commenters stated that the proposed limits are greater than those authorized in the ICAO Technical Instructions and would present an unnecessary double standard for international travelers. RSPA agrees and has adopted the limits of 2 kilograms or 2 liters permitted under the ICAO Technical Instructions.

Other revisions to the proposed changes include the addition of a dropped parenthesis in (a)(8); the Class 9 reference to dry ice was determined to be unnecessary and is deleted; and the smoking distance is revised to read "(10 feet)", as the customary unit is shown for information purposes only and need not be an exact equivalent.

Section 175.25. The adoption of SI units as the regulatory standard led to the Docket HM–181B proposals in § 175.25 that the 75 ounce total for small quantities shown on passenger notices in airports be revised to read "2.2 kg (77.6 ounces)". Commenters to this proposal requested a two to three-year transition period for implementation of this change, as "many thousands, perhaps tens of thousands of signs will need to be replaced". RSPA believes that replacing many thousands of signs simply to indicate the SI unit is not necessary at this time, and is withdrawing the proposal in § 175.25 until such time as other changes to the passenger notices are proposed.

Section 175.30. The section is adopted essentially as proposed in Docket HM–181B, except that in paragraph (d)(2), the reference to Class 9 for carbon dioxide, solid is removed, as RSPA agrees with commenters that it is unnecessary.

Section 175.320. The section is adopted essentially as proposed in Docket HM–181B, except that in paragraphs (b)(9) and (c)(4)(iii), the smoking distance is revised to read "15 meters (50 feet)", as the customary unit is shown for information only and, therefore, does not need to be an exact equivalent.

Section 175.630. In paragraph (a), the INFECTIOUS SUBSTANCE label was proposed in Docket HM–181B to replace the ETIOLOGIC AGENT label. However, RSPA now believes that the ETIOLOGIC AGENT label should be retained, in addition to the INFECTIOUS SUBSTANCE label, until such time as it is determined to be obsolete. The KEEP AWAY FROM FOOD label is also added to the list of labels in paragraph (a).

G. Part 176: Carriage By Vessel

Section 176.2. Section 176.2, which is being adopted essentially as proposed under Docket HM–204, is added to

include definitions of terms that are used extensively in part 176. Words and terms defined include "Cantline", "Cargo net", "Closed freight container", "Commandant (G-MTH)", "Compartment", "CSC safety approval plate", "Deck structure", "Draft", "Dunnage", "Explosives anchorage", "Explosive article", "Explosives handling facility", "Explosive substance", "Handling", "Hold", "In containers or the like", "Incompatible materials", "Landing mat", "Machinery spaces of category A", "Magazine", "Master of the Vessel", "Open freight container", "Overstowed", "Pallet", "Palletized unit", "Pie plate", "Portable magazine", "Readily combustible material", "Responsible person", "Safe working load", "Skilled person", "Skipboard", "Splice", "Transport unit", and "Tray".

One commenter requested that the list of definitions be revised to include "barge" and "lighter." Barge is defined in § 171.8. The term "lighter" was used only once in part 176 and in this final rule it has been changed to "barge". In Notice 87-4, RSPA proposed to define "clear of living quarters" in § 176.83. In this final rule, this definition has been relocated into this section.

Section 176.3. In § 176.3, paragraph (b), which is being adopted essentially as proposed under Docket HM-204, is revised to remove the reference to § 176.5(c) and to refer the reader to § 173.54, Forbidden Explosives. Readers of the current regulations will notice that § 176.5(c) is a reserved section which contains no regulatory text. The revision of § 176.3 removes the inappropriate reference to § 176.5(c).

Section 176.4. Section 176.4, which is being adopted essentially as proposed under Docket HM-204, is added to transfer the port security regulations of 46 CFR 146.29-7 to the HMR. One commenter recommended that, "if the basic theme of Docket HM-204 is to consolidate existing regulations pertaining to the transport of explosive by vessel," the applicable provisions of 33 CFR parts 6, 109, 110, 125, 126, and 160 be incorporated into this section. It is impossible for RSPA to comply with this recommendation. The 33 CFR provisions in question are waterfront safety, port security and navigation regulations promulgated by the U.S. Coast Guard under statutes other than the HMTA. The commenter's recommendation is far beyond the intended scope of Docket HM-204.

Section 176.5. As proposed under Docket HM-204, paragraph (e) of § 176.5 is removed. This section referred to the military explosives requirements of 46 CFR part 146. Under Docket HM-204A, which appears elsewhere in this issue of the **Federal Register**, RSPA and the USCG have revoked the regulations governing the transportation of military explosives by vessel, 46 CFR part 146. After the compliance date of this final rule, the transport of military-type explosives will be subject to the regulations in this final rule. Military type explosives will no longer be treated as separate class of explosives distinct from other types of explosives, but will be handled and stowed according to their hazard divisions and compatibility groups. Where necessary, special handling or stowage requirements for individual articles appear in the § 172.101 Table or in part 176.

Section 176.11. In § 176.11, paragraphs (a), (c), and (f), which, except as discussed below, are adopted essentially as proposed under Docket HM-204, are revised to clarify the use of the IMDG code for transportation by vessel.

Three commenters took issue with this section, which refers the reader to § 171.12 for the conditions and limitations on the use of the IMDG Code. Section 171.12, as proposed under Notice 87-4 and Docket HM-181A, would have disallowed the use of the IMDG Code for Class 1 (explosive materials). Commenters requested that RSPA amend this section to allow the use of the IMDG Code for Class 1 materials. RSPA concurs with the commenters and has amended § 171.12 accordingly. However, Class 1 materials will still be required to be approved in accordance with § 173.56. In addition, § 176.11(a) is written as it appeared in the HMR as revised October 1, 1989, with the exception that paragraph (a)(1), which has been removed, and paragraph (a)(2)(i) from which the words "Explosive A and B" have been removed. Readers are advised however, that part 176 subpart G contains regulations on matters such as Coast Guard permits and cargo handling, on which the IMDG Code is silent. Those regulations must be observed when explosives are loaded, handled, or unloaded in U.S. ports.

Section 176.30. In § 176.30, which is being adopted essentially as proposed under Docket HM-204, the reference to § 172.102 is removed from paragraph (a)(3).

Section 176.54. Section 176.54, which is being adopted essentially as proposed under Docket HM-204, is revised by changing the section heading to include power-actuated tools. In addition, paragraph (b)(1) is modified to refer to the Captain of the Port's (COTP) authority in 33 CFR 126.15(c), and paragraph (b)(2) is revised to require notification of the nearest COTP before any repairs are made.

Section 176.57. Throughout § 176.57, which is being adopted essentially as proposed under Docket HM-204, the phrase "qualified person" is replaced by "responsible person".

Section 176.58. Section 176.58, which is being adopted essentially as proposed under Docket HM-204, is revised to include more detailed requirements for preparing a vessel for loading hazardous materials. The regulations will now require that all decks, gangways, hatches, and cargo ports over or through which hazardous materials must be passed or handled in loading or unloading must be free of all loose material before cargo handling operations begin. The revisions do not allow any debris that might create a fire hazard or a hazardous condition for persons engaged in loading or unloading operations and also prohibit the stowage of hatch beams and hatch covers in locations that would interfere with cargo handling.

Section 176.65. Section 176.65 has been revised in this final rule to clarify that the COTP may authorize alternative segregation procedures in addition to alternative stowage locations and handling and stowage procedures.

Sections 176.69 and 176.74. In § 176.69, paragraph (d) and (e), which is being adopted essentially as proposed under Docket HM-204, are added to outline additional general stowage requirements for hazardous materials.

Another commenter recommended that this section be revised to include a new subparagraph stating that "loading and stowage of military ammunition and explosives aboard breakbulk merchant vessels will performed in accordance with Army TM 55-607/Navy NAVSEA OP 3221." RSPA views this proposal and others which would perpetuate a separate regulatory regime only for military explosives as contrary to the stated intent of Docket HM-204.

The IMDG Code, compliance with which is authorized under § 176.11 and with which the regulations in this final rule are intended to harmonize, provides requirements for the stowage and segregation of military, as well as nonmilitary, explosives and covers export, import, and domestic transport by both breakbulk and container vessels. RSPA reminds the commenter of the nearly two-year transition period which should provide them ample time to make the necessary adjustments to the new system. Further, there is nothing in this final rule which would impede the commenter from developing and applying their own instructions and

manuals for handling, stowing, and securing explosive cargoes which exceed the requirements of this Final Rule, as long as those instructions and manuals do not conflict with the regulatory requirements.

Section 176.76. Section 176.76, which is being adopted essentially as proposed under Docket HM–204, is revised to eliminate the requirements for USCG approval for freight containers containing Division 1.1 or 1.2 (Class A explosives) materials. The USCG approval provisions are incorporated into the requirements of §§ 176.170, 176.172, and 176.194. In addition, the requirements of paragraph (a)(9) for loading solids on top of liquids are removed as are the requirements of paragraph (c) limiting railroad vehicles to transport only on board a trainship, railroad car ferry, or a carfloat.

Section 176.78. Section 176.78, which is being adopted essentially as proposed under Docket HM–204, is revised to provide for the use of certain specified forklift trucks for handling Class 1 (explosives) materials. Generally, Series EE or EX electric trucks as defined in Underwriters Laboratories (UL) Standard UL583 may be used in all situations. UL Series GS, LPS, D, or DS may be used only under conditions acceptable to the COTP. For safety reasons, forklifts used to handle small or unstable loads are being required to have backrests sufficient to prevent loads from falling towards the mast of the truck and onto the driver. Paragraph (1) is revised to make the provisions for the storage of industrial truck fuel consistent with the Ships Stores regulations in 46 CFR part 147.

Section 176.83. Section 176.83, which, except as discussed below, is being adopted essentially as proposed under Docket HM–204, is revised to harmonize the U.S. stowage and segregation requirements and charts with the IMDG Code stowage and segregation requirements. The IMDG Code at present does not contain provisions for the stowage and segregation of explosive materials in Division 1.6. In Table 176.83(a), the requirements for Division 1.4 will also apply to Division 1.6. Two new tables containing the segregation requirements for freight containers on board container ships and transport vehicles on trailerships "roll-on/roll-off" [RO/RO] vessels have been added to this section.

One commenter pointed out that paragraph 15.2.3.1 of the General Introduction to the IMDG Code allows materials for which "away from" segregation is required to be stowed in the same freight container with the approval of the competent authority. The commenter believes that there are circumstances where such materials can be safely stowed in the same container and that these situations should be dealt with by the Coast Guard on a case by case basis not subject to RSPA's exemption process. The commenter goes on to recommend accomplishing this by adding to paragraph (b) of this section the words; "However, hazardous materials required to be segregated 'away from' may be carried in the same transport unit with the approval of the Commandant (G–MTH)."

For several reasons, RSPA has not accepted the commenter's recommendation. The exception noted in the IMDG Code can only be authorized by the Competent Authority. In this final rule, RSPA has defined the Competent Authority as the Associate Administrator for Hazardous Materials Safety. Therefore, the commenters recommendations would be in conflict with this definition. In addition, the commenter's recommended addition would negate the principles of shipboard segregation. RSPA suspects that, if this addition were adopted, many shippers would pack their freight containers following the less stringent highway segregation rules, and then, on arrival of their shipment at a port, request that Coast Guard waive the shipboard segregation rules. Second, the commenter's proposal would necessitate the creation of procedures by which a shipper could obtain a Coast Guard approval. Finally, the DOT exemption process, which are issued by the Associate Administrator for Hazardous Materials Safety, has been long established for the purpose of providing waivers of the HMR. 49 CFR part 107, subpart B contains adequate procedures for obtaining exemptions on either an emergency or priority basis which shippers having legitimate problems packing their freight containers are free to take advantage of.

One commenter recommended that this section be revised to allow ammonium nitrate, Division 5.1 to be stowed with Class 1 (explosive) materials. The recommended revision is not necessary; the stowage of ammonium nitrate, fertilizers, and mixtures of Division 5.1 in the same hold, compartment, or freight container with Class 1 materials is permitted under § 176.410(e).

In table § 176.83(f), the segregation requirements for open versus open containers under deck for which "separated from" fore and aft separation is specified has been revised to read "one bulkhead" in place of "one container space".

Section 176.84. In § 176.84, paragraph (c), which, except as discussed below, is being adopted essentially as proposed under Docket HM–204, is added to provide provisions for the stowage of Class 1 (explosives) materials. Specific provisions are added to provide for the shipment of small quantities of Class 1 (explosives) materials in compatibility groups other than A, H, J, K, and L. This section contains a chart that lists the notes found in Column 10B of the § 172.101 Table and their meaning.

Paragraph (c) of this section has been extensively revised due to the change in manner in which vessel stowage requirements are stated in Column 10 of the § 172.101 Table. In particular, paragraphs (c)(1) and (c)(2) have been removed. Also, explosives stowage notes 24E through 28E are added to the table in paragraph (c)(4).

Section 176.98. Section 176.98, which is being adopted essentially as proposed under Docket HM–204, is revised to read "Barges used to transport hazardous materials must be constructed of steel" instead of the present wording, "Only barges constructed of steel may be used to transport hazardous materials."

Section 176.98. In § 176.98, which is being adopted essentially as proposed under Docket HM–204, the words "column (7)" are amended to read "Column (10)".

Section 176.100. One commenter to Docket HM–204 proposed that this section be revised to specify what the carrier must provide the COTP to obtain a permit and to clarify under what circumstances a COTP would entertain an exception to this requirement. RSPA agrees with the commenter. This section has been revised to refer to 33 CFR 126.19, which sets forth such procedures.

Section 176.102. Section 176.102, which is being adopted essentially as proposed under Docket HM–204, is added to authorize the COTP to assign a USCG detail to supervise the loading and unloading of Class 1 (explosives) materials. This requirement has been a long-standing provision for military Class 1 (explosives) materials but, apart from the COTP's broad authority under 33 CFR part 126, it is a new requirement for nonmilitary Class 1 (explosives) materials.

Section 176.104. Section 176.104, which is being adopted essentially as proposed under Docket NM–204, is added to consolidate the loading and unloading requirements for nonmilitary Class 1 (explosives) found in current § 176.105 with those for military Class 1 (explosives) materials. This consolidation will essentially mean no change in the requirements for

nonmilitary Class 1 (explosives) materials, but many detailed requirements for military Class 1 (explosives) are eliminated. Current § 176.105 has been removed. One commenter felt that this section should address the responsibility for ensuring the adequacy and condition of the ship's cargo working gear, and recommended that this section be revised to direct that the vessel's master or other person in charge of the vessel be responsible for inspection and certifying the safe operating condition of cargo handling equipment. RSPA agrees in principle with this comment. Rather than revising this section, however, a new section (c) has been added to § 176.108 requiring the "responsible person" to inspect cargo-handling equipment before it is used to handle Class 1 (explosive) materials to ensure that it is suitable for its purpose and in safe operating condition.

Section 176.108. Section 176.108, which, except as discussed below, is being adopted essentially as proposed under Docket NM–204, is added to define the responsibilities of the responsible person in charge of the loading, unloading, stowage and handling operations for Class 1 (explosives) materials aboard a vessel.

Four commenters requested that the definition of "responsible person" be clarified. One commenter suggested that the responsible person be the master of the vessel or other person in charge of the vessel. The definition of responsible person in § 176.2 is taken directly from the IMDG Code; however, RSPA agrees that the definition is unclear as to who "empowers" the responsible person and, therefore, has revised the definition by adding the phrase "by the master of a vessel" following the word "empowered". This allows the master to appoint any suitably trained ship's officer or crewmember as the "responsible person," but would not preclude masters from empowering themselves if they so choose.

Section 176.112. Section 176.112, which is being adopted essentially as proposed under Docket HM–204, is added to state the applicable stowage requirements for Division 1.4 (Class C explosives), compatibility group S materials. Because of the limited hazards associated with items in this category, their stowage is allowed with all other Class 1 (explosives) materials except those in compatibility groups A or L.

Section 176.116. Section 176.116, which is being adopted essentially as proposed under Docket HM–204, is added to include many of the requirements for stowage conditions for Class 1 (explosives) materials that are found in the IMDG Code. The section requires the stowage of Class 1 (explosives) materials in a cool, dry location and Class A steel bulkheads are required between Class 1 (explosives) materials stowage and accommodation spaces. In addition, machinery space bulkheads must be insulated to a "Class A–60" standard.

One commenter proposed that a new paragraph, comparable to 46 CFR 146.29–63, be added to this section to account for the stowage and dunnaging of ammunition and containers of military explosives "in bulk". This commenter further recommended that there be a reference to the securement procedures for stowing military explosives on board breakbulk merchant vessels detailed in Army technical manual 55–607/Navy publication NAVSEA OP 3221. RSPA's response to this comment may be found under the discussion of § 176.69.

The same commenter felt that paragraph (e)(1) of this section placed an "unreasonable burden" on the carriers, agents, and responsible officials by requiring them to search 46 CFR chapter I for more stringent [vessel structure] requirements. The commenter recommended that the paragraph be changed to include "more definitive language" thereby precluding the need to refer the operator to 46 CFR Chapter I. RSPA has several responses to this comment. First, part 176 is not intended to, and cannot be, a comprehensive manual of vessel design, navigation, cargo handling and stowage, and port facility operations. Second, the language used in this paragraph, and similar language in subparagraph 5.3.4.1 of the Introduction to Class 1 of IMDG Code, exist in order to alert a reader that merely complying with the provisions stated therein does not relieve the vessel from complying with applicable structural requirements of the Safety of Life at Sea Convention (SOLAS) as embodied in 46 CFR Chapter I. In all cases of conflict between the HMR and 46 CFR Chapter I, the 46 CFR regulations, if more stringent, must prevail. Finally, RSPA does not think it unreasonable to expect that a competent vessel owner or operator would know whether a vessel met SOLAS and/or 46 CFR Chapter I and was suitable for the carriage of explosives before accepting such a cargo.

Proposed paragraph (a)(2) of this section was included in Docket HM–204 by error. The requirement for flash-arresting screens in ventilation shafts of holds containing explosives would have been expensive and impracticable, and is not consistent with either the IMDG Code or the Safety of Life at Sea Convention. This paragraph has not been included in this Final Rule.

Section 176.118. Section 176.118, which is being adopted essentially as proposed under Docket HM–204, is added to specify the requirements for electrical equipment and cables installed in compartments where Class 1 (explosives) materials are carried. This section permits the use of energized electrical circuits in explosive storage locations if certain conditions are met.

Section 176.120. Section 176.120, which is being adopted essentially as proposed under Docket HM–204, is added to include lightning protection requirements for ships carrying Class 1 (explosives) materials. The requirements for the cleaning of decks, hatches, and gangways that are currently found in § 176.120 are covered by revised § 176.58. The requirements of present § 176.120(b) concerning the closing of hatches are relocated to § 176.182(h).

Section 176.122. Section 176.122, which is being adopted essentially as proposed under Docket HM–204, is added to list the requirements for explosive stowage under deck. Generally, explosive stowage under deck is allowed as described in §§ 176.124 through 176.136.

Section 176.124. Section 176.124, which is being adopted essentially as proposed under Docket HM–204, is added for "ordinary" stowage provisions. New "ordinary" stowage replaces present stowage provisions for nonmilitary Class 1 (explosives) materials not requiring magazine stowage and present "ammunition stowage" provisions for military Class 1 (explosives) materials.

Section 176.128. Section 176.128, which is being adopted essentially as proposed under Docket HM–204, is added to list the general stowage requirements for explosive substances. Generally, all explosive substances, with some limited exceptions for compatibility groups G, L, or S, require magazine stowage. Depending on their characteristics, Class 1 (explosives) materials are required to be stowed in one of three different types of magazines designated by the letters A, B, and C.

Section 176.130. Section 176.130, which is being adopted essentially as proposed under Docket HM–204, is revised to reflect the design, construction, and location requirements for Magazine Stowage Type A as well as the requirements for the stowage of Class 1 (explosives) materials therein. The requirements for securing, blocking and bracing Class 1 (explosives) materials that are currently found in

§ 176.130 are relocated to § 176.69, where they will apply to all hazardous materials. The stowage requirements for kegs of black powder in the present paragraph (c) of this section are not consistent with the IMDG Code and have been removed.

One commenter felt that the information provided in Docket HM-204 for Type A magazine construction was "too broad" and did not provide enough detail to assist operating personnel in constructing such magazines. The commenter recommended incorporating details expressed in 46 CFR 146.29-71 through 146.29-83. RSPA's response to this comment may be found under the discussion of § 176.69.

Section 176.132. Section 176.132, which is being adopted essentially as proposed under Docket HM-204, is added to reflect the design, construction, and location requirements for Magazine Stowage Type B on vessels. The section also addresses the requirements for explosive stowage within a Type B area.

Section 176.133. Section 176.133, which is being adopted essentially as proposed under Docket HM-204, is added to reflect the design, construction, and location requirements for Magazine Stowage Type C on vessels.

Section 176.134. Section 176.134, which is being adopted essentially as proposed under Docket HM-204, is added to allow the use of closed transport vehicles as magazine stowage locations if they meet the requirements of the appropriate magazine stowage type. Additional requirements for the use of transport vehicles as explosive stowage locations are now found in § 176.168.

Section 176.136. Section 176.136, which is being adopted essentially as proposed under Docket HM-204, is added to address special stowage provisions for Class 1 (explosives) materials that present unique hazards. Special stowage requirements are included for Class 1 (explosives) that have smoke hazards (compatibility groups G or H), are toxic (compatibility group K), or are materials that could have a chemical reaction when in contact with water (compatibility group L).

Section 176.137. Section 176.137, which is being adopted essentially as proposed under Docket HM-204, is added to contain the requirements for the design and fabrication of portable magazines meeting the requirements of the Bureau of Alcohol, Tobacco, and Firearms; and authorize COTP's, instead of Commandant (G-MTH-1), to approve oversize portable magazines.

Section 176.138. Section 176.138, which is being adopted essentially as proposed under Docket HM-204, is revised to include the requirements for the on-deck stowage of Class 1 (explosives) materials. This section requires that Class 1 (explosives) materials stowed on deck to be at least 6 m (20 feet) away from any fire, machinery exhaust, galley uptake, or other potential sources of ignition. The section also requires any on-deck explosive stowage to be clear of walkways, fire hydrants, means of access, or any facility necessary for the safe working operations of the vessel. The construction requirements for magazines that are currently found in § 176.138 have been moved to § § 176.128 through 176.133.

One commenter felt that Docket HM-204 did not adequately account for procedures to be used for on deck stowage of breakbulk military cargo, and recommended that in the Final Rule this section be changed to reflect the language of 46 CFR 146.29-57. RSPA's response to this comment may be found under the discussion of § 176.69.

Section 176.140. Section 176.140, which is being adopted essentially as proposed under Docket HM-204, is added to list the requirements for the segregation of Class 1 (explosives) materials in relation to bulk cargoes of hazardous materials. For specific instructions, reference is made to the General Introduction of the IMDG Code.

Section 176.142. Section 176.142, which is being adopted essentially as proposed under Docket HM-204, is added to address the stowage requirements for certain hazardous materials of extreme flammability. These exceptions are listed as paragraphs (b) and (c) of § 176.142.

Section 176.144. Section 176.144, which, except as discussed below, is being adopted essentially as proposed under Docket HM-204, is added to include provisions for mixed stowage in the same compartment, container, or transport vehicle of explosives in different compatibility groups. Table 176.144(a) contains compatibility requirements for Class 1 (explosives) materials in compatibility group N which are not currently found in the IMDG Code. The requirements for the ventilation of magazines that are currently found in § 176.144 are not consistent with the IMDG Code and have been removed.

One commenter pointed out that the heading of Table 176.144(a) means that incompatible explosives may not be stowed in adjacent compartments. This represents a significant and costly change in the commenter's allocation of space on vessels. The commenter recommends that RSPA conduct a "stowage hazard safety analysis" to weigh the risks associated with adjacent versus non-adjacent compartment stowage. No such analysis is needed. The inclusion of the word "adjacent" in Docket HM-204 was in error and has been deleted in this final rule. The same commenter was concerned that Table 176.144(a) permits the "commingling" of compatibility group G explosives with those in Groups C, D, and E. The commenter believes this constitutes a distinct departure from what is currently deemed to be safe stowage conditions. The commenter recommends that the Table be revised to continue the requirement to stow explosives in compatibility group G separate from explosives in compatibility groups C, D, and E. RSPA does not accept this comment. Compatibility Group G in the main comprises not only fireworks and pyrotechnic items, but also explosive articles the primary hazard of which is the release of smoke or tear-producing agents. Fireworks, i.e. UN numbers 0333, 0334, 0335, and 0336, are a hazard in transportation because their manufacture and quality control are often substandard. This is not usually the case with other manufactured articles, particularly those of a munitions nature. These articles, RSPA believes, can be safely transported with articles in Compatibility Groups C, D, and E.

One commenter proposed that a new section be added as § 176.139 to address procedures for stowage of breakbulk explosives on board barges. The commenter was particularly concerned because of their dependence on barges, both as a means of transferring explosives cargoes to and from vessels at explosives anchorages and as shipborne transport units. The commenter proposed the regulations be amended to provide "clear direction" for the stowage of explosives on board the same barge, and to allow the use of sandbags as a substitute for permanent steel bulkheads on a barge. RSPA points out to the commenter that § § 176.83(h), 176.144, 176.145, and 176.174 all apply to the carriage of explosives by barge. To partially clarify the application of these regulations, the clause "Except as provided in 176.145," has been added to the first sentence of paragraph (a) of § 176.144. Also, a new paragraph (f) has been added to § 176.144 which allows sandbag barriers to used to separate explosives stowed on deck on a barge when it is impracticable to provide the 6 m (20 feet) separation required by 176.144(e). This provision applies only to barges used to transfer explosives

cargoes between a waterfront facility and a vessel.

Section 176.145. Section 176.145, which is being adopted essentially as proposed under Docket HM–204, is added to include provisions for stowing Class 1 (explosives) materials on board small vessels having only a single hold when certain segregation provisions of § 176.83 cannot be met.

Section 176.146. Section 176.146, which is being adopted essentially as proposed under Docket HM–204, is added to include new provisions for the segregation of Class 1 (explosives) materials from nonhazardous materials.

Section 176.147. The requirements for metal stowage lockers for fireworks that are currently found in § 176.147 are not consistent with the IMDG Code stowage requirements and have been removed.

Section 176.148. Section 176.148, which is being adopted essentially as proposed under Docket HM–204, is added to allow the use of electric lights as the only form of artificial lighting permitted when loading and unloading Class 1 (explosives) materials.

Section 176.150. Section 176.150, which, except as discussed below, is being adopted essentially as proposed under Docket HM–204, is revised to include provisions for the use and deenergization of sources of electromagnetic radiation (radio transmitters, radars) during Class 1 (explosives) materials handling operations. In addition, the section permits low-power VHF transmitters to be used and adds stowage requirements for items which are sensitive to electromagnetic radiation. The design and fabrication requirements for portable magazines that are currently found in § 176.150 have been relocated to § 176.137.

One commenter requested that the word "energized" in the next-to-last line of paragraph (a) be changed to "deenergized." In Docket NM–204, the word "not" was inadvertently omitted between "are" and "to be energized." This error has been corrected in the Final Rule.

Section 176.154. Section 176.154, which is being adopted essentially as proposed under Docket HM–204, is added to prohibit the loading or unloading of Class 1 (explosives) materials aboard a vessel while bunkering (fueling) is in progress. Bunkering also is not permitted while the hatches of cargo spaces containing Class 1 (explosives) materials are open. The only allowable exceptions to these requirements are for the stowage of Class 1 (explosives) materials in compatibility group S or with prior permission of the COTP.

Section 176.156. Section 176.156, which is being adopted essentially as proposed under Docket HM–204, is revised to require that defective, leaking, or damaged packages of Class 1 (explosive) material must be handled in accordance with the emergency response communication regulations issued under Docket HM–126C. The requirements for the stowage of Class 1 (explosives) materials with combustible liquids currently found in § 176.156 are redundant to the segregation requirements of § 176.83 and have been removed.

One commenter requested that, in paragraph (b) of this section, "may be moved" be changed to "may not be moved." It now reads "No deteriorated package of explosive may be moved . . .". If this comment were adopted, the double negative thus created would negate this prohibition.

Section 176.160. Section 176.160, which is being adopted essentially as proposed under Docket HM–204, is added to specify requirements for loading and unloading Class 1 (explosives) materials during rainstorms. This section requires that care must be taken to prevent packages containing Class 1 (explosives) materials from becoming wet.

Section 176.162. Section 176.162, which is being adopted essentially as proposed under Docket HM–204, is added to list security requirements and to restrict entry by unauthorized persons into spaces containing Class 1 (explosives) materials. This requirement is new for nonmilitary Class 1 (explosives) materials although similar provisions presently exist for military Class 1 (explosives) materials in 46 CFR.

Section 176.164. Section 176.164, which is being adopted essentially as proposed under Docket HM–204, is added to include fire prevention provisions that are similar to those now in force for nonmilitary Class 1 (explosives) materials. Many existing detailed requirements for military Class 1 (explosives) materials have been eliminated.

Section 176.166. Section 176.166, which is being adopted essentially as proposed under Docket HM–204, is added to list the requirements for carrying Class 1 (explosives) materials on passenger vessels. The proposed requirements of this section revise current regulations regarding explosive transport on passenger ships in order to be consistent with Amendment 25 of the IMDG Code. Generally, Division 1.4S (Class C explosives) materials, explosive articles for lifesaving purposes, and Class 1 (explosives) materials in compatibility groups C, D, E, and G if the net explosive mass (weight) does not exceed 10 kilogram (22 pounds) per vessel, are authorized to be carried on a passenger vessel. In addition, materials in compatibility group B are allowed if the net explosive mass (weight) does not exceed 5 kilograms (11 pounds).

Perceiving an "ambiguity" surrounding the transport of Class 1 (explosive) materials by passenger vessel, one commenter recommended amending the § 172.101 Table and § 176.166 to explain clearly the circumstances under which those materials may be carried aboard passenger vessels. In the correction document published to Docket HM–181A (June 15, 1990; 55 FR 24350), RSPA proposed to revise the method by which stowage requirements are presented in the table. As revised, Column 10A of the § 172.101 Table is consistent with § 176.166. It should be noted further that more Class 1 items than as previously provided are permitted to be carried on passenger vessels. In addition, the revision of the table has made proposed paragraph (c)(l) of § 176.84 unnecessary, so RSPA has removed that paragraph from this final rule.

Section 176.168. Section 176.168, which is being adopted essentially as proposed under Docket HM–204, is added to include new provisions governing the carriage of Class 1 (explosives) materials in motor vehicles aboard RO/RO vessels. Transport vehicles carrying Class 1 (explosives) materials are required to be structurally serviceable as defined in § 176.172(a)(2) and need to be in compliance with the loading and unloading requirements of §§ 177.834 and 177.835. In addition, all explosive-laden transport vehicles are required to be secured to the ship in such a manner to prevent the movement of the vehicle during the sea passage.

Section 176.170. Section 176.170, which is being adopted essentially as proposed under Docket HM–204, is added to include the requirements for the transport of Class 1 (explosives) materials in freight containers. The provisions of §§ 176.170 and 176.172 eliminate the present requirements of § 176.76 (a) and 46 CFR 146.29–11(c)(16) for Commandant, USCG approval of freight containers containing Division 1.1 or 1.2 (Class A explosives) materials. In addition, § 176.170 also covers loading and stowage provisions for freight containers.

Three commenters objected to restricting to 5000 kg (11,023 lbs) the net weight explosive weight of Class 1 materials that could be carried in a 20 foot freight container. The restriction on

net explosive weight in this section applies only to freight containers *exceeding* 20 feet in length (a 40 foot container, for example). A 20 foot container may be loaded with Class 1 materials with no restrictions on net mass (weight).

One commenter requested a definition of "close-boarded floor" as used in paragraph (c) of this section. In this final rule, paragraph (c) has been revised in part to read: ". . . must have a floor consisting of tightly-fitted wooden boards, plywood, or equivalent non-metallic material. . . ."

Section 176.172. Section 176.172, which is being adopted essentially as proposed under Docket HM–204, is added to specify the structural serviceability requirements for freight containers and transport vehicles that are used for stowage of Class 1 (explosives) materials aboard ship. Sections 176.172, 176.170 and 176.192 eliminate the approval requirements for freight containers that are found in § 176.76(a) and 46 CFR 146.29–11(c)(16). The definition of the term "splice" as used in regard to freight containers is also included. In addition, § 176.172(c) contains a requirement for a written statement to accompany shipments of Class 1 (explosives) materials in freight containers or vehicles aboard vessels certifying that the freight containers or motor vehicles meet the structural serviceability requirements of § 176.172(a).

Citing the development of repair techniques and standards by the global freight container industry, one commenter urged RSPA to change the structural serviceability criteria for freight containers used to transport Class 1 (explosive) materials as follows:

a. Allow inserts of equal or greater strength than the original components on main structural members other than corner posts without limits, provided that each insert is at least six inches in length, and where within six inches of the corner casting, the insert extends to the corner casting.

b. Allow not more than one insert on a corner post.

c. Allow protrusions not exceeding one inch on the interior walls and floor.

RSPA rejects this proposal. The structural serviceability criteria in this section are taken from the U.N. Recommendations and the IMDG Code. The commenter's proposed criteria are less stringent and are used in the industry for all containers regardless of their service or intended cargo. The philosophy behind the criteria in this final rule is that containers used to transport potentially highly hazardous explosives should be superior in their condition to the general run of containers. RSPA believes that only containers which are the best of the available pool should be used in explosives service.

Section 176.174. Section 176.174, which is being adopted essentially as proposed under Docket HM–204, is added to include the requirements for the transport of Class 1 (explosives) materials in shipborne barges. Generally, all types of Class 1 (explosives) materials are allowed to be transported in shipborne barges except that Class 1 (explosives) materials in compatibility group G or H are required to be stowed in steel portable magazines or freight containers, and Class 1 (explosives) materials in compatibility groups K or L are required to be stowed in steel portable magazines.

Section 176.176. Section 176.176, which is being adopted essentially as proposed under Docket HM–204, is added to require vessels to display signals while loading or unloading Class 1 (explosives) materials. These requirements are the same as those currently required for military Class 1 (explosives) materials, but are new requirements for the vessel transportation of nonmilitary Class 1 (explosives) materials.

Section 176.178. Section 176.178, which is being adopted essentially as proposed under Docket HM–204, is added to specify the requirements for the proper use of mooring lines on vessels transporting Class 1 (explosives) materials. The requirements are similar to those currently contained in 46 CFR for military Class 1 (explosives) materials but are new for nonmilitary Class 1 (explosives) materials.

Section 176.180. Section 176.180, which is being adopted essentially as proposed under Docket HM–204, is added to require manning of an explosive-laden vessel while in port. This section requires a sufficient crew on board at all times necessary to maintain a proper watch and to operate the propulsion and firefighting equipment in case of an emergency.

Section 176.182. Section 176.182, which is being adopted essentially as proposed under Docket HM–204, is added to include general operating requirements for safety in port. This section includes provisions concerning lighting, smoking, and the use of drugs or alcohol that are currently found in §§ 176.167, 176.171, and 176.173. Requirements concerning operations during adverse weather conditions are also included in § 176.182. Current §§ 176.167, 176.171, and 176.173 are removed.

Section 176.184. Section 176.184, which is being adopted essentially as proposed under Docket HM–204, is added to prohibit the handling of Class 1 (explosives) materials in compatibility group L in any port area without the special permission of the COTP. Group L explosives are also subject to any special handling precautions specified by the COTP.

Section 176.190. Section 176.190, which is being adopted essentially as proposed under Docket HM–204, is added to require a vessel to leave port as soon as possible after the loading of Class 1 (explosives) materials is completed.

Section 176.192. Section 176.192, which is being adopted essentially as proposed under Docket HM–204, is added to provide provisions concerning freight container handling equipment. These provisions are the same as those issued under Commandant, USCG approval procedures for Division 1.1 and 1.2 (Class A explosives) materials shipped in freight containers, except certain inspection and approval provisions of the approval which are covered by U.S. Occupational Safety and Health Administration (OSHA) regulations are omitted. The provisions of §§ 176.192, 176.170 and 176.172 eliminate the requirements in § 176.76(a) and 46 CFR 146.29–11(c) (16) for Commandant, USCG approval of freight containers.

Section 176.194. Section 176.194, which is being adopted essentially as proposed under Docket HM–204, is added to include the regulations that are currently found in § 176.177 and 46 CFR 146.29–53. This section remains unchanged from current provisions with the exception of § 176.194(m). Section 176.194(m) is revised to include current requirements for fire extinguishing equipment. Current § 176.177 is removed.

Section 176.225. The text of § 176.225, which is being adopted essentially as proposed under Docket HM–204, for the stowage of chlorine is revised to specifically prohibit the stowage of chlorine with copper or brass leaf sheets or finely divided organic material. Prohibitions against the stowage of chlorine with metallic sodium or potassium, turpentine, ammonia, coal gas, hydrogen, or acetylene are covered by changes in the stowage and segregation tables in § 176.83.

Section 176.305, 176.331 and 176.340. Section 176.340(a)(2)(ix), which is being adopted essentially as proposed under Docket HM–204, is revised to clarify that the non-DOT specification portable tanks authorized under this section must

be periodically retested as presently required for DOT specification 57 portable tanks. Other changes include the deletion of the reference to "bulk asbestos" in § 176.305(b)(2)(ii) and the addition of a provision in § 176.331 that requires flammable liquids with CORROSIVE or KEEP AWAY FROM FOOD labels to be stowed away from foodstuffs.

Section 176.320. One commenter requested RSPA to define "nonsparking type" flashlight. RSPA refers the commenter to Underwriters Laboratories Standard UL 783 or American Society for Testing and Materials Specification F 1014–86. In this final rule, the words "of a nonsparking type" have been changed to "suitable for use in hazardous locations where fire or explosion hazards may exist."

Section 176.400. In § 176.400, which is being adopted essentially as proposed under Docket HM–204, new provisions are added to require Class 4 and Division 5.2 (organic peroxide) materials to be stowed away from heat or ignition sources.

Section 176.405. In § 176.405, which is being adopted essentially as proposed under Docket HM–204, the term "broom clean" is removed.

Sections 176.410 and 176.415. In § 176.410, which, except as noted below, is being adopted essentially as proposed under Docket HM–204, the names of materials listed in paragraph (a) are changed to their proper shipping names as listed in the revised § 172.101 Table. In § 176.415, which, except as noted below, is being adopted essentially as proposed under Docket HM–204, the names of the materials to which this section applies are revised throughout to be consistent with proper shipping names as listed in the § 172.101 Table.

One commenter requested deletion of the references in §§ 176.410 and 176.415 to UN 0222 and UN 0223 (ammonium nitrate (Division 1.1D) and ammonium nitrate fertilizer (Division 1.1D), respectively). The reason given was "possible misinterpretation and confusion with regulatory agencies, especially on a state or local basis." RSPA has removed both of these entries for two different reasons. Ammonium nitrate fertilizer (1.1D; UN 0223) has been removed because RSPA concurs with the commenters. The reader is referred to the discussion of subpart C of part 173 for further discussion of this issue. Ammonium nitrate (1.1D; UN 0222) has been removed to remove a inconsistency that could develop with the permitting requirements of § 176.100. Therefore, UN 0222 will be subject to the permitting requirements of § 176.100.

Section 176.419. In § 176.419, which is being adopted essentially as proposed under Docket HM–204, new provisions are added that require packages of Class 4 and Class 5 materials bearing CORROSIVE or KEEP AWAY FROM FOOD labels to be stowed away from foodstuffs.

Section 176.600. In § 176.600, paragraphs (c) and (d), which are being adopted essentially as proposed under Docket HM–204, are added stating the requirement that materials labeled with the KEEP AWAY FROM FOOD label must be stowed away from foodstuffs and packages bearing the FLAMMABLE LIQUID or FLAMMABLE GAS label must be stowed away from sources of heat and ignition.

One commenter noted that, while Section 16 of the General Introduction of the IMDG Code excepts limited quantities of Division 6.1 (poisonous) materials from labelling requirements, no similar exception is provided under proposed § 173.153. Therefore, limited quantity packages of Division 6.1 materials will be subject to the requirements of § 176.600 regarding segregation from foodstuffs because of the Division 6.1 labels on the packages. This, the commenter pointed out, is contrary to the IMDG Code. To correct this perceived deficiency the commenter suggests that an exception be added to § 173.153 to provide that limited quantities of Division 6.1 would, except for transport by air, not be required to be labelled.

RSPA rejects this proposal. First, the package limitations for "limited quantities" of Division 6.1 (poisonous) materials in the IMDG Code is much more restrictive than the limited quantity provisions in § 173.153. Adoption of the commenters proposal would require further change in § 173.153 which was not proposed in Notice 87–4 or in any of the other supplemental NPRMs. In a future rulemaking, RSPA intends to examine this issue further and is therefore not adopting the commenters proposal at this time.

Sections 176.800. Section 176.800, which is being adopted essentially as proposed under Docket HM–204, is revised to align the section with the IMDG Code by specifying the stowage requirements for packages of Class 8 (corrosive material) material which also bear POISON or FLAMMABLE LIQUID labels.

Subpart O Heading. The heading of subpart O, which is being adopted essentially as proposed under Docket HM–204, is revised to read "Detailed Requirements for Cotton and Vegetable Fibers, Motor Vehicles, and Asbestos" to more adequately describe the requirements found in subpart O. Under the IMDG Code and the numerical classifications used throughout this final rule, cotton and other fibers are in either Division 4.1, 4.2 or Class 9. In a future rulemaking, the rules applying to cotton and other fibers may be relocated to subpart J of part 176.

Section 176.900. In § 176.900, which is being adopted essentially as proposed under Docket HM–204, the section heading is changed to show that this section contains packaging as well as stowage requirements for cotton and other vegetable fibers. Paragraphs (i) and (l) are not consistent with the segregation requirements of § 176.83 and have been removed.

Section 176.902. This section is not consistent with the stowage and segregation requirements for cotton in the § 172.101 Table and § 176.83. As proposed under Docket HM–204, this section is removed.

Section 176.904. The requirements of this section are not consistent with the segregation requirements in proposed § 176.83 for cotton (Division 4.1, 4.2 or Class 9) and sodium nitrate (Division 5.1). As proposed under Docket HM–204, this section is removed.

H. Part 177; Carriage By Public Highway

Section 177.818. The water capacity limit per package for flammable cryogenic liquids is measured in liters and decreased from 125 gallons to 450 liters (119 gallons) for consistency with the definitions in § 171.8 for bulk and non-bulk packagings.

Section 177.839. The section is adopted essentially as proposed in Docket HM–181B, with the word "package" to replace the word "container" throughout the section.

Section 177.840. The water capacity limit per package for flammable cryogenic liquids is measured in liters and decreased from 125 gallons to 450 liters (119 gallons) for consistency with the definitions in § 171.8 for bulk and non-bulk packagings.

Section 177.841. The section is adopted essentially as proposed in Docket HM–181B, except that paragraph (e) is rewritten to require separation of a package bearing a KEEP AWAY FROM FOOD label from foodstuffs in the same motor vehicle, and the references to tear gas substances are deleted.

Section 177.848. To maintain consistency with the IMDG Code, several commenters recommended using the stowage and segregation requirements in § 171.12 instead of the proposed requirements of paragraph (d)

of this section and §§ 176.83 and 176.144. Thus, paragraph (b) requires that hazardous materials must be stowed and segregated in accordance with § 171.12 when a rail car is to be transported by vessel, other than ferry vessel.

RSPA has changed the proposed language in § 177.848(a)(2) to prohibit two or more materials from being transported in the same cargo tank motor vehicle if they combine chemically to produce an explosion, excessive increase in pressure, release of toxic vapors or other unsafe conditions. This section requires that hazardous materials within a multi-compartmented cargo tank be segregated in accordance with § 173.33.

Commenters questioned why the proposed segregation table had no provisions for Division 6.1 (poisonous) liquid and solid materials of Packing Groups II and III, materials in Division 6.2 (etiologic or infectious substances), and Class 8 (corrosive) solid materials. None of these hazard classes are regulated under existing segregation requirements. Therefore, a statement that the absence of any hazard class or division, or a blank space in the segregation table indicating that no restrictions apply, has been added to the instructions for the segregation table.

In an attempt to further align the segregation table with the stowage and segregation requirements of the IMDG Code, RSPA requires Division 2.3 (poisonous gas) materials in Hazard Zone A and other than Hazard Zone A, and Division 6.1 PG I (poisonous) materials in Hazard Zone A be segregated from other hazardous materials. No other poisons require segregation. The segregation requirements for Division 6.1 PG I (poisonous) materials in Hazard Zone A are now the same, with one exception, as those for Division 2.3 (poisonous gas) materials in Hazard Zone A because of their similar hazards. Division 6.1 PG I (poisonous) materials in Hazard Zone A require separation from Division 2.1 (flammable gas) materials however, Division 2.3 (poisonous gas) materials in Hazard Zone A require segregation from Division 2.1 (flammable gas) materials.

Many commenters opposed the separation of Class 3 (flammable liquid) materials from Class 8 (corrosive) liquid materials. The rationale behind this separation requirement was based on the reclassification of certain hazardous materials, such as nitric acid and perchloric acid, from Division 5.1 (oxidizer) materials to Class 8 (corrosive) materials. However, RSPA agrees that separation and palletization could impose an economic hardship that may not enhance transportation safety. Therefore, RSPA withdraws the proposed requirement to separate Class 3 (flammable liquid) materials from Class 8 (corrosive) liquid materials. The prohibition against loading Class 8 (corrosive) materials above Class 4 (flammable solid) materials or Division 5.1 (oxidizer) materials is retained in paragraph (e)(2) to correct an oversight in Docket HM-181B.

In paragraphs (e)(5) (i) and (ii), Note A clarifies the provisions previously contained in footnote (5), and Note B includes a new horizontal distance requirement for materials identified in the segregation table with the letter "O". Again, several commenters opposed this requirement stating it poses an economic hardship to the regulated industry which cannot be justified by any increase in transportation safety. RSPA agrees and will allow the use of other methods of segregation to insure that the contents of a leaking package will not commingle with other hazardous materials under conditions normally incident to transportation. One commenter pointed out that subsidiary risk labeling was not addressed in the segregation requirements proposed under Docket HM-181B. RSPA agrees that issue of subsidiary hazard classes must be addressed. Therefore, paragraph (e)(6) is revised to include provisions for subsidiary hazard classes consistent with § 176.83 (a)(6) and (a)(8) under Docket HM-204. When the segregation requirements for the secondary hazard are more restrictive than those of the primary hazard, the secondary hazard segregation requirements apply.

Several commenters opposed use of the word "handled" as it relates to the transportation of Class 1 (explosive) materials. RSPA selected the word "handled" as an alternative for the word "treated", as used in the U.N. Recommendations in section 4.6.3(b). RSPA agrees that the word "handled" is unnecessary, and it is removed throughout paragraphs (h) and (i).

To correct an oversight in Docket HM-181B, RSPA is adding numbers (4) and (5) to the Compatibility Table for Class 1 (explosive) Materials. Number (4) refers the reader to existing § 177.835(g) for the transportation of detonators with other Class 1 (explosive) materials. Number (5) directs the reader to segregate Division 1.4S fireworks from Division 1.1 and Division 1.2 (Class A explosive) materials. Both numbers reiterate existing requirements in 49 CFR part 177.

I. Part 178: Specifications for Packagings

Part 178 contains the requirements for the design, construction, testing, certification, and marking of packagings. Part 178 is adopted essentially as it was proposed in Notice 87-4, except for certain changes made in response to comments received. One hundred specifications for non-bulk packagings are eliminated and twenty packaging standards based on the U.N. Recommendations are added. Performance tests generally based on the U.N. Recommendations are also added. The title to part 178 is changed to reference "packagings" rather than "shipping containers". A number of subparts have been removed and reserved.

Commenters to Notice 87-4 recommended that self-certification of packages by packaging manufacturers or shippers should remain a standard practice in the U.S. under performance standards, and that package testing and certification by independent agencies (herein referred to as third party certification agencies) should be a voluntary option. Several commenters pointed out, however, that European governments and industry are distrustful of U.S. self-certification because in Europe, packages generally are certified based on testing by government-approved laboratories. One commenter indicated that European officials will accept self-certified U.S. packages only if they believe procedures are properly performed. Thus, to give validity to testing and certification practices as the U.S. moves to performance standards, commenters strongly urged RSPA to set Federal standards for testing and certification.

One commenter stated that self-certification has worked well in the U.S., but under performance standards, third-party certification agencies will figure more prominently. The commenter recommended that a mechanism be established to ensure that laboratories, whether in-house or third party, are capable of satisfactorily performing the testing and certification process. Another commenter noted that requirements for type of tests, test equipment capabilities and level of technician training to perform tests were not addressed in Notice 87-4.

Other commenters were divided over the need, if any, for third-party testing. Several commenters stated that when testing is deemed to be necessary, it should only be done by qualified and fully staffed third-party testing laboratories. Another commenter stated

that use of commercial laboratories is not realistic due to the small number of third party certification agencies and the lead time required to conduct the volume of tests that will be required under a performance standards system. The commenter contended that delays in shipments due to a requirement for testing at commercial laboratories would be very costly.

A commenter recommended several DOT and industry arrangements to accomplish a suitable scheme of package testing and certification under performance standards. The commenter recommended that RSPA consult with the National Safe Transit Association (NSTA) or other industry sources in developing detailed certification standards. The commenter further stated that RSPA could contract with NSTA to certify third-party certification agencies and manufacturer or shipper in-house self-certification procedures, or recognize NSTA certification. RSPA could also publish certification standards in the final rule.

U.S. third-party certification agencies undergo an approval process, including a checklist of equipment on hand, employee training, and recordkeeping, as specified in § 107.402(b) prior to being approved by DOT. Also, as part of the approval process, the applicant is required to perform actual testing to be witnessed by a DOT representative. This approval process is designed to assess the applicant's capability to test and certify packagings in accordance with the U.N. Recommendations and the HMR. RSPA considers the present system to be adequate, and no changes to the approval process are made in this final rule.

In recognition of the past safety history of self-certified packagings, RSPA believes that self-certification should continue to be an option. RSPA's approach in more clearly establishing manufacturer and shipper responsibilities in §§ 173.22 and 178.1 is based on the expectation that self-certification will continue.

RSPA did not propose, or adopt in this final rule, detailed procedures for self-certification, or third party certification, such as documentation, equipment capabilities and employee qualifications. RSPA believes it is not appropriate to issue detailed standards in this final rule.

Section 178.2. Section 178.0–2 is redesignated as § 178.2 and addresses the responsibilities of persons who manufacture packagings in accordance with the standards in part 178. Paragraph (a) addresses the applicability of part 178. Paragraph (b) sets forth the responsibility of the packaging manufacturer to comply with all applicable provisions of part 178. Paragraphs (a) and (b) are adopted essentially as proposed in Notice 87–4. Paragraph (c), which was proposed as paragraph (d) in Notice 87–4, requires that manufacturers notify, in writing, persons to whom packagings are transferred of any specification requirements which have not been met at the time of transfer and of any actions which need to be taken to comply with specification requirements. The notification requirement is broadened in this final rule to require that subsequent distributors, as well as manufacturers, provide the written notification. Copies of the notifications must be retained by the manufacturer and each transferee of the packaging for at least one year.

RSPA considers this notification especially important in this final rule where performance-oriented packaging standards would replace specification packagings. Shippers perform many functions normally considered as part of manufacturing (e.g. assembling combination packagings or closing drums). It is essential that persons performing these functions have the information necessary to ensure that packages, as assembled, meet all specification requirements.

Paragraph (c) as proposed in Notice 87–4 addressed a manufacturer's responsibility to comply with subpart B of part 173. This proposal is not adopted in this final rule. See the discussion under *Shipper and Manufacturer Responsibilities.* Paragraphs (d) and (e) in Notice 87–4 are adopted as proposed.

Section 178.3. Section 178.0–3 is redesignated as § 178.3; the specification marking requirements are relocated to § 178.3, as proposed in Notice 87–4, and this section addresses all specification markings. Paragraph (a) requires that packagings be marked to identify the standard or specification to which the packaging is manufactured, and with the name and address or symbol of the manufacturer or approval agency certifying compliance with the specification or standard. A letter height of at least 6 mm (0.2 inches) is specified for packagings having a capacity of less than or equal to 30 L (7.9 gallons) for liquids or 30 kg (66 pounds) for solids and a letter height of at least 12 mm (0.47 inches) is specified for other packagings. Notice 87–4 was not clear regarding the proper size of the required "UN" symbol (the letters "u" and "n" enclosed within a circle), specifying only that "letters and numerals" must meet the minimum height requirements. RSPA believes that the "UN" symbol as a whole should meet the minimum height requirements. Therefore § 178.3(a)(4) specifies that letters, numerals, and "the United Nations symbol" must be at least a certain height. In all cases, the markings must be legible.

Paragraph (b)(2) of this section requires that the name and address or symbol of "the manufacturer" (as defined in § 171.8) be entered on packagings, for consistency with § 178.503 and the revised definition of a manufacturer.

Subparts A through K: Non-Bulk Specification Packagings

1. Subpart A. Seven specifications for carboys and two specifications for polyethylene drums are removed and subpart A is reserved.

2. Subpart B. Specifications 2P and 2Q are inner receptacles for compressed gases and are retained in this subpart. Specification 2R is an inner packaging for radioactive materials. It is relocated to subpart K and redesignated as § 178.360. The remaining specifications are removed from this subpart.

3. Subpart C. Subpart C contains specifications for cylinders and is not affected by this final rule.

4. Subpart D. Four of the specifications in subpart D (Specs. 6L, 6M, 20PF and 21PF) are packagings for radioactive materials. They are moved to subpart K and redesignated as §§ 178.352, 178.354, 178.356 and 178.358, respectively. The remaining specifications are removed and the subpart is removed and reserved.

5. Subpart E. Two specifications in subpart E, 20WC and 21WC, are used for radioactive materials and are redesignated and moved to subpart K. The remaining specifications are removed and subpart E is removed and reserved.

6. Subpart F. Subpart F is removed and reserved.

7. Subpart G. Subpart G is removed and reserved.

8. Subpart H. In § 178.270–11, pressure relief device requirements for IM101 and IM102 intermodal tanks are revised editorially to address pressure relief settings in terms of tank test pressure instead of maximum allowable working pressure (MAWP).

9. Subpart K. Radioactive materials packagings from the aforementioned subparts are relocated to subpart K. No other changes are made to the subpart.

10. Subpart L: non-bulk performance-oriented packaging standards. A new subpart L is added to part 178, generally as proposed in Notice 87–4, containing marking requirements and packaging standards for non-bulk packagings based on chapter 9 of the U.N. Recommendations.

Section 178.500. Section 178.500 contains a general statement of scope and purpose and refers the user to § 171.8 for definitions of packaging terms. This section is adopted as proposed in Notice 87–4.

Section 178.502. Section 178.502 sets forth the identification codes for packagings as used in the U.N. Recommendations. For example, "4" designates a box and "G" designates fiberboard. Therefore, "4G" is the identification code for a fiberboard box. This section is adopted as proposed in Notice 87–4.

Section 178.503. Section 178.503 sets forth requirements for marking packages. In general, markings for the U.N. standards consist of the following ten elements:

(1) The UN symbol.

(2) The package identification code.

(3) A letter designating the packing group or groups for which the packaging design type has been performance tested.

(4) The specific gravity for liquids or the maximum gross mass for solids.

(5) For packagings intended to contain solids or inner packagings, the letter "S", or for single or composite packagings intended to contain liquids, the hydrostatic test pressure at which the packaging is rated.

(6) The last two digits of the year of manufacture.

(7) The letters "USA".

(8) The name and address or symbol of the manufacturer or approval agency certifying compliance.

(9) For packagings tested in accordance with § 178.601(g)(2), the letters "SP".

(10) For metal or plastic drums and jerricans intended for reuse, the thickness (in millimeters) of the packaging material.

In addition, reconditioned packagings are marked with the following:

(1) The name of the country in which the reconditioning is performed.

(2) The name and address or symbol of the reconditioner.

(3) The month and last two digits of the year of reconditioning.

(4) The letter "R".

(5) If leakproofness tested, the letter "L".

The information required by this section, such as packing group designation and hydrostatic test pressure rating, is believed necessary for the shipper to be able to select a packaging appropriate for a specific hazardous material based on the characteristics of that material. Paragraph (a)(9), which was not proposed in Notice 87–4, requires that the letters "SP" be marked on a packaging after the name and address or symbol of the packaging manufacturer, for a packaging which is certified under the selective testing provisions of § 178.601(g)(2). A marking proposed as paragraph (a)(10) in Notice 87–4, for marking the tare weight in kilograms on drums intended for nitric acid, is not adopted in this final rule. Marking of drums used for nitric acid is addressed in § 173.158.

A requirement proposed in paragraph (b) of Notice 87–4, that certain of the required markings be applied in a permanent manner (e.g. by embossment) is withdrawn from this final rule. RSPA recognizes that some markings may be applied to a packaging at the time of reconditioning, and it may be impractical for these markings to be applied in a permanent manner at that time. In this final rule, all markings must be "durable" and "clearly visible", in accordance with § 178.503(a).

Since the publication of Notice 87–4 a number of questions have been raised regarding the marking specified in § 178.503(a)(5). Commenters asked, for combination packagings containing inner packagings which have been hydrostatically tested (for air shipments), whether the packaging should be marked with an "S" to indicate inner packagings, or the hydrostatic pressure to which the inner packagings have been tested. Inner packagings are excepted from the hydrostatic pressure test; however, for shipments by aircraft, the inner packagings must be capable of withstanding an internal pressure. The ICAO Technical Instructions clearly specify that combination packagings be marked with an "S" to indicate inner packagings, rather than with a hydrostatic pressure. Because in this final rule the hydrostatic pressure test is not specifically required for the inner packagings of combination packagings, and for consistency with the ICAO Technical Instructions, § 178.503(a)(5) specifies that combination packagings containing inner packagings are marked with an "S".

Many questions have been raised since the publication of Notice 87–4 regarding whose name or symbol should appear on packagings as part of the package marking. Notice 87–4 contained a proposal, in § 178.503(a)(8), that the name and address or symbol "of the person applying the marks" required by the section be applied as part of the marking. Notice 87–4 defined a packaging "manufacturer" as a person who applies to a packaging a DOT specification marking or a U.N. mark. In many cases the person who actually constructs a packaging and places the marks on the packaging is not the person who is certifying compliance with the DOT or U.N. requirements. Also, when a third party certification agency performs the testing and provides certification of a packaging design, the third party agency rarely applies markings to packagings. RSPA believes that the name or symbol of the person taking responsibility for certification of a packaging should appear as part of the markings required by § 178.503.

As proposed in Notice 87–4 and adopted in this final rule, § 178.503(a) contains a requirement that the "manufacturer" mark each package in the prescribed manner. The definition of "manufacturer" in this final rule is based on RSPA's belief that the person who is certifying compliance of the packaging to the applicable standards should be responsible for marking the package. A "manufacturer", as defined in § 171.8, is a person who certifies compliance of a packaging with a DOT standard or a U.N. standard, including a person who applies, or directs the application of, a DOT specification marking or a U.N. mark to a packaging. The package markings prescribed by § 178.503 identify the person certifying compliance with the packaging, and not necessarily the person who constructs the packaging or the person who applies the markings. Section 178.503(a)(8) specifies that the name or symbol of the manufacturer or the approval agency certifying compliance with the U.N. standard must appear as part of the package marking. Therefore, if a packaging is certified by a third party certification agency, that agency's name or symbol appears on the packaging.

When a third party agency is approved by DOT to perform certifications of U.N. packagings, the agency is issued a third-party designator consisting of a "+" followed by two letters. The DOT approval instructs the third party agency to provide a four digit number (a test number) as part of each certification to identify the packaging that was tested, and in addition, to have the third party designator and test number marked on packagings certified by that test series. This identifier takes the place of the name and address of the manufacturer when third party certification is utilized. However, through this mark, the packaging manufacturer can be identified. The test number assigned to each packaging is unique to a single packaging and manufacturer. The packaging manufacturer's or shipper's name may appear on a third-party certified

packaging in addition to the third party agency identifier.

A packaging manufacturer or shipper may choose not to apply the third party mark, even if the packaging is tested by a third party certification agency. However, if the third party mark is not applied, there would be no indication on the package that it has been tested by a third party testing laboratory. Responsibility for conformance of the packaging to U.N. standards then rests with the manufacturer or shipper whose name or symbol appears on the package.

Sections 178.504 through 178.523—General. Sections 178.504 through 178.523 contain the standards for the 20 performance packagings. These standards specify the general requirements for materials, construction and capacity of packagings. They are more general than the previous specifications and give manufacturers wide latitude in designing and constructing packagings. The sections are adopted essentially as proposed in Notice 87–4; however, §§ 178.504, 178.505, 178.506, 178.509, and 178.511 contain references to the minimum thickness and marking requirements for reuse found in §§ 173.28(a)(4) and 178.503(a)(10) to inform packaging manufacturers that certain additional requirements apply to packagings intended for reuse.

Section 178.516. Section 178.516 contains the standards for fiberboard boxes. As proposed in Notice 87–4, § 178.516 stated in paragraph (b)(1) that "fiberboard shall be cut, creased without scoring, and slotted." A commenter asked whether the prohibition against "scoring" meant that impressions could not be made in the fiberboard to facilitate folding. The recognized meaning of a "score" in the U.S., as defined in the Fibre Box Handbook of the Fibre Box Association, is "an impression or crease in corrugated or solid fiberboard to locate and facilitate folding." The U.N. defines "scoring" as cutting through part of the thickness of the fiberboard. It is cutting through the thickness of the fiberboard which is intended to be prohibited by § 178.516. Therefore, this section of the final rule states that "fiberboard shall be cut, creased without cutting through any thickness of fiberboard, and slotted."

11. Subpart M; testing of non-bulk packagings. In place of the previous hodgepodge of package testing and record retention requirements, subpart M of part 178 of this final rule standardizes requirements for all of the performance-oriented non-bulk packagings in subpart L.

Section 178. 601. In § 178.601, general requirements for testing and test record retention are prescribed. Several commenters objected to the wording proposed in § 178.601(a) of Notice 87–4, which stated that each packaging must ". . . be capable of successfully passing the prescribed tests and of conforming to the requirements of § 173.24 of this subchapter at all times while in transportation." The proposed paragraph also stated that the requirements are minimum requirements. These commenters said that the paragraph as proposed is unrealistic and inconsistent with the intent of the regulations. They suggested the paragraph be rewritten to delete mention of "minimum requirements" and to state that each packaging must be ". . . capable of successfully passing the prescribed tests applicable to normal conditions of transportation." They contended that as written, the paragraph means that if any failure of a packaging occurs at any time during transportation, the packaging has failed to comply with the requirements of the subchapter.

As was discussed in the preamble to Notice 87–4, failure of a test may constitute *prima facie* evidence of noncompliance with the subchapter. Enforcement action could be taken upon receipt of test results from a testing facility or after testing conducted at a manufacturing or shipping location. Such actions would be preceded by thorough investigation (possibly, by additional testing) to determine what caused the failure, whether a violation occurred, who committed it, and what the appropriate sanction should be. In practice, RSPA does not anticipate testing other than new packagings in the transportation system. Packagings that would normally be selected for testing for enforcement purposes would be packagings that were not obviously damaged during transportation, with no obvious defects. RSPA does not expect that packagings which have been damaged during transportation will be capable of withstanding the prescribed performance tests. Rather, RSPA expects that packagings will be capable of withstanding the normal transportation environment without leakage of hazardous materials contents. Therefore, RSPA does not believe it is necessary to revise § 178.601(a), and the paragraph is adopted in this final rule as proposed in Notice 87–4.

Paragraph (b) establishes the packaging manufacturer's and shipper's responsibilities for ensuring that each packaging is capable of passing the prescribed tests. As proposed in Notice 87–4 and adopted in this final rule, paragraph (b) states that when assembly functions, including final closure, are performed by the person offering a hazardous material for transportation, it is the responsibility of that person, as well as the manufacturer, to ensure that each package is capable of passing the prescribed tests.

A question was raised regarding whether the tests required by subpart M of part 178 must be performed separately for each location where packagings are produced, or if one set of performance tests may be used to qualify all packagings produced by a single manufacturer at multiple locations. RSPA believes that the performance tests may be conducted at a single facility to qualify all *identical* packagings produced by the same manufacturer at multiple locations. This is the policy in other parts of the world, and RSPA believes that to adopt a more stringent policy would put U.S. industry at a disadvantage. However, if testing is not performed at each location where packagings are manufactured, the manufacturer must take steps, through testing or other quality control measures, to ensure that each packaging is capable of successfully passing the prescribed tests, in accordance with § 178.601(a).

"Design qualification testing", "periodic retesting", and "production testing" are defined in § 178.601(c). What constitutes a "different" packaging is also defined. Paragraphs (d) and (e) establish the required frequency of design qualification and periodic testing. Design qualification tests are required at the start of production for each new and different packaging. Periodic retests are required "at intervals established by the manufacturer of sufficient frequency to ensure that all packagings are capable of passing the prescribed tests", but at a minimum frequency. Notice 87–4 proposed that each packaging design type be tested at the start of production and at intervals established by the manufacturer, but at least once every 12 months. An annual retest is less frequent than previous production testing requirements for DOT specification steel and plastic drums. However, there were many DOT specification packagings and packagings authorized by DOT that required no testing.

A number of commenters objected to proposed § 178.601(c) and stated that annual testing of packagings will be time-consuming and expensive, costing the packaging manufacturing industry millions of dollars for no apparent benefit. Further, they noted that producers and users of packagings

which had been exempt from testing requirements would not only have to conduct tests at the start of production, but also conduct retesting every 12 months. Many commenters to § 178.601(c) stated that if there has been no change in packaging documentation, processing, quality control procedures, material requirements, specifications, and no failures in transportation, there is no need for packaging retesting. These commenters said that retesting should be done only to accommodate design changes or to satisfy RSPA concerns. One suggested alternative to the proposed periodic testing requirement was to state, as NSTA procedures do, that "any time a change is made in a packaging which differs from that which is already certified, a recertification test must be performed."

Commenters noted that the proposed annual retest requirement is particularly burdensome as it relates to combination packagings. These commenters stated that annual retesting of all variations of combination packagings would place an undue burden on the industry. With many modifications made to these combination packagings to accommodate varying shipping needs, the number of packagings requiring periodic testing would become so large as to be unmanageable. A commenter recommended that, to ease the burden, retesting be required every two or three years. Several commenters recommended that § 178.601(c) be revised to establish retesting requirements for single and composite packagings, and require that combination packagings be retested only if a change is made to the packaging.

RSPA believes that a distinction must be made between performance testing for certification of a packaging design, and performance testing as a production quality control check. A packaging design type must be shown to be capable of withstanding the prescribed performance tests at the start of initial production. RSPA also believes that the packaging manufacturer must institute quality control procedures to ensure that packagings are constructed that will consistently pass the required performance tests. RSPA does not believe that testing sample production packagings once in each 12-month period is adequate to ensure that all packagings are capable of meeting the required testing standards. Because each packaging must meet certain minimum standards, and testing the limited number of samples specified in this final rule is not a statistically valid way to ensure that each packaging meets those standards, the manufacturer may need to take other steps to ensure that each packaging meets the minimum standards. These other steps may mean testing an increased number of samples or testing samples to higher levels, such as increased drop heights and increased internal pressures. Or, manufacturers may need to employ other means of quality assurance during the manufacturing process to ensure that each packaging is capable of withstanding the prescribed tests.

In this final rule, "design qualification testing" and "periodic retesting" are defined in 178.601(c) to distinguish between the two concepts. Design qualification tests must be done only at the original start of production and any time a change is made to the packaging. Certain alternative test methods have been authorized for periodic and production testing, so that the cost to perform these periodic tests can be reduced. The definitions in no way relieve a packaging manufacturer of the responsibility for maintaining quality control during production of packagings.

RSPA believes that an annual testing frequency for single packagings is a relaxation of testing requirements for many types of packagings previously manufactured under a DOT specification. Further, RSPA believes that a good quality control program must include packaging testing much more frequently than once every 12 months, or other effective quality control measures during production. No quality control measures are established in this final rule. Therefore, § 178.601(e) requires that single and composite packagings be tested at a sufficient frequency to ensure that all packagings are capable of passing the prescribed tests, but not less than once every 12 months. In other words, testing must be performed every 365 days; it cannot be performed in June 1991 and then not repeated until July 1992.

RSPA recognizes the difficulties that third party agencies, as well as those who choose to self-certify, might face in keeping up with annual retesting of combination packagings. RSPA also recognizes that combination packagings are not produced in the same manner as single packagings, and the number of variations in combination packagings is very large. Paragraphs (g)(1) and (2) of § 178.601 authorize certain modifications to a tested package without further testing. These authorized modifications reduce the number of packagings requiring testing. The required periodic retesting frequency for combination packagings is two years in this final rule. This extended period for retesting further reduces the burden of testing on combination packaging manufacturers and users. It should be noted that a combination packaging may be tested to a "worst case" scenario—in other words, a packaging may be tested to Packing Group I levels, for a material with the highest expected specific gravity. That packaging could then be used for materials in a packing group with a lesser hazard, and for materials with an equal or lower specific gravity. Packagings tested in this manner would create more versatile packagings, reduce the number of different packaging designs necessary, and therefore reduce the amount of testing necessary. The design qualification tests and periodic retests may be performed by the manufacturer or by an independent testing agency.

Paragraph (f) clarifies test sample requirements. Paragraph (g) contains provisions for the selective testing of packagings that differ only in minor respects from the tested type, such as packagings which are produced with small reductions in dimensions. Some specific variations to combination packagings which are authorized without further testing of the package are included as paragraphs (g) (1) and (2). Paragraph (g)(3) contains a provision authorizing the Associate Administrator for Hazardous Materials Safety to approve the selective testing of packagings that differ only in minor respects from a tested type, other than those specifically outlined in paragraphs (g) (1) and (2).

Notice 87–4 proposed, in paragraph (e), to provide relief from testing of packagings which vary only slightly from a previously tested design. The ICAO Technical Instructions and the IMDG Code contain similar provisions but offer little guidance on what can be considered a minor variation. Commenters expressed concern about the amount of testing of combination packages that would be required under the proposed rule. These commenters asked that the final rule clarify the kinds of variations in packagings which would be considered "minor" and would, therefore, not require testing of the modified packaging. Commenters also expressed concern about required testing of packages which may be offered only on a one-time basis. They said that under the provisions of Notice 87–4, for certain unique shipments or emergency shipments, the shipper would be required to test a number of samples of the proposed packaging, while only one package or a small number of packagings might ever be shipped. These commenters recommended that

some provisions be added to the final rule to permit use of combination packages which have not been tested, provided the outer packaging has been tested for a "worst case" scenario.

RSPA issued a Notice of Competent Authority Ruling on March 22, 1990, advising the industry that the U.S. Competent Authority was limiting required testing of combination packagings that differ only in certain minor respects from the tested design type, in accordance with certain provisions agreed to by the U.N. Subcommittee. The Notice of Competent Authority Ruling also authorized the assembly and transportation of inner packagings of any type, for solids or liquids, without testing of each packaging configuration, when the outer packaging has been tested to some very specific, restrictive levels. The provisions published in the March 22, 1990 Notice are adopted in this final rule, with some modifications, as paragraphs (g) (1) and (2).

Paragraph (h), which was not proposed in Notice 87–4, authorizes the use of packagings which do not meet the specifications in §§ 178.504–178.523, or which are tested by methods other than those specified in Subpart M of Part 178, if the packaging is approved by the Associate Administrator for Hazardous Materials Safety. Packages approved under this provision must be shown to be equally effective, and the test methods used must be equivalent. This provision is similar to paragraph 9.3.13 of the U.N. Recommendations.

Paragraph (i) authorizes the Associate Administrator for Hazardous Materials Safety to require proof, through testing, that packagings meet specified requirements. It is envisioned that this testing will be performed by the manufacturer (with RSPA personnel or an independent inspector witnessing tests), by an independent testing agency, or by RSPA personnel. The paragraph is adopted essentially as proposed in paragraph (f) of Notice 87–4.

Paragraph (j) states that if an inner treatment or coating of a packaging is required for safety reasons, the manufacturer shall design the packaging so that the treatment or coating retains its protective properties after withstanding the performance tests. The U.N. Recommendations contain a similar provision at Paragraph 9.7.1.8. Several commenters to Notice 87–4 stated that it is unreasonable to expect an inner coating or liner to withstand the performance tests and retain its protective properties. RSPA believes that where an inner treatment or coating is required for safety reasons, it is important that the inner treatment or coating retain its protective properties during transportation. As the performance tests are designed to represent, to a certain extent, the potential transportation environment, RSPA believes it is important that an inner treatment or coating, if required for safety reasons, retain its protective properties after testing. Therefore, paragraph (j) is adopted as proposed in paragraph (g) of Notice 87–4.

Paragraph (k) (paragraph (h) in Notice 87–4) contains requirements for retention of test records. Retention of samples is not required for any packaging. Manufacturers are required to keep records of design qualification tests and periodic retests, and to make these records available for inspection by a representative of the Department upon request. The format of these records is left to the discretion of the individual manufacturer; however, paragraph (k) lists certain information which must be included in the test reports. The paragraph clarifies that test records must be maintained at each facility where packagings are manufactured, and at each facility where packaging tests are conducted.

A separate issue with regard to retesting has been raised by the DOT-approved third-party certification agencies. These agencies have asked whether a packaging design which has been certified by a third-party agency must be retested at the required frequency by the third-party agency that did the original design qualification testing. These agencies indicated that they would not be capable of handling the volume of testing which would be required if they must perform annual retesting in addition to the original design certification. However, some of the third-party agencies have also expressed a reluctance to have their identifying marks retained on a packaging that someone else has taken responsibility for testing. One third-party agency stated that the retest should be considered a production test which may be conducted by the packaging manufacturer, and the third-party agency should be called upon only for original design certification, and for a new certification when a change is made to the packaging.

The approvals issued by DOT for U.N. third-party certification agencies require that an identifier, consisting of a "+" symbol followed by two letters and a four digit number, be marked on all certifications. This identifier takes the place of the manufacturer's name and address. However, this third-party mark indicates only that the third-party certification agency is certifying that the design type they tested is capable of withstanding the prescribed performance tests. The third-party mark does not mean that the third-party agency is responsible for ensuring that each packaging manufactured after they have certified the design type is capable of withstanding the prescribed tests. The actual manufacturer of the packaging can be identified through the test number marked on the packaging in association with the third-party designator. The packaging manufacturer, or shipper, by continuing to place the U.N. markings on packagings, is certifying that each packaging is constructed in the same manner as the originally tested and certified packaging, and that each packaging is capable of withstanding the prescribed performance tests.

In this final rule, RSPA is maintaining the option of self-certification, both for original design qualification testing and for periodic retesting. If a packaging design is originally tested and certified by a third-party certification agency, the periodic retesting requirement may be satisfied by the packaging manufacturer or shipper. There must be an understanding on the part of the packaging manufacturer or shipper that the original packaging certification is only maintained if the packagings continue to be constructed and assembled in the same manner, if retesting is performed at the required frequency, and adequate quality control is exercised to ensure that each packaging produced is capable of withstanding prescribed performance tests.

Several commenters to Notice 87–4 raised another issue related to the periodic testing of packagings. These commenters pointed out that certain packagings manufactured from "expensive" materials, such as stainless steel, nickel, and monel, were previously exempted from periodic testing requirements. They stated that these containers are used in small numbers, and test samples represent very high cost in relation to production. The commenters were referring to DOT Specification 5 and 5C stainless steel drums, DOT Specification 5K nickel drums, and DOT Specification 5M monel drums. These drums were not required to be periodically tested during production if containers satisfactorily met prescribed tests at the start of original production, and the tested samples were retained for at least a year. DOT, in incorporating the exceptions from periodic hydrostatic pressure and drop testing, recognized that to require frequent, destructive testing of these "expensive" containers,

would result in an undue financial burden on the manufacturers of these specialty containers.

RSPA believes that some exceptions from periodic testing would not conflict with current U.N. Recommendations, because the U.N. Recommendations leave the question of periodic testing frequency to the discretion of the competent authority. Neither the ICAO Technical Instructions nor the U.N. Recommendations contain a specification for a metal drum other than steel or aluminum, although the general packing requirements and codes for designating types of packagings provide for one. RSPA does not believe that a complete exception from retesting will ensure, in the absence of detailed design specifications, that all containers produced are capable of withstanding the prescribed tests. RSPA recognizes that some exceptions from periodic retesting are needed for production of these containers to be economically sound. In this final rule, samples of containers made from stainless steel, monel, or nickel must be tested at least once in each 12-month period. However, for the periodic retest on these containers, only two sample drums must be used for performance of the drop test, one for each orientation. Also, only one sample is required for the hydrostatic pressure test and the stacking test. The exceptions for the use of fewer test samples are contained in the specific sections relating to the hydrostatic pressure, stacking, and drop tests. If the same container is used for more than one test, even fewer samples can be used. It should be noted that § 178.601(f) requires that each packaging intended to contain liquids be leakproofness-tested in accordance with § 178.604.

Section 178.602. Section 178.602 contains general requirements for filling and conditioning packages in preparation for testing. As proposed in Notice 87–4, § 178.602(c) would have required that if the materials to be transported are replaced for test purposes, the material used must be of the same or higher specific gravity, and their other physical properties (e.g. viscosity) must correspond as closely as possible. Many commenters urged RSPA to permit the use of water or a water and antifreeze mixture for testing in lieu of the actual hazardous material. These commenters stated that a less viscous material would actually create a more stringent drop test, since the dynamics of the less viscous material would create a greater surge effect inside the packaging.

The drop testing section, § 178.603, provides a way to test with water, even if the material to be shipped has a higher specific gravity, as long as the drop height is increased by a specified factor. The provision is consistent with paragraph 9.7.3.4 of the U.N. Recommendations, which gives the factors by which a drop height must be increased when water is used for the drop test in place of a material with a higher specific gravity. However, § 178.602(c) of Notice 87–4 did not provide for the use of water for testing as a substitute for materials with higher specific gravity. Paragraph 9.7.2.2 of the U.N. Recommendations specifically authorizes the use of water for drop testing. It was RSPA's intention to authorize the use of water for drop testing, provided the drop height used for the test is determined in accordance with § 178.603(d)(2). Therefore, § 178.602(c) of this final rule authorizes the use of water for the drop test.

A number of comments were received with regard to the conditioning requirements for paper and fiberboard packagings in proposed § 178.602(d) of Notice 87–4. That paragraph proposed that paper and fiberboard packagings be conditioned to standard temperature and humidity prior to design qualification testing. Periodic testing could be conducted at ambient conditions. One commenter urged RSPA to reconsider the requirement to condition paper and fiberboard packagings to standard temperature and relative humidity prior to testing. This commenter recommended that testing be authorized at ambient conditions for design qualification testing as well as periodic testing. This commenter stated that testing at ambient conditions would ensure that packagings are capable of withstanding the testing at standard conditions, since ambient conditions would generally produce a more stringent test. The commenter contended that to require conditioning of paper and fiberboard packagings prior to testing would effectively eliminate self-certification of these packagings. However, a number of commenters suggested that RSPA apply the conditioning requirements to periodic retesting as well as design qualification testing of paper and fiberboard packagings.

RSPA believes that standard conditions of temperature and relative humidity are necessary in testing paper and fiberboard packagings to ensure that the results obtained are consistent with testing done on similar packagings. Test results can vary dramatically with differences in relative humidity. RSPA has not received sufficient information concerning the variations in the performance of paper and fiberboard packagings, as a result of temperature and relative humidity changes, to warrant elimination of the conditioning requirements for design qualification testing. The design qualification tests are used as a base-line determination of the adequacy of a packaging for transportation of a given hazardous material. Conditioning requirements establish a consistency between test results. Therefore, the conditioning requirements for paper and fiberboard packagings are retained in this final rule.

Several commenters to § 178.602(d) stated that the specified temperature and relative humidity ranges are unreasonable. These commenters stated that if the temperature varies by as much as the specified +/− 2 °C, the relative humidity will vary more than the specified range (+/− 2%). The commenters suggested that RSPA either expand the relative humidity range or simply establish a lower limit on relative humidity, with no upper limit. They indicated that testing chambers are available which can maintain the specified conditions, but that these chambers are expensive and most self-certifying facilities do not currently have the chambers.

RSPA believes that the temperature and relative humidity conditions proposed in Notice 87–4 are attainable. These conditions are those that are specified in the U.N. Recommendations. RSPA acknowledges that the specified tolerances may be difficult to maintain, but has insufficient information to suggest that the conditions are unreasonable. The temperature and relative humidity conditions specified for paper and fiberboard packagings adopted in this final rule are the same as proposed in Notice 87–4. However, RSPA understands the commenters' concerns in this area, and invites the industry to provide information on experience with the conditioning requirements, as well as information on variations in the performance of paper and fiberboard packagings resulting from temperature and relative humidity changes. RSPA recently brought the issue of conditioning to the attention of the U.N. Subcommittee, and expects discussion of the issue at future Subcommittee meetings.

Sections 178.603 through 178.608—General. Sections 178.603 through 178.608 contain requirements for the drop test, leakproofness test, hydrostatic pressure test, stacking test, cooperage test, and vibration standard. These tests, based mostly on the U.N. Recommendations, apply to all of the

performance-oriented packagings in subpart L. It is believed that the performance tests, in conjunction with the enhanced provisions in §§ 173.24 and 173.24a, will ensure a level of packaging integrity equivalent to, or better than, that provided by previous DOT specifications for non-bulk packagings. The leakproofness test must be performed on all packagings intended to contain liquids, except for the inner packagings of combination packagings. The drop test, hydrostatic pressure test and stacking test are performed on representative samples of packagings, in accordance with the provisions of the specific test and the general test requirements of §§ 178.601 and 178.602. Proposed § 178.608 of Notice 87–4, which prescribed a chemical compatibility test for plastic receptacles, is withdrawn and replaced in the same section with a base-level vibration standard.

Section 178.603. Section 178.603 contains the requirements for drop testing. Based on comments to Notice 87–4, RSPA is reducing the number of test samples required for the periodic retesting of stainless steel, monel, and nickel packagings. For these containers, fewer samples are required for performance of the tests due to the cost of constructing and destructively testing these packagings in relation to the number of packagings produced. A provision in paragraph (b) of this section waives the requirement for conditioning a paper or fiberboard packaging in accordance with § 178.602(d) if the packaging is conditioned in accordance with § 178.603(b) (temperature reduced to −18 °C). This provision is consistent with paragraph 9.7.3.2 of the U.N. Recommendations.

Section 178.604. Section 178.604 contains requirements for leakproofness testing, and is adopted generally as proposed in Notice 87–4. Paragraph (a)(ii) contains a provision which authorizes the testing of the inner receptacle of a composite packaging without the outer packaging, provided the results of the test are not affected. As proposed in Notice 87–4, paragraph (d) authorizes, in lieu of the specified leakproofness test method, "other methods, at least equally effective," if approved by the Associate Administrator for Hazardous Materials Safety. Commenters to Notice 87–4 suggested that, in lieu of a requirement for approval of alternative leakproofness test methods, some of the methods which have been previously approved under DOT regulations, and which are in widespread use in the U.S. and Europe, should be specifically included in part 178. The alternative leakproofness tests proposed were:

(1) Application of soap suds over the exterior;

(2) Application of a water and oil mixture over the exterior;

(3) The helium method in a vacuum chamber; and

(4) Pressure differential.

One commenter proposed a specific pressure differential test procedure.

The tests proposed in Notice 87–4 represent the standards established internationally by the Committee of Experts on the Transport of Dangerous Goods. The tests were designed to be simple, easily repeatable tests which could be conducted anywhere in the world with limited equipment. Paragraph 9.7.4.3 of the U.N. Recommendations authorizes: "other methods at least equally effective" for the performance of the leakproofness test.

RSPA believes that the U.N. Recommendations provide for some discretion on the part of the competent authority in authorizing alternative, equivalent testing methods. As the U.S. competent authority, the Associate Administrator for Hazardous Materials Safety has some discretion in permitting alternative leakproofness tests, provided these alternatives are "at least equally effective". Many DOT specifications for drums authorize alternative leakage test methods if approved by the Associate Administrator for Hazardous Materials Safety. Under this approval system, helium tests, pressure differential tests, and tests using the application of soap suds over portions of the exterior of the drum have been authorized. RSPA believes that the helium test and the pressure differential test are methods which are at least as effective as the "full submersion" test, provided the equipment used is sensitive and accurate enough to detect leakage. RSPA also believes that application of soap suds or a water and oil mixture over all exterior seams and welds of a packaging is as effective as the full submersion test. Therefore, this final rule authorizes the helium test, the pressure differential test, and the application of soap suds or a water and oil mixture over exterior seams and welds as alternatives to the "full submersion" test. The alternative test methods are incorporated into appendix B to part 178.

RSPA has not received sufficient information to indicate that any other methods of leakproofness testing, such as the application of soap suds over portions of the drum exterior, are at least as effective as the "full submersion" test. However, a provision for approval of other methods of leakproofness testing is included in § 178.604(d). RSPA may consider other methods of leakproofness testing under the approval process if adequate information is presented to show that the alternative method is at least as effective as the specified test.

Section 178.605. Section 178.605 contains requirements for hydrostatic pressure testing. A reduced number of samples is authorized for periodic retesting of packagings constructed of stainless steel, monel, or nickel. Notice 87–4 proposed that the hydrostatic pressure test be performed on all inner packagings of combination packagings intended for transportation by aircraft. The HMR previously required only that packagings intended for transportation by aircraft be "capable of withstanding" specified internal pressures. Similarly, the ICAO Technical Instructions exempt inner packagings of combination packagings from hydrostatic pressure testing, but require that these inner packagings be capable of withstanding internal pressure. For consistency with the ICAO requirements, and as recommended by commenters, § 178.605 in this final rule states that the hydrostatic pressure test is not required for inner packagings of combination packagings intended for transportation by aircraft. However, these inner packagings must be capable of withstanding internal pressures in accordance with § 173.27(c).

Section 178.606. Section 178.606 contains the requirements for a stacking test. Notice 87–4 proposed to provide for "alternative test methods which yield equivalent results" for the stacking test, if approved by the Associate Administrator for Hazardous Materials Safety. Many commenters urged RSPA to allow the use of dynamic compression testing as an alternative to the stacking test, for the original design testing or for the periodic retest. One commenter stated that the stacking test procedure proposed in Notice 87–4 would be particularly burdensome to the plastic drum industry. As proposed in Notice 87–4, § 178.606(c), plastic containers would be subjected to the stacking test at an elevated temperature for 28 days. Further, Notice 87–4 proposed that the performance tests be repeated at least once in each 12-month period. Commenters, citing DOT specifications for fiber drums which authorize dynamic compression testing, presented specific recommendations for the required procedure and loads to be applied. ASTM D 642 was recommended

as a possible dynamic compression testing procedure.

RSPA does not believe that a packaging tested with alternative tests (other than the leakproofness test) may be certified as a U.N. packaging without a special marking to indicate that the packaging deviates from the U.N. Recommendations. Paragraph 9.4.4 of the U.N. Recommendations provides for a marking of "W" to signify that the packaging is manufactured to a specification differing from, but equivalent to, those in Section 9.6. This marking is not widely used in Europe for packagings tested using alternative testing methods. Because no specific provision is provided in the U.N. Recommendations for alternatives to the stacking test, RSPA does not believe it is appropriate to authorize alternative stacking test methods for the design qualification testing. Packaging design types which are tested in accordance with the U.N. Recommendations are assured of being acceptable internationally as well as for domestic use. However, RSPA accepts a commenter's suggestion that dynamic compression testing be authorized for the annual retest.

Commenters suggesting the use of dynamic compression testing as an alternative to the stacking test proposed some specific procedures for conducting the test. A commenter suggested that the required test load for dynamic compression testing be 1.5 times the required static compression load (stacking weight). Another commenter proposed an equation for determining the required load for dynamic compression versus a static stacking load.

In this final rule, RSPA is authorizing the use of dynamic compression testing as an alternative to the stacking test for the periodic retest required by § 178.601(e). Section 178.606 contains provisions for the use of dynamic compression testing. The test method specified is similar to that proposed by commenters and the procedure previously specified for DOT Specification 21C fiber drums. Some aspects of ASTM Standard D 642 are incorporated into the test procedure. The dynamic compression test may be performed at ambient temperature for plastic drums and jerricans. RSPA believes that the factor by which the load is increased for dynamic compression testing is large enough to account for differences between testing at ambient temperature and testing at elevated temperatures.

Section 178.607. Section 178.607 contains a cooperage test for bung-type wooden barrels, and is adopted as proposed in Notice 87-4.

Section 178.608. Section 178.608 contains a base level vibration standard. Proposed § 178.608 of Notice 87-4 contained a chemical compatibility test for plastic receptacles. Based on comments to Notice 87-4, the chemical compatibility test has been moved to part 173 as a shipper's responsibility rather than a packaging manufacturer's responsibility. Conversely, the requirement to ensure that all non-bulk packagings be capable of withstanding a vibration test, proposed in § 173.24a(a)(5), is added to in § 178.608 as a packaging manufacturer's responsibility. The base-level vibration standard is as it was proposed in Notice 87-4 in appendix C to part 173. For further discussion of the vibration standard, refer to the preamble discussion to § 173.24a.

Section 178.609. A new § 178.609 is added. This section contains test requirements for packagings for infectious substances. These test requirements were taken from the Sixth revised edition of the U.N. Recommendations.

Appendix B. A new appendix to part 178 contains alternate leakproofness test methods, including a helium test, a pressure differential test, and the application of soap suds or a water and oil mixture over the exterior of the packaging.

J. Part 179: Specifications for Tank Cars

Section 179.14. The proposal in Notice 87-4 to revise § 179.14 is withdrawn, since those changes were promulgated in the final rule for Docket HM-166W.

Section 179.101-1. One commenter recommended that the requirement that Class DOT 112 and 114 tank car tanks have an exterior finish coat of white paint if the tanks are equipped with thermal protection or insulation be deleted. RSPA and FRA agree that there is no need for such a finish coat on tanks that are equipped with insulation and have modified footnote 4 accordingly. Also footnotes 4 and 13 have been consolidated into a revised footnote 4.

Section 179.105. In § 179.105(c), "tank car tank" is changed to "insulated tank car tank" and "section A8.01" is amended to "section A8.00" to correct typographical errors. In addition, tank car tanks carrying any commodity are permitted to use the alternative valve sizing option of § 179.105(c).

Section 179.200-18. Section 179.200-18(b) is revised to be consistent with § 173.31(a)(15) and to clarify that tank car tanks equipped with safety vents may be used to transport combustible liquids, Class 9 materials, Other Regulated Materials, and non-regulated materials.

Section 179.201-1. The table in § 179.201-1 is revised by deleting all references to obsolete paragraphs.

XIII. Administrative Notices

A. Executive Order 12291

This final rule has been reviewed under the criteria specified in § 1(b) of Executive Order 12291 and is determined not to be a major rule. However, it is a significant rule under the regulatory procedures of the Department of Transportation (44 FR 11034). This final rule does not require a Regulatory Impact Analysis, or an environmental impact statement under the National Environmental Policy Act (42 U.S.C. 4321 et seq.) A regulatory evaluation is available for review in the Docket.

B. Executive Order 12612

This final rule has been reviewed in accordance with Executive Order 12612 ("Federalism"). It has no substantial direct effect on the States, on the current Federal-State relationship, or the current distribution of power and responsibilities among levels of government. Thus this final rule contains no policies that have Federalism implications, as defined in Executive Order 12612, and no Federalism Assessment is required.

C. Impact on Small Entities

A study prepared in 1985 by RSPA's Transportation Systems Center, entitled *Regulatory Evaluation of Performance-Oriented Packaging Standards for Fiberboard Boxes and Metal Drums*, examined those segments of industry where HM-181 would seem to have the greatest impact: Fiberboard boxes, metal drums (including the reconditioning industry), and exemptions reductions. Included in that study was an analysis of the impacts of performance-oriented packaging standards on small businesses. The conclusion of that analysis is summarized as follows:

> The impact of performance standards on the manufacturers of packaging and containers would not be significant, because only a small fraction of their output is used for hazardous materials, and only a portion of their hazmat packaging would be affected. Moreover, there is no reason to expect that significant changes in their production processes would be required. The primary burden of performance standards would be borne by chemical companies that ship hazardous materials in glass jars, bottles and jugs. Although a substantial number of these companies may be small entities, it is highly

unlikely that performance standards would increase their costs very significantly, because the cost of compliance would represent a very small fraction of their total costs. For shippers of hazardous materials in metal drums, cost savings would be realized through the use of thinner gauge drums. Finally, the operations of drum reconditioners would be virtually unaffected.

There are other costs which were not addressed in the study. These include the costs of retraining personnel in a new regulatory system. On the other hand, there are savings for both large and small firms which were not considered. A reduction in the types of packagings that must be carried in inventory, or simplification of requirements applicable to international transport for firms that do import or export business in hazardous materials, are examples of such savings. Simplifying the regulations would have a positive impact on small, unsophisticated businesses for whom regulatory compliance with complex requirements is particularly burdensome.

Based on limited information concerning size and nature of entities likely affected, I certify that this final rule will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

D. Paperwork Reduction Act

Information collection requirements contained in this final rule have been submitted for approval to the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act of 1980 (Public Law 96-511).

List of Subjects

49 CFR Part 107

Administrative practice and procedure, Hazardous materials transportation, Packaging and containers, Penalties, Reporting and recordkeeping requirements.

49 CFR Part 171

Exports, Hazardous materials transportation, Hazardous waste, Imports, Incorporation by reference, Reporting and recordkeeping requirements.

49 CFR Part 172

Hazardous materials transportation, Hazardous waste, Labeling, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 173

Hazardous materials transportation, Packaging and containers, Radioactive materials, Reporting and recordkeeping requirements, Uranium.

49 CFR Part 174

Hazardous materials transportation, Radioactive materials, Railroad safety.

49 CFR Part 175

Air carriers, Hazardous materials transportation, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 176

Hazardous materials transportation, Maritime carriers, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 177

Hazardous materials transportation, Motor carriers, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 178

Hazardous materials transportation, Motor vehicle safety, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 179

Hazardous materials transportation, Railroad safety, Reporting and recordkeeping requirements.

In consideration of the foregoing, 49 CFR parts 107, 171, 172, 173, 174, 175, 176, 177, 178, and 179 are amended as follows:

PART 107—HAZARDOUS MATERIALS PROGRAM PROCEDURES

1. The authority citation for part 107 continues to read as follows:

Authority: 49 App. U.S.C. 1421(c); 49 App. U.S.C. 1802, 1806, 1808–1811; 49 CFR 1.45 and 1.53 and app. A of part 1, Public Law 89–670 (49 U.S.C. 1653(d), 1655).

§ 107.101 [Amended]

2. In § 107.101, the introductory text is amended by removing the reference "chapter, 46 CFR part 64 or part 146" and inserting in its place the reference "chapter, or 46 CFR part 64".

§ 107.103 [Amended]

3. In § 107.103, paragraph (a) is amended by removing the reference "46 CFR part 64 or part 146" and inserting in its place the reference "or 46 CFR part 64".

§ 107.113 [Amended]

4. In § 107.113, paragraph (a) is amended by removing the reference "46 CFR part 64 or part 146" and inserting in its place the reference "or 46 CFR part 64".

§ 107.201 [Amended]

5. In § 107.201, paragraph (c) is amended by removing the words "and 46 CFR part 146".

5a. A new subpart G is added to part 107 as follows:

Subpart G—OMB Control Numbers Under the Paperwork Reduction Act

Sec.
107.601 Purpose and scope.
107.603 OMB control numbers.

Subpart G—OMB Control Numbers Under the Paperwork Reduction Act

§ 107.601 Purpose and scope.

This subpart collects and displays the control numbers assigned to the HMR collections of information by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1980. The section complies with the requirements of 5 CFR 1320.7(f), 1320.12, 1320.13 and 1320.14 (OMB regulations implementing the Paperwork Reduction Act of 1980) for the display of control numbers assigned by OMB to collections of information of the HMR.

§ 107.603 OMB control numbers.

(a) The table in paragraph (c) of this section sets forth the control numbers assigned to collection of information in the HMR by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1980.

(b) Column 1 lists the OMB control number assigned to the HMR collections of information. Column 2 contains the Report Title of the approved collection of information. Column 3 lists the part(s) or section(s) in 49 CFR identified or described in the collection of information.

(c) *Table.*

Current OMB control No.	Title	Title 49 CFR part or section where identified and described
2137-0014	Cargo Tank Specification Requirements	§§ 107.503, 178.320, 178.337, 178.338, 178.345, 180.417, 180.409.
2137-0018	Portable Tank Inspection and Testing	§§ 173.24, 173.32, 173.32a, 173.32b, 173.32d.

Current OMB control No.	Title	Title 49 CFR part or section where identified and described
2137-0022	Recordkeeping and Information Collection for Cylinders	§§ 173.34, 173.303(d).
2137-0034	Hazardous Material Shipping Papers	Part 172, §§ 172.7(a)(1), 173.22(a)(1), 173.56 (b)(1), (d)(1), (e)(2), 173.150(f)(3)(i), 174.10(c), 174.12, 174.25, 174.26(c), 174.114, 175.30, 175.35, 175.703, 176.9, 176.24, 176.27, 176.30, 176.31, 176.36, 176.89, 176.90, 176.95.
2137-0039	Hazardous Materials Incident Report	§§ 171.15, 171.16.
2137-0051	Rulemaking and Exemption Petitions	Part 107, subpart B, §§ 106.31, 107.5, 107.7, 107.103 (b)(11), (d).
2137-0510	RAM Transportation Requirements	§§ 173.22 (c), (d), 173.417 (a)(5), (b) (3), (4), 173.471 (a), (d), (f), 173.472, 173.476(a), 173.416(b), 173.473(a), 173.476(b), 173.473 (d), (e), 173.478(a), 173.417(b)(4), 173.477, 173.478, 173.415(a), 173.457(b), 173.414(d), 177.825 (a), (d).
2135-0542	Cryogenic Liquids Requirements	§§ 177.816, 177.818, 177.840(h), 173.33(d)(1)(ii).
2137-0557	Approvals for Hazardous Materials	§§ 107.402, 107.404, 107.300a, 173.300b, 173.51 (a), (b), 173.56 (a)(2), (b) (1), (2), (4), (c), (f), (g), (i), (j)(3), 173.63(c), 173.171 (a), (c), 173.180(a), 173.340 (a), (b), (c)(4), 173.336, 172.102(c)(B69), 173.21, 173.159(f), 173.3a, 173.4(a)(11), 173.24(e)(3)(iii), 173.128(c)(4), 173.225 (b)(4), (c), 173.245(b), 173.334(d), 173.7, 173.606, 176.340, 173.305, 173.315, 173.319, 173.334, 173.185(a)(h) (1), (2), (3)(ii), 173.214, 178.601(g), 178.606(c), 178.608(b)(5), 179.14(b), 172.101(k)(2)(3).
2137-0559	Rail Carriers and Tank Car Tank Requirements	§§ 173.31(a)(4), 173.31 (c)(8), (d), 173.31(d)(4), Table Footnote (i), 173.332(d), 173.336(b)(4), 173.366(a), 173.273(a)(4), 173.247(a)(14), 173.10, 174.9, 174.20, 174.50, 174.61(c), 174.63(d) (1), (2), 174.81 Table Note b, 177.8484(a) Table Note b, 174.114(a), 174.104 (c), (e), (f).
2137-0572	Testing Requirements for Packaging	§§ 178.601(1), 178.0-2(c).
2137-0575	Bulk Packaging Marking Requirements	§§ 172.332, 172.336.
2137-0580	Emergency Response Communication Standards	Part 172, subpart G.

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

6. The authority citation for part 171 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1808; 49 CFR part 1.

7. In § 171.3, paragraph (e) preceding Note 1 is removed, and Notes 1 and 2 are revised to read as follows:

§ 171.3 Hazardous waste.

* * * * *

Note 1: EPA requires shippers (generators) and carriers (transporters) of hazardous wastes that have identification numbers which must be displayed on hazardous waste manifests. See 40 CFR parts 262 and 263. (Identification number application forms may be obtained from EPA regional offices.)

Note 2: In 40 CFR part 263, the EPA sets forth requirements for the cleanup of releases of hazardous wastes.

8. Section 171.6 is added to read as follows:

§ 171.6 Units of measure.

(a) General. To ensure compatibility with international transportation standards, most units of measure in this subchapter are expressed using the International System of Units ("SI" or metric). Where SI units appear, they are the regulatory standard. U.S. standard or customary units, which appear in parentheses following the SI units, are for information only and are not intended to be the regulatory standard.

(b) Abbreviations for SI units of measure generally used throughout this subchapter are as shown in paragraph (c) of this section. Customary units shown throughout this subchapter are generally not abbreviated.

(c) Conversion values. (1) Conversion values are provided in the following table and are based on values provided in ASTM E 380-89, "Standard for Metric Practice."

(2) If an exact conversion is needed, the following method should be used.

TABLE OF CONVERSION FACTORS FOR SI UNITS

Column 1	Column 2	Column 3
Length	1 cm = 3.937008E −01 in. 1 m = 3.280840 ft	1 in = 2.540000E +00 cm 1 ft = 3.048000E −01 m
Thickness	1 mm = 3.937008E −02 in.	1 in = 2.540000E +01 mm
Mass (weight)	1 kg = 2.204622E +00 lb. 1 gr = 3.527397E −02 oz.	1 lb = 4.535924E −01 kg 1 oz = 2.834952E +01 gr
Pressure	1 kPa = 1.450377E −01 psi.	1 psi = 6.894757E +00 kPa
Volume (liquid)	1 l = 2.641720E −01 gal. 1 ml = 3.381402E −02 oz. 1 m³ = 3.531466E +01 ft³.	1 gal = 3.785412E +00 l 1 oz = 2.957353EE +01 ml 1 ft³ = 2.831685E −02 m³
Density	1 kg/m³ = 6.242797E −02 lb/ft³.	1 lb/ft³ = 1.601846E +01 kg/m³

ABBREVIATIONS FOR UNITS OF MEASURE ARE AS FOLLOWS

Unit of measure	Abbreviation
(SI)	
millimeter	mm
centimeter	cm
meter	m
gram	g
kilogram	kg
kiloPascal	kPa
liter	L
milliliter	ml
cubic meter	m³
(U.S.)	
inch	in
foot	ft
ounce	oz
pound	lb
pounds per square inch	psi
gallon	gal
cubic feet	ft³

9. Section 171.7 is revised to read as follows:

§ 171.7 Reference material.

(a) *Matter incorporation by reference*—(1) *General.* There is incorporated, by reference in parts 170–189 of this subchapter, matter referred to that is not specifically set forth. This matter is hereby made a part of the regulations in parts 170–189 of this subchapter. The matter subject to change is incorporated only as it is in effect on the date of issuance of the regulation referring to that matter. The material listed in paragraph (a)(3) has been approved for incorporation by reference by the Director of the Federal Register. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the **Federal Register**. Matters referenced by footnote are included as part of the regulations of this subchapter.

(2) *Accessibility of materials.* All incorporated matter is available for inspection at:

(i) The Dockets Branch, room 8419, NASSIF Building, 400 7th Street, SW., Washington, DC 20590; and

(ii) The Office of the Federal Register, room 8401, 1100 L Street, NW., Washington, DC.

(3) *Table of material incorporated by reference.* The following Table sets forth material incorporated by reference. The first column lists the name and address of the organization from which the material is available and the name of the material. The second column lists the section(s) of this subchapter, other than § 171.7, in which the matter is referenced. The second column is presented for information only and may not be all inclusive.

Source and name of material	49 CFR reference
The Aluminum Association, 420 Lexington Avenue, New York, NY 10017	
Aluminum Standards and Data, Seventh Edition, June 1982	178.65-5
American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018	
ANSI B9.1-89, Safety Code for Mechanical Refrigeration	173.306
ANSI B16.5-77, Steel Pipe Flanges, Flanged Fittings	178.345; 178.360
ANSI N14.1 Standard for Packaging of Uranium Hexafluoride for Transport, 1971, 1982 and 1987 Editions.	173.417; 173.420
American Pyrotechnics Association (APA), P.O. Box 213, Chestertown, MD 21620	
APA Standard 87-1, Standard for Construction and Approval for Transportation of Fireworks and Novelties, September 1987 Edition.	173.56
American Society of Mechanical Engineers, United Engineering Center, 354 47th Street, New York, NY 10017	
ASME Code, Sections II (Parts A and B), V, VIII, (Division 1) and IX of 1986 Edition of American Society of Mechanical Engineers Boiler and Pressure Vessel Code and Addenda through December 31, 1985.	173.32; 173.306; 173.315; 177.814; 178.245; 178.251; 178.255; 178.270; 178.337; 178.338; 178.340; 178.342; 178.343; 179.400; 180.407
ASME Code, Section V (FR Nondestructive Examination), 1977	180.407
ASME Code, Section IX (FR Welding and Brazing Qualification), 1977 and Addendum (1979)	178.245; 178.270; 178.337; 178.338
American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103	
Noncurrent ASTM Standards are available from: Engineering Societies Library, 354 E. 47th Street, New York, NY 10017	
ASTM A 20-81 Standard Specification for General Requirements for Steel Plates for Pressure Vessels, Revision C.	178.337; 179.102-17
ASTM A 47-68 Malleable Iron Castings	179.200
ASTM A 53-69a Welded and Seamless Steel Pipe	179.12-2
ASTM A 178-70 Electric Resistance Welded Carbon Steel Boiler Tubes	179.12-2
ASTM A 192-69 Seamless Carbon Steel Boiler Tubes for High Pressure Service	179.12-2
ASTM A 240-82 Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Fusion-Welded Unfired Pressure Vessels, Revision A.	178.358; 179.100; 179.200; 179.201; 179.220; 179.400
ASTM A 242-81 Standard Specification for High-Strength Low-Alloy Structural Steel	179.100
ASTM A 262-68 Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steels.	179.200
ASTM A 269-69 Seamless and Welded Austenitic Stainless Steel Tubing for General Service	179.12-2
ASTM A 285-78 Pressure Vessel Plates, Carbon Steel, Low and Intermediate-Tensile Strength	179.100; 179.200; 179.220; 179.300
ASTM A 300-58 Steel Plates for Pressure Vessels for Service at Low Temperatures	178.337
ASTM A 302-78 Pressure Vessel Plates, Alloy Steel, Manganese-Molybdenum and Manganese-Molybdenum Nickel.	179.100; 179.200; 179.220
ASTM A 312-70a Seamless and Welded Austenitic Stainless Steel Pipe	179.12-2
ASTM A 333-67 Seamless and Welded Steel Pipe for Low-Temperature Service	178.45
ASTM A 370-77 Standard Methods and Definition for Mechanical Testing of Steel Products	179.102-4, and 179.102-17
ASTM A 388-67 Ultrasonic Testing and Inspection of Heavy Steel Forging	178.45
ASTM A 441-81 Standard Specification for High-Strength Low-Alloy Structural Manganese Vanadium Steel.	178.338
ASTM A 514-81 Standard Specification for High-Yield Strength Quenched and Tempered Alloy Steel Plate, Suitable for Welding.	178.338
ASTM A 515-69 Carbon Steel Plates for Pressure Vessels for Intermediate and Higher Temperature Service.	179.100; 179.200; 179.220; 179.300
ASTM A 516-79b Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower-Temperature Service.	178.337; 179.100; 179.102; 179.200; 179.220
ASTM A 537-80 Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel.	179.100; 179.102
ASTM A 572-82 Standard Specification for High-Strength Low-Alloy Columbian-Vanadium Steels of Structural Quality.	178.338; 179.100
ASTM A 588-81 Standard Specification for High-Strength Low-Alloy Structural Steel with 50 Ksi Minimum Yield Point to 4 in. Thick.	179.100; 178.338
ASTM A 606-75 Standard Specification for Steel Sheet and Strip Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy, with Improved Atmospheric Corrosion Resistance, 1975 (Reapproved 1981).	178.338
ASTM A 612-72a High Strength Steel Plates for Pressure Vessels for Moderate and Lower Temperature Service.	178.337
ASTM A 633-79a Standard Specification for Normalized High-Strength Low-Alloy Structural Steel, 1979 Edition.	178.338
ASTM A 715-81 Standard Specification for Steel Sheet and Strip, Hot-Rolled, High-Strength, Low-Alloy with Improved Formability, 1981.	178.338
ASTM B 90-69 Magnesium Alloy Sheet and Plate	178.251
ASTM B 161-70 Nickel Seamless Pipe and Tube, 1970	179.12-2
ASTM B 162-69 Nickel Plate, Sheet, and Strip	179.200
ASTM B 209-69 Aluminum Alloy Sheet and Plate	179.100; 179.200; 179.220
ASTM B 210-70 Aluminum Alloy Drawn Stainless Tables (FR B210-68(78))	179.12-2

Source and name of material	49 CFR reference
ASTM B 221–76 Aluminum Alloy Extruded Bars, Rods, Shapes and Tubes	179.12–2
ASTM B 241–76 Standard Specification for Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube	179.12–2
ASTM B 557–84 Tension Testing Wrought and Cast Aluminum and Magnesium-Alloy Products	178.251
ASTM B 580–79 Standard Specification for Anodic Oxide Coatings on Aluminum, 1979	173.316; 173.318
ASTM D 56–79 Standard Method of Test for Flash Point by Tag Closed Tester	173.120
ASTM D 93–80 Standard Method of Test for Flash Point by Pensky Martens Closed Tester	173.120
ASTM D 445–88 Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).	171.8
ASTM D 1200–88 Viscosity by Ford Viscosity Cup	171.8
ASTM D 1838–64 Copper Strip Corrosion by Liquefied Petroleum (LP) Gases	173.315
ASTM D 3278–78 Flash Point of Liquids by Setaflash Closed Tester	173.120
ASTM D 4359–84 Standard Test Method for Determining Whether a Material is a Liquid or a Solid	171.8
ASTM E 8–89 Tension Testing of Metallic Materials	178.36; 178.37; 178.38; 178.39; 178.44; 178.45; 178.50; 178.51; 178.53; 178.55; 178.56; 178.57; 178.58; 178.59; 178.60; 178.61; 178.68; 178.251
ASTM E 23–60 Notched Bar Impact Testing of Metallic Materials	178.57; 179.400
ASTM E 681–85 Standard Test Method for Concentration Limits of Flammability of Chemicals	173.115
ASTM G 23–69 Standard Recommended Practice for Operating Light-and-Water Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials.	172.407; 172.519
ASTM G 26–70 Standard Recommended Practice for Operating Light-and-Water Exposure Apparatus (Xenon-Arc-Type) for Exposure of Nonmetallic Materials.	172.407; 172.519
American Water Works Association, 1010 Vermont Avenue, NW., Suite 810, Washington, DC 20005	
AWWA Standard C207–55, Steel Pipe Flanges, 1955	178.360
American Welding Society, 550 N. W. Le Jeune Road, Miami, Florida 33126	
AWS Code B 3.0; Standard Qualification Procedure; 1972 (FRB 3.0–41, rev. May 1973)	178.356
AWS Code D 1.0; Code for Welding in Building Construction (FR D 1.0–66)	178.356
Association of American Railroads, American Railroads Building, 50 F Street, NW., Washington, DC 20001	
AAR Specifications for Design, Fabrication and Construction of Freight Cars, Volume 1, 1988	179.100–23
AAR Specification for Tank Cars, Specification M–1002, 1988	173.31; 179.100
AAR Specification for Tank Cars, Specification M–1002, Section C—Part III, September 1988	179.6; 179.12; 179.100; 179.101; 179.102; 179.103; 179.105; 179.200; 179.201; 179.220; 179.300; 179.400
Chlorine Institute, Inc., 2001 L Street, NW., Suite 506, Washington, DC 20036	
Type 1½ JQ 225, Dwg. H51970, Revision D, April 5, 1989; or Type 1½ JQ 225, Dwg. H50155, Revision F, April 4, 1989.	173.315
Standard Chlorine Angle Valve Assembly, Dwg. 104–6, December 1, 1982	178.337–9
Excess Flow Valve with Removable Seat, Dwg. 101–6, September 1, 1973	178.337–11
Excess Flow Valve with Removable Basket, Dwg. 106–5, September 1, 1973	178.337–11
Standards for Housing and Manway Covers for Steel Cargo Tanks, Dwg. 137–3, September 1, 1982	178.337–10
Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, Virginia 22202	
CGA Pamphlet C–3, Standards for Welding and Brazing on Thin Walled Containers, 1975	178.47; 178.51; 178.54; 178.56; 178.57; 178.58; 178.60; 178.61; 178.68;
CGA Pamphlet C–6, Standards for Visual Inspection of Compressed Gas Cylinders, 1984	173.34;
CGA Pamphlet C–7, A Guide for the Preparation of Precautionary Markings for Compressed Gas Containers, Appendix A, issued April 15, 1983.	172.400a
CGA Pamphlet C–8, Standard for Requalification of DOT–3HT Cylinder Design, 1985	173.34
CGA Pamphlet C–12, Qualification Procedure for Acetylene Cylinder Design, 1979	173.34; 173.303
CGA Pamphlet C–14, Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems, 1979	173.34
CGA Pamphlet G–2.2 Tentative Standard Method for Determining Minimum of 0.2% Water in Anhydrous Ammonia, 1985.	173.315
CGA Pamphlet G–4.1, Cleaning Equipment for Oxygen Service, 1985	178.338
CGA Pamphlet S–1.1., Pressure Relief Device Standards Part 1—Cylinders for Compressed Gases, 1989	173.34
CGA Pamphlet S–1.2, Safety Relief Device Standards Part 2—Cargo and Portable Tanks for Compressed Gases, 1980.	173.315; 173.318
CGA Technical Bulletin TB–2, Guidelines for Inspection and Repair of MC–330 and MC–331 Cargo Tanks, 1980.	180.413
Department of Defense (DOD), 2461 Eisenhower Avenue, Alexandria, VA 22331	
DOD TB 700–2; NAVSEAINST 8020.8; AFTO 11A–1–47; DLAR 8220.1; Explosives Hazard Classification Procedure, December 1989.	173.56
Department of Energy (USDOE), 100 Independence Avenue SW., Washington, DC 20545	
USDOE publications available from: Superintendent of Documents, Government Printing Office (GPO) or The National Technical Information Service (NTIS).	
USDOE, CAPE–1662, Revision 1, and Supplement 1, Civilian Application Program Engineering Drawings	178.356; 178.358
USDOE, Material and Equipment Specification No. SP–9, Rev. 1, and Supplement—Fire Resistant Phenolic Foam.	178.356; 178.358
USAEC ORO 651—Uranium Hexafluoride Handling Procedures and Container Criteria, Revision 3, 1972	173.417; 178.356; 178.358
USDOE, KSS–471, November 30, 1986—Proposal for Modifications to U.S. Department of Transportation Specification 21PF–1, Fire and Shock Resistant Phenolic Foam—Insulated Metal Overpack.	178.356
Fertilizer Institute, 501 Second Street, NE., Washington, DC 20002	
Definition and Test Procedures for Ammonium Nitrate Fertilizer, August 1984	174.519
General Services Administration, Specification Office, Rm. 6662, 7th and D Street, SW., Washington, DC 20407	
Federal Specification RR–C–901C, Cylinders, Compressed Gas: High Pressure Steel DOT 3AA, and Aluminum Applications, January 15, 1981 (Superseding RR–C–901B, August 1, 1967).	172.302; 172.304

Source and name of material	49 CFR reference
Institute of Makers of Explosives,	
1120 19th Street, Suite 310, Washington, DC 20036-3605	
IME Safety Library Publication No. 22 (IME Standard 22), Recommendation for the Safe Transportation of Detonators in a Vehicle with Certain Other Explosive Materials, January 1, 1985.	177.835
International Atomic Energy Agency (IAEA),	
Wagramerstrasse 5, P.O. Box 100, A-1400, Vienna, Austria	
Also available from: Unipub Incorporated, P.O. Box 433, New York, NY 10016	
IAEA, Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1985, Revised Edition (as amended) (88 Supplement).	171.12; 173.416; 173.417; 173.473; 173.476
International Civil Aviation Organization (ICAO),	
P.O. Box 400, Place de l'Aviation Internationale, 1000 Sherbrooke Street West, Montreal, Quebec, Canada H3A 2R2	
ICAO Technical Instructions available from: INTEREG, International Regulations, Publishing and Distribution Organization, P.O. Box 60105, Chicago, IL 60660	
Technical Instructions for the Safe Transport of Dangerous Goods by Air, DOC 9284-AN/905, 1991-1992 Edition.	171.11; 172.401
International Maritime Organization (IMO),	
4 Albert Embankment, London, SE17SR, United Kingdom	
or New York Nautical Instrument & Service Corporation, 140 W. Broadway, New York, NY 10013	
International Maritime Dangerous Goods (IMDG) Code, 1990 Consolidated Edition	171.12; 172.401; 172.407; 176.2; 176.5; 176.11; 176.27; 176.30
International Organization for Standardization,	
Case Postale 56, CH-1211, Geneve 20, Switzerland	
Also available from: ANSI, 1430 Broadway, New York, NY 10018	
ISO-62-1974(E) Steels Tensile Testing	178.270-3
ISO-2431-1984(E) Standard Cup Method	173.121
ISO 780-1985(E) Packaging-Pictorial Marking and Handling of Goods	172.312
ISO 535-1976(E) Paper and Board-Determination of Water Absorption-Cobb Method	178.516
National Board of Boiler and Pressure Vessel Inspectors,	
1055 Crupper Avenue, Columbus, Ohio 43229	
National Board Inspection Code, A Manual for Boiler and Pressure Vessel Inspectors, NB-23, Rev. 4, 1983 Edition.	180.413
National Fire Protection Association,	
Batterymarch Park, Quincy, MA 02269	
NFPA Pamphlet No. 58—Standard for the Storage and Handling of Liquefied Petroleum Gases, 1979	173.315
National Institute of Standards and Technology,	
Department of Commerce, 5285 Port Royal Road, Springfield, VA 22151	
USDC, NBS Handbook H-28 (1957), 1957 Handbook of Screw-Thread Standards for Federal Services, Part II, December 1966 Edition.	178.45
National Motor Freight Traffic Association, Inc.,	
Agent 1616 P Street, NW., Washington, DC 20036	
National Motor Freight Classification NMF 100-I, 1982	177.841
Transport Canada,	
TDG Canadian Government Publishing Center, Supply and Services, Canada, Ottawa, Ontario, Canada K1A 0S9.	
Transportation of Dangerous Goods Regulations, as of July 1, 1985, incorporating Registration Numbers SOR/85-77, SOR/85-585 and SOR/85-609.	171.12a; 172.401; 172.502; 174.11
Truck Trailer Manufacturers Association,	
1020 Princess Street, Alexandria, Virginia 22314	
TTMA RP No. 81, Performance of Spring Loaded Pressure Relief Valves on MC 306, MC 307, and MC 312 Tanks, May 24, 1989 Edition.	178.345-10
TTMA TB No. 107, Procedure for Testing Inservice, Unmarked, and/or Uncertified MC 306 Type Cargo Tank Manhole Covers, May 24, 1989 Edition.	180.405
United Nations,	
United Nations Sales Section, New York, NY 10017	
UN Recommendations on the Transport of Dangerous Goods, Sixth Revised Edition (1989)	172.401; 172.407; 172.519;
UN Recommendations on the Transport of Dangerous Goods, Tests and Criteria, Second Edition, 1990	173.21; 173.56; 172.57

(b) *List of informational materials not requiring incorporation by reference.* The materials listed in this paragraph do not require approval for incorporation by reference and are included for informational purposes.

These materials may be used as noted in those sections in which the material is referenced.

Source and name of material	49 CFR reference
Association of American Railroads,	
American Railroads Building, 50 F Street, NW., Washington, DC 20001	
AAR Catalog Nos. SE60CHT; SE60CC; SE60CHTE; SE60CE; SE60DC; SE60DE	179.14
AAR Catalog Nos. SE67CC; SE67CE; SE67BHT; SE67BC; SE67BHTE; SE67BE	179.14
AAR Catalog Nos. SE68BHT; SE68BC; SE68BHTE; SE68BE	179.14
AAR Catalog Nos. SE69AHTE; SE69AE	179.14
AAR Catalog Nos. SF70CHT; SF70CC; SF70CHTE; SF70CE	179.14
AAR Catalog Nos. SF73AC; SF73AE; SF73AHT; SF73AHTE	179.14
AAR Catalog Nos. SF79CHT; SF79CC; SF79CHTE; SF79CE	179.14

Source and name of material	49 CFR reference
Bureau of Explosives, Hazardous Materials Systems (BOE), Association of American Railroads, American Railroads Building, 50 F Street, NW., Washington, DC 20001	
Fetterley's Formula (The Determination of the Relief Dimensions for Safety Valves on Containers in which Liquefied gas is charged and when the exterior surface of the container is exposed to a temperature of 1,200 °F.).	173.315
Pamphlet 6, Illustrating Methods for Loading and Bracing Carload and Less-Than-Carload Shipments of Explosives and Other Dangerous Articles, 1962.	174.55; 174.101; 174.112; 174.115; 174.290
Pamphlet 6A (includes Appendix No. 1, October 1944 and Appendix 2, December 1945), Illustrating Methods for Loading and Bracing Carload and Less-Than-Carload Shipments of Loaded Projectiles, Loaded Bombs, etc., 1943.	174.101; 174.290
Pamphlet 6C, Illustrating Methods for Loading and Bracing Trailers and Less-Than-Trailer Shipments of Explosives and Other Dangerous Articles Via Trailer-on-Flatcar (TOFC) or Container-on-Flatcar (COFC), 1985.	174.55; 174.63; 174.101; 174.112; 174.115
Emergency Handling of Hazardous Materials in Surface Transportation, 1987	171.7
Department of Transportation (USDOT), 400 Seventh St., SW., Washington, DC 20590	
Guidelines for Selecting Preferred Highway Routes for Highway Route Controlled Quantity Shipments of Radioactive Materials [51 FR 5968 February 18, 1986] Effective March 20, 1986, HMT-166T.	177.825
National Association of Corrosion Engineers, 1440 South Creek, Houston, Texas 77084	
NACE Standard TM-01-69, Test Method Laboratory Corrosion Testing of Metals for the Process Industries, 1969.	173.136
Society of Plastics Industries, Inc., Organic Peroxide Producers Safety Division, 1275 K Street, NW., Suite 400, Washington, DC 20005	
Self Accelerating Decomposition Temperature Test, 1972	173.21

10. In § 171.8, the following definitions and abbreviations are added, revised, or removed, as indicated, in appropriate alphabetical order:

§ 171.8 Definitions and abbreviations.

(Add:)

* * * * *

Bag means a flexible packaging made of paper, plastic film, textiles, woven material or other similar materials.

Bar means 1 BAR = 100 kPa (14.5 psi)

Box means a packaging with complete rectangular or polygonal faces, made of metal, wood, plywood, reconstituted wood, fiberboard, plastic, or other suitable material.

Class means hazard class. See "hazard class".

Class 1. See § 173.50 of this subchapter.

Class 2. See § 173.115 of this subchapter.

Class 3. See § 173.120 of this subchapter.

Class 4. See § 173.124 of this subchapter.

Class 5. See § 173.128 of this subchapter.

Class 6. See § 173.132 of this subchapter.

Class 7. See § 173.403 of this subchapter.

Class 8. See § 173.136 of this subchapter.

Class 9. See § 173.140 of this subchapter.

Closure means a device which closes an opening in a receptacle.

Combination packaging means a combination of packaging, for transport purposes, consisting of one or more inner packagings secured in a non-bulk outer packaging. It does not include a composite packaging.

Compatibility group letter means a designated alphabetical letter used to categorize different types of explosive substances and articles for purposes of stowage and segregation. See § 173.52 of this subchapter.

Composite packaging means a packaging consisting of an outer packaging and an inner receptacle, so constructed that the inner receptacle and the outer packaging form an integral packaging. Once assembled it remains thereafter an integrated single unit; it is filled, stored, shipped and emptied as such.

Crate means an outer packaging with incomplete surfaces.

Domestic transportation means transportation between places within the United States other than through a foreign country.

Dangerous when wet material. See § 173.124 of this subchapter.

Division means a subdivision of a hazard class.

Drum means a flat-ended or convex-ended cylindrical packaging made of metal, fiberboard, plastic, plywood, or other suitable materials. This definition also includes packagings of other shapes made of metal or plastic (e.g., round taper-necked packagings or pail-shaped packagings) but does not include cylinders, jerricans, wooden barrels or bulk packagings.

Hazard class means the category of hazard assigned to a hazardous material under the definitional criteria of part 173 of this subchapter and the provisions of the § 172.101 Table. A material may meet the defining criteria for more than one hazard class but is assigned to only one hazard class.

Infectious substance. See § 173.134 of this subchapter.

Inner packaging means a packaging for which an outer packaging is required for transport. It does not include the inner receptacle of a composite packaging.

Inner receptacle means a receptacle which requires and outer packaging in order to perform its containment function. The inner receptacle may be an inner packaging of a combination packaging or the inner receptacle of a composite packaging.

International transportation means transportation—

(1) Between any place in the United States and any place in a foreign country;

(2) Between places in the United States through a foreign country; or

(3) Between places in one or more foreign countries through the United States.

Jerrican means a metal or plastic packaging of rectangular or polygonal cross-section.

Manufacturer means any person who certifies that packaging complies with a UN or DOT standard, including a person who applies or directs another to apply a DOT specification marking or a UN mark to a packaging.

Maximum capacity means the maximum inner volume of receptacles or packagings.

Maximum net mass means the maximum net mass of contents in a single packaging or, as used in subpart M of part 178 of this subchapter, the

maximum combined mass of inner packaging, and the contents thereof.

n.o.s. description means a shipping description from the § 172.101 Table which includes the abbreviation "n.o.s.", and as contained in the lists in § 172.203(k)(3) of this subchapter, regarding additional description requirements.

Offshore supply vessel means a cargo vessel of less than 500 gross tons that regularly transports goods, supplies or equipment in support of exploration or production of offshore mineral or energy resources.

Outer packaging means the outermost enclosure of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings.

Packing group means a grouping according to the degree of danger presented by hazardous materials. Packing Group I indicates great danger; Packing Group II, medium danger; Packing Group III, minor danger. See § 172.101(f) of this subchapter.

Poisonous materials. See § 173.132 of this subchapter.

Primary hazard means the hazard class of a material as assigned in the § 172.101 Table.

Receptacle means a containment vessel for receiving and holding materials, including any means of closing.

Single packaging means a non-bulk packaging other than a combination packaging.

Specification packaging means a packaging conforming to one of the specifications or standards for packagings in part 178 or part 179 of this subchapter.

Subsidiary hazard means a hazard of a material other than the primary hazard. (See "primary hazard").

Table in § 172.101 or *§ 172.101 Table* means the Hazardous Materials Table in § 172.101 of this subchapter.

UN standard packaging means a specification packaging conforming to the requirements in subparts L and M of part 178 of this subchapter.

UN means United Nations.

Wooden barrel means a packaging made of natural wood, of round cross-section, having convex walls, consisting of staves and heads and fitted with hoops.

* * * * *

(Revise:)

* * * * *

Bottle means an inner packaging having a neck of relatively smaller cross section than the body and an opening capable of holding a closure for retention of the contents.

Bulk packaging means a packaging, other than a vessel or a barge, including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment and which has:

(1) An internal volume greater than 450 L (119 gallons) as a receptacle for a liquid;

(2) A capacity by weight greater than 400 kg (882 pounds) or internal volume greater than 450 L (119 gallons) as a receptacle for a solid; or

(3) A water capacity greater than 454 kg (1001 pounds) as a receptacle for a gas as defined in § 173.115 of this subchapter.

Captain of the Port (COTP) means the officer of the Coast Guard, under the command of a District Commander, so designated by the Commandant for the purpose of giving immediate direction to Coast Guard law enforcement activities within an assigned area. As used in this subchapter, the term "Captain of the Port" includes an authorized representative of the Captain of the Port.

Cargo aircraft only means an aircraft that is used to transport cargo and is not engaged in carrying passengers. For purposes of this subchapter, the terms "cargo aircraft only", "cargo-only aircraft" and "cargo aircraft" have the same meaning.

Combustible liquid. See § 173.120 of this subchapter.

Competent Authority means a national agency responsible under its national law for the control or regulation of a particular aspect of the transportation of hazardous materials (dangerous goods). The term "Appropriate Authority", as used in the ICAO Technical Instructions, has the same meaning as "Competent Authority". For purposes of this subchapter, the Associate Administrator for Hazardous Materials Safety is the Competent Authority for the United States.

Compressed gas. See § 173.115 of this subchapter.

Corrosive material. See § 173.136 of this subchapter.

Etiologic or infectious substance. See § 173.134 of this subchapter.

EX number means a number, preceded by the prefix "Ex-", which is assigned by the Associate Administrator for Hazardous Materials Safety to identify an explosive which has been approved. See § 173.56 of this subchapter.

Flammable gas. See § 173.115 of this subchapter.

Flammable liquid. See § 173.120 of this subchapter.

Flammable solid. See § 173.124 of this subchapter.

Flash point means the minimum temperature at which a substance gives off flammable vapors which, in contact with sparks or flame, will ignite. (For criteria, see § 173.121 of this subchapter.)

Gross weight or *Gross mass* means the weight of a packaging plus the weight of its contents.

Limited quantity, when specified as such in a section applicable to a particular material, means the maximum amount of a hazardous material for which there is a specific labeling or packaging exception.

Magnetic material. See § 173.21(d) of this subchapter.

Marking means a descriptive name, identification number, instructions, cautions, weight, specification, or UN marks, or combinations thereof, required by this subchapter on outer packagings of hazardous materials.

Name of contents means the proper shipping name as specified in § 172.101 of this subchapter.

Net weight, Net mass, or *Net quantity* means the mass or volume of hazardous material contained in a package, excluding the weight or volume of any packaging material, except in the case of explosive devices where the net weight is the weight of the finished device excluding packagings.

Non-bulk packaging means a packaging which has:

(1) An internal volume of 450 liters (119 gallons) or less as a receptacle for a liquid;

(2) A capacity of 400 kilograms (882 pounds) or less or an internal volume of 450 liters (119 gallons) or less as a receptacle for a solid; or

(3) A water capacity of 453.6 kilograms (1000 pounds) or less as a receptacle for a gas as defined in § 173.115 of this subchapter.

Organic peroxide. See § 173.128 of this subchapter.

ORM means other regulated material. See § 173.144 of this subchapter.

Oxidizer. See § 173.128 of this subchapter.

Packaging means a receptacle, which require an outer packaging, and any other components or materials necessary for the receptacle to perform its containment function and to ensure compliance with the minimum packing requirements of this subchapter. For radioactive materials packaging, see § 173.403 of this subchapter.

Passenger vessel means—

(1) A vessel subject to any of the requirements of the International Convention for the Safety of Life at Sea,

1974, which carries more than 12 passengers;

(2) A cargo vessel documented under the laws of the United States and not subject to that Convention, which carries more than 16 passengers;

(3) A cargo vessel of any foreign nation that extends reciprocal privileges and is not subject to that Convention and which carries more than 16 passengers; and

(4) A vessel engaged in a ferry operation and which carries passengers.

Pyrophoric liquid. See § 173.124(b) of this subchapter.

Trailership means a vessel, other than a carfloat, specifically equipped to carry motor transport vehicles and fitted with installed securing devices to tie down each vehicle. The term "trailership" includes "Roll-on/Roll-off (RO/RO)" vessels.

Spontaneously combustible material. See § 173.124(b) of this subchapter.

Water reactive material. See § 173.124(c) of this subchapter.

* * * * *

(Remove:)

* * * * *

"Away from"
"Class A explosives"
"Class B explosives"
"Class C explosives"
"NRC (non-reusable container)"
"Outside container"
"Poison A"
"Poison B"
"Pyrophoric solid"
"Separated by a complete hold or compartment from"
"Separated from"
"Separated longitudinally by a complete hold or compartment from"
"STC (single-trip container)"

* * * * *

11. Section 171.10 is revised to read as follows:

§ 171.10 Hazardous materials in bulk on board vessels or barges.

Except for transportation in bulk packagings (as defined in § 171.8) the requirements of this subchapter do not apply to the bulk carriage of hazardous materials by vessel or barge. See 46 CFR chapter I, subchapters D, I, N and O for requirements applicable to bulk carriage by vessel or barge.

11a. In § 171.11, paragraph (c) is revised, paragraphs (d)(4)(i) and (d)(4)(ii) are removed, paragraphs (d)(4)(iii) and (d)(4)(iv) are redesignated as (d)(4)(i) and (d)(4)(ii), respectively, and paragraph (d)(11) is added to read as follows:

§ 171.11 Use of ICAO Technical Instructions.

* * * * *

(c) Is not a forbidden material or package according to § 173.21 of this subchapter or Column 3 of the § 172.101 Table and does not meet the definition for Division 2.3 (see § 173.115(c) of this subchapter) or Division 6.1, Packaging Group I, for inhalation toxicity (see § 173.132 of this subchapter); and

(d) * * *

(11) Packages of Class 1 (explosive) materials must be marked in accordance with § 172.320 of this subchapter.

11b. Section 171.12 is revised to read as follows:

§ 171.12 Import and export shipments.

(a) *Importer's responsibility.* Except in the case of a shipment from Canada conforming to § 171.12a of this subchapter, each person importing a hazardous material into the United States shall provide the shipper and the forwarding agent at the place of entry into the United States timely and complete information as to the requirements of this subchapter that will apply to the shipment of the material within the United States. The shipper, directly or through the forwarding agent at the place of entry, shall provide the initial carrier in the United States the certificate of compliance required by § 172.204 of this subchapter. The carrier may not accept the material for transportation unless the required certification is provided.

(b) *IMDG Code.* The IMDG Code sets forth descriptions, classifications, packagings, labeling and vessel stowage requirements. Notwithstanding the provisions of this subchapter, a material which is packaged, marked, classed, labeled, placarded, described, stowed and segregated in accordance with the IMDG Code, and otherwise conforms to the requirements of this section, may be offered and accepted for transportation and transported within the United States. The following conditions and limitations apply:

(1) The provisions of this paragraph apply only if all or part of the transportation is by vessel.

(2) Bulk packagings must conform to the requirements of this subchapter.

(3) A number of materials listed in the IMDG Code may not be subject to the requirements of this subchapter. The provisions of this subchapter do not apply to materials listed in the IMDG Code which are not designated as hazardous materials under this subchapter.

(4) A material may not be transported under the provisions of this paragraph if it is—

(i) A forbidden material or package according to § 173.21 or Column 3 of the § 172.101 Table;

(ii) A Class 1 material, unless it is classed and approved under the procedures in subpart C of part 173 of this subchapter and conforms to the requirements of § 172.320 and part 176 of this subchapter;

(iii) A Division 2.3 material or Division 6.1, Packing Group I, material which is poisonous by inhalation, unless it is described and packaged in accordance with the provisions of this subchapter;

(iv) A Class 7 material;

(v) A material designated as a hazardous material under this subchapter which is not subject to the requirements of the IMDG Code;

(vi) A hazardous waste as defined in this subchapter unless—

(A) The word "Waste" precedes the proper shipping name on shipping papers and packages; and

(B) It conforms to the requirements of § 172.205 of this subchapter with respect to hazardous waste manifests;

(vii) A hazardous substance as defined in this subchapter, unless it conforms to the requirements of §§ 172.203(c) and 172.324 of this subchapter; or

(viii) A poisonous material, unless it conforms to the requirements of § 172.203(m) of this subchapter.

(c) *Use of IMDG Code in port areas.* Section 171.2 notwithstanding, a hazardous material (other than Division 1.1 or 1.2 or Class 7) being imported into or exported from the United States or passing through the United States in the course of being shipped between places outside the United States may be offered and accepted for transportation and transported by motor vehicle within a single port area (including contiguous harbors) when packaged, marked, classed, labeled, stowed and segregated in accordance with the IMDG Code, if the hazardous material is offered and accepted in accordance with the requirements of subparts C and F of part 172 of this subchapter pertaining to shipping papers and placarding and otherwise conforms to the applicable requirements of part 176 of this subchapter. (See § 176.11 of this subchapter for exceptions applicable to vessels.)

(d) *Use of IAEA regulations for radioactive materials.* Radioactive materials being imported into or exported from the United States, or passing through the United States in the course of being shipped between places outside the United States, may be offered and accepted for transportation when packaged, marked, labeled and otherwise prepared for shipment in accordance with IAEA "Regulations for the Safe Transport of Radioactive

Materials, Safety Series No. 6, 1985 Edition" including "Supplement 1988", if—

(1) Highway route controlled quantities (see § 173.403 of this subchapter) are shipped in accordance with §§ 172.203(d)(1)(iii), 172.507, 173.22(c), and 177.825 of this subchapter;

(2) For fissile materials and Type B packages, the competent authority certification and any necessary revalidation is obtained from the appropriate competent authorities as specified in §§ 173.471, 173.472 and 173.473 of this subchapter and all requirements of the certificates and revalidations are met;

(3) Type A package contents are limited in accordance with § 173.431 of this subchapter;

(4) The country of origin for the shipment has adopted the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1985 Edition", including "Supplement 1988"; and

(5) The requirements of §§ 173.448(e), 173.448(f), and 173.448(g)(3) of this subchapter are fulfilled, when applicable.

11c. Section 171.12a is revised to read as follows:

§ 171.12a Canadian shipments and packagings.

(a) *Scope and applicability.* This section sets forth provisions for the transportation by rail or highway of shipments of hazardous materials which conform to the regulations of the Government of Canada but which may differ from the requirements of this subchapter with regard to hazard communication, classification or packaging. The provisions apply only to shipments which originate in Canada and terminate in the U.S. or transit the U.S. to a Canadian or foreign destination, and to the return to Canada of empty bulk packages containing residues of hazardous materials which originally were imported into the U.S. Reciprocal provisions, applicable to exports from the U.S., appear in the regulations of the Government of Canada.

(b) *Conditions and limitations.* Notwithstanding the requirements of parts 172, 173 and 178 of this subchapter, a hazardous material that is classed, marked, labeled, placarded, described on a shipping paper, packaged and offered for transportation in accordance with the Regulations Respecting the Handling, Offering for Transport and Transporting of Dangerous Goods (the Transportation of Dangerous Goods Regulations or TDG Regulations), issued by the Government of Canada, may be offered and accepted for transportation and transported by motor vehicle or rail car within the United States. Copies of the TDG Regulations may be obtained from the Canadian Government Publishing Centre, Ottawa, Ontario K1A 0S9; Telephone (819) 956–4800. The following conditions and limitations apply:

(1) A number of materials listed in the TDG Regulations may not be subject to the requirements of this subchapter do not apply to materials listed in the TDG Regulations which are not designated as hazardous materials under this subchapter.

(2) A material designated as a hazardous material under this subchapter which is not subject to the requirements of the TDG Regulations may not be transported under the provisions of this section.

(3) A forbidden material or package according to § 173.21 of this subchapter or Column 3 of the § 172.101 Table may not be transported under the provisions of this section.

(4) A Class 1 material must be classed and approved under the procedures in subpart C of part 173 of this subchapter, and packages of Class 1 materials must be marked in accordance with § 173.320 of this subchapter.

(5) A Division 2.3 material, a Division 2.4 material other than anhydrous ammonia, or a Division 6.1, Packing Group I, material that is poisonous by inhalation, must be described and packaged in accordance with the provisions of this subchapter. Anhydrous ammonia may be described and packaged in accordance with the TDG Regulations if—

(i) The words "Inhalation Hazard" are included on shipping papers and packages, as required by this subchapter; and

(ii) The shipping paper contains an indication that the markings, labels and placards have been applied in conformance with the TDG Regulations and this paragraph (b)(5).

(6) Required shipping descriptions and package markings must be in English. Abbreviations may not be used unless specifically authorized by this subchapter. Identification numbers must be preceded by "UN" or "NA". The use of an identification number preceded by "PIN" is not authorized.

(7) Shipments must conform to the requirements for emergency response information in subpart G of part 172 of this subchapter.

(8) A Class 7 material must conform to the provisions of § 171.12(d) of this subchapter;

(9) For a hazardous waste as defined in this subchapter—

(i) The word "Waste" must precede the proper shipping name on shipping papers and packages; and

(ii) The requirements of § 172.205 of this subchapter with respect to hazardous waste manifests are applicable;

(10) A hazardous substance as defined in this subchapter must conform to the requirements of §§ 172.203(c) and 172.324 of this subchapter; and

(11) A poisonous material must conform to the requirements of § 172.203(m) of this subchapter.

(12) For a Division 4.3 material, the words "Dangerous When Wet" must appear in association with the basic description on shipping papers.

(13) When the provisions of this subchapter require the specification or UN standard packagings must be used for a hazardous material, only DOT specification or UN standard packaging authorized by this subchapter, or corresponding standards authorized by the TDG Regulations may be used. Cylinders not manufactured to DOT specifications must conform to the requirements of § 173.301(i) of this subchapter.

12. Section 171.14 is revised to read as follows:

§ 171.14 Transitional provisions for implementing requirements based on the UN Recommendations.

(a) *Purpose, scope, and exceptions.* A rule published in the **Federal Register** on December 21, 1990, effective October 1, 1991, resulted in a comprehensive revision of this subchapter based on the UN Recommendations. The purpose of the provisions of this section is to provide an orderly transition to the new requirements, so as to minimize any burdens associated with them. The transitional provisions of paragraph (b) of this section apply only to the new requirements in the December 21, 1990, rule and do not apply to the classification and hazard communication provisions of parts 172 and 173 of this subchapter for the following materials:

(1) New explosives, as defined in § 173.56 of this subchapter;

(2) Infectious substances, as defined in § 173.134 of this subchapter; and

(3) Materials which are poisonous by inhalation, including poisonous gases, as defined in §§ 173.115 and 173.132 of this subchapter.

(b) *Transition periods.* Notwithstanding the provisions of the December 21, 1990 rule and except as provided in paragraph (a) of this section, a hazardous material may be offered for transportation and transported, and

packagings may be manufactured, maintained and used in accordance with the provisions of this subchapter which were in effect on September 30, 1991 until—

(1) October 1, 1996, with regard to the maintenance and use of packagings under the provisions of part 173 of this subchapter, except for packagings for Division 2.3 materials and poisonous liquids subject to the "Poison-Inhalation Hazard" shipping paper description of § 172.203(m) of this subchapter;

(2) October 1, 1994, with regard to the manufacture and marking of packagings under the provisions of subpart B of part 173, subparts A, B, D, E, F, and G of part 178, and part 179 of this subchapter; and

(3) October 1, 1993, with regard to all provisions of the December 21, 1990 rule, other than those addressed in paragraphs (a) (1), (2), and (3) and (b) (1) and (2) of this section.

(c) Reference should be made to the List of CFR Sections Affected in the Finding Aids portion of this CFR volume to determine the sections affected by the December 21, 1990 rule.

(d) *Retention of 1990 49 CFR.* Users of 49 CFR parts 100–180 and 46 CFR part 146 are urged to retain the October 1990 editions of the CFR containing the superseded rules. If the 1990 49 CFR or 46 CFR is not available from the Government Printing Office, a list of commercial sources may be obtained by writing the Office of Hazardous Materials Standards, Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590–0001.

13. The heading of part 172 is revised to read as follows:

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS REQUIREMENTS AND EMERGENCY RESPONSE INFORMATION REQUIREMENTS

14. The authority citation for part 172 is revised to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1808; 49 CFR part 1, unless otherwise noted.

Subpart B—Table of Hazardous Materials and Special Provisions

15. The heading of subpart B of part 172 is revised to read as set forth above.

16. Section 172.101 is amended by revising paragraphs (a) through (j), adding paragraphs (k) and (l), and revising the Table up to the Appendix, as follows:

§ 172.101 Purpose and use of hazardous materials table.

(a) The Hazardous Materials Table (Table) in this section designates the materials listed therein as hazardous materials for the purpose of transportation of those materials. For each listed material, the Table identifies the hazard class or specifies that the material is forbidden in transportation, and gives the proper shipping name or directs the user to the preferred proper shipping name. In addition, the Table specifies or references requirements in this subchapter pertaining to labeling, packaging, quantity limits aboard aircraft and stowage of hazardous materials aboard vessels.

(b) *Column 1: Symbols.* Column 1 of the Table contains five symbols ("+", "A", "D", "I", and "W"), as follows:

(1) The plus (+) fixes the proper shipping name, hazard class and packing group for that entry without regard to whether the material meets the definition of that class or packing group or meets any other hazard class definition. An appropriate alternate proper shipping name and hazard class may be authorized by the Associate Administrator for Hazardous Materials Safety.

(2) The letter "A" restricts the application of requirements of this subchapter to materials offered or intended for transportation by aircraft, unless the material is a hazardous substance or a hazardous waste.

(3) The letter "D" identifies proper shipping names which are appropriate for describing materials for domestic transportation but may be inappropriate for international transportation under the provisions of international regulations (e.g., IMO, ICAO). An alternate proper shipping name may be selected when either domestic or international transportation is involved.

(4) The letter "I" identifies proper shipping names which are appropriate for describing materials in international transportation. An alternate proper shipping name may be selected when only domestic transportation is involved.

(5) The letter "W" restricts the application of requirements of this subchapter to materials offered or intended for transportation by vessel, unless the material is a hazardous substance or a hazardous waste.

(c) *Column 2: Hazardous materials descriptions and proper shipping names.* Column 2 lists the hazardous materials descriptions and proper shipping names of materials designated as hazardous materials. Modification of a proper shipping name may otherwise be required or authorized by this section. Proper shipping names are limited to those shown in Roman type (not italics).

(1) Proper shipping names may be used in the singular or plural and in either capital or lower case letters. Words may be alternatively spelled in the same manner as they appear in the ICAO Technical Instructions or the IMDG Code. For example "aluminum" may be spelled "aluminium" and "sulfur" may be spelled "sulphur". However, the word "inflammable" may not be used in place of the word "flammable".

(2) Punctuation marks and words in italics are not part of the proper shipping name, but may be used in addition to the proper shipping name. The word "or" in italics indicates that terms in the sequence may be used as the proper shipping name, as appropriate.

(3) The abbreviation "n.o.i." or "n.o.i.b.n." may be used interchangeably with "n.o.s.".

(4) Except for hazardous wastes, when qualifying words are used as part of the proper shipping name, their sequence in the package markings and shipping paper description is optional. However, the entry in the Table reflects the preferred sequence.

(5) When one entry references another entry by use of the word "see", if both names are in Roman type, either name may be used as the proper shipping name (e.g., Ethyl alcohol, see Ethanol).

(6) When a proper shipping name includes a concentration range as part of the shipping description, the actual concentration, if it is within the range stated, may be used in place of the concentration range. For example, an aqueous solution of hydrogen peroxide containing 30 percent peroxide may be described as "Hydrogen peroxide, aqueous solution *with not less than 20 percent but not more than 40 percent hydrogen peroxide*" or "Hydrogen peroxide, aqueous solution *with 30 percent hydrogen peroxide*".

(7) Use of the prefix "mono" is optional in any shipping name, when appropriate. Thus, Iodine monochloride may be used interchangeably with Iodine chloride. In "Glycerol alpha-monochlorohydrin" the term "mono" is considered a prefix to the term "chlorohydrin" and may be deleted.

(8) Hazardous substances. The appendix to this section lists materials which are listed or designated as hazardous substances under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Proper shipping names for hazardous substances (see the appendix

to this section and § 171.8 of this subchapter) shall be determined as follows:

(i) If the hazardous substance appears in the Table by technical name, then the technical name is the proper shipping name.

(ii) If the hazardous substance does not appear in the Table and is not a forbidden material, then an appropriate generic, or "n.o.s.", shipping name shall be selected corresponding to the hazard class (and packing group, if any) of the material as determined by the defining criteria of this subchapter (see §§ 173.2 and 173.2a of this subchapter). For example, a hazardous substance which is listed in the appendix but not in the Table and which meets the definition of a flammable liquid might be described as "Flammable liquid, n.o.s." or other appropriate shipping name corresponding to the flammable liquid hazard class.

(9) If the word "waste" is not included in the hazardous material description in Column 2 of the Table, the proper shipping name for a hazardous waste (as defined in § 171.8 of this subchapter), shall include the word "Waste" preceding the proper shipping name of the material. For example: Waste acetone.

(10) Mixture and solutions. (i) A mixture or solution comprised of a hazardous material identified in the Table by technical name and non-hazardous material shall be described using the proper shipping name of the hazardous material and the qualifying word "mixture" or "solution", as appropriate, unless—

(A) Except as provided in § 172.101(i)(4) the packaging specified in Column 8 is inappropriate to the physical state of the material;

(B) The shipping description indicates that the proper shipping name applies only to the pure or technically pure hazardous material;

(C) The hazard class, packing group, or subsidiary hazard of the mixture or solution is different from that specified for the entry; or

(D) There is a significant change in the measures to be taken in emergencies.

(ii) If one or more of the conditions specified in paragraphs (c)(10) (i)(A), (i)(B), (i)(C), and (i)(D) of this section are satisfied, then a proper shipping name shall be selected as prescribed in paragraph (c)(12)(ii) of this section.

(11) Except for a material subject to or prohibited by §§ 173.21, 173.51, 173.56(d), 173.56(e)(1) or 173.114a(g)(2) of this subchapter, a material for which the hazard class is uncertain and must be determined by testing or a material that is a hazardous waste may be assigned a tentative shipping name, hazard class and identification number, based on the shipper's tentative determination according to—

(i) Defining criteria in this subchapter;

(ii) The hazard precedence prescribed in § 173.2a of this subchapter; and

(iii) The shipper's knowledge of the material.

(12) Except when the proper shipping name in the Table is preceded by a plus (+)—

(i) If it is specifically determined that a material meets the definition of a hazard class or packing group, other than the class or packing group shown in association with the proper shipping name, or does not meet the defining criteria for a subsidiary hazard shown in Column 5 of the Table, the material shall be described by an appropriate proper shipping name listed in association with the correct hazard class, packing group, or subsidiary hazard for the material.

(ii) If an appropriate technical name is not shown in the Table, selection of a proper shipping name shall be made from the generic or n.o.s. descriptions corresponding to the specific hazard class, packing group, or subsidiary hazard, if any, for the material. The name that most appropriately describes the material shall be used; e.g., an alcohol not listed by its technical name in the Table shall be described as "Alcohol, n.o.s." rather than "Flammable liquid, n.o.s.". Some mixtures may be more appropriately described according to their application, such as "Coating solution" or "Extracts, flavoring, liquid", rather than by an n.o.s. entry, such as "Flammable liquid, n.o.s." It should be noted, however, that an n.o.s. description as a proper shipping name may not provide sufficient information for shipping papers and package markings. Under the provisions of subparts C and D of this part, the technical name of the constituent which makes the product a hazardous material may be required in association with the proper shipping name.

(iii) If a material meets the definition of more than one hazard class, and is not identified in the Table by a specific description or a dual hazard n.o.s. description (e.g., "Flammable liquid, corrosive, n.o.s."), the hazard class of the material shall be determined by using the precedence specified in § 173.2a of this subchapter, and an appropriate shipping description shall be selected as described in paragraph (c)(12)(ii) of this section.

(iv) If it is specifically determined that a material is not a forbidden material and does not meet the definition of any hazard class, the material is not a hazardous material.

(13) Organic peroxides. Generic proper shipping names for organic peroxides, as listed in Column 2 of the Table, shall be selected based on the technical name of the organic peroxide, in accordance with the provisions of § 173.225 of this subchapter.

(d) *Column 3: Hazard class or Division.* Column 3 contains a designation of the hazard class or division corresponding to each proper shipping name, or the word "Forbidden".

(1) A material for which the entry in this column is "Forbidden" may not be offered for transportation or transported. This prohibition does not apply if the material is diluted, stabilized or incorporated in a device and it is classed in accordance with the definitions of hazardous materials contained in part 173 of this subchapter.

(2) When a reevaluation of test data or new data indicates a need to modify the "Forbidden" designation or the hazard class or packing group specified for a material specifically identified in the Table, this data should be submitted to the Associate Administrator for Hazardous Materials Safety.

(3) A basic description of each hazard class and the section reference for class definitions appear in § 173.2 of this subchapter.

(4) Each reference to a Class 3 material is modified to read "Combustible liquid" when that material is reclassified in accordance with § 173.150(f) of this subchapter.

(e) *Column 4: Identification number.* Column 4 lists the identification number assigned to each proper shipping name. Those preceded by the letters "UN" are associated with proper shipping names considered appropriate for international transportation as well as domestic transportation. Those preceded by the letters "NA" are associated with proper shipping names not recognized for international transportation, except to and from Canada. Identification numbers in the "NA9000" series are associated with proper shipping names not appropriately covered by international hazardous materials (dangerous goods) transportation standards, or not appropriately addressed by international transportation standards for emergency response information purposes, except for transportation between the United States and Canada.

(f) *Column 5: Packing group.* Column 5 specifies one or more packing groups assigned to a material corresponding to the proper shipping name and hazard

class for that material. Classes 1, 2 and 7 materials, combustible liquids, and ORM–D materials do not have packing groups. Packing Groups I, II and III indicate the degree of danger presented by the material is either great, medium or minor, respectively. If more than one packing group is indicated for an entry, the packing group for the hazardous material is determined using the criteria for assignment of packing groups specified in subpart D of part 173. When a reevaluation of test data or new data indicates a need to modify the specified packing group(s), the data should be submitted to the Associate Administrator for Hazardous Materials Safety. Each reference in this column to a material which is a hazardous waste or a hazardous substance, and whose proper shipping name is preceded in Column 1 of the Table by the letter "A" or "W", is modified to read "III" on those occasions when the material is offered for transportation or transported by a mode in which its transportation is not otherwise subject to requirements of this subchapter.

(g) *Column 6: Labels.* Column 6 specifies the hazard warning label(s) required for a package filled with a material conforming to the associated hazard class and proper shipping name, unless the package is otherwise excepted from labeling by provisions in subpart D of part 172, or part 173 of this subchapter. The first label shown for each entry is indicative of the primary hazard of the material, additional labels are indicative of subsidiary hazards. Provisions in § 172.402 of this part may require that a label other than that specified in Column 6 be affixed to the package in addition to that specified in Column 6.

(h) *Column 7: Special provisions.* Column 7 specifies codes for special provisions applicable to hazardous materials. When Column 7 refers to a special provision for a hazardous material, the meaning and requirements of that special provision are as set forth in § 172.102 of this subpart.

(i) *Column 8: Packaging authorizations.* Columns 8A, 8B and 8C specify the applicable sections for exceptions, non-bulk packaging requirements and bulk packaging requirements, respectively, in part 173 of this subchapter. Columns 8A, 8B and 8C are completed in a manner which indicates that "§ 173." precedes the designated numerical entry. For example, the entry "202" in Column 8B associated with the proper shipping name "Gasoline" indicates that for this material conformance to non-bulk packaging requirements prescribed in § 173.202 of this subchapter is required. When packaging requirements are specified, they are in addition to the standard requirements for all packagings prescribed in § 173.24 of this subchapter and any other applicable requirements in subparts A and B of part 173 of this subchapter.

(1) Exceptions. Column 8A contains exceptions from some of the requirements of this subchapter. The referenced exceptions are in addition to those specified in subpart A of part 173 and elsewhere in this subchapter. A "None" in this column means no packaging exceptions are authorized, except as may be provided by special provisions in Column 7.

(2) Non-bulk packaging. Column 8B references the section in part 173 of this subchapter which prescribes packaging requirements for non-bulk packagings. A "None" in this column means non-bulk packagings are not authorized, except as may be provided by special provisions in Column 7. Each reference in this column to a material which is a hazardous waste or a hazardous substance, and whose proper shipping name is preceded in Column 1 of the Table by the letter "A" or "W", is modified to include "§ 173.203" or "§ 173.213", as appropriate for liquids and solids, respectively, on those occasions when the material is offered for transportation or transported by a mode in which its transportation is not otherwise subject to the requirements of this subchapter.

(3) Bulk packaging. Column 8C specifies the section in part 173 of this subchapter which prescribes packaging requirements for bulk packaging other than IM portable tanks. A "None" in this column means bulk packagings are not authorized, except as may be provided by special provisions in Column 7. Authorizations for use of IM portable tanks are set forth in Column 7. For each reference in this column to a material which is a hazardous waste or a hazardous substance, and whose proper shipping name is preceded in Column 1 of the Table by the letter "A" or "W" and which is offered for transportation or transported by a mode in which its transportation is not otherwise subject to the requirements of this subchapter:

(i) The column reference is §§ 173.240 or 173.241, as appropriate for a solid or liquid, respectively.

(ii) For a solid material, the exception provided in Special provision B54 is applicable.

(4) For a hazardous material which is specifically named in the Table and whose packaging sections specify packagings not applicable to the form of the material (i.e., packaging specified is for solid material and the material is being offered for transportation in a liquid form) the following table should be used to determine the appropriate packaging section:

Packaging section reference for solid materials	Corresponding packaging section for liquid materials
§ 173.211	§ 173.201
§ 173.212	§ 173.202
§ 173.213	§ 173.203
§ 173.240	§ 173.241
§ 173.242	§ 173.243

(j) *Column 9: Quantity limitations.* Columns 9A and 9B specify the maximum quantities that may be offered for transportation in one package by passenger-carrying aircraft or passenger-carrying rail car (Column 9A) or by cargo aircraft only (Column 9B), subject to the following:

(1) "Forbidden" means the material may not be offered for transportation or transported in the applicable mode of transport.

(2) The quantity limitation is "net" except where otherwise specified, such as for "Consumer commodity" which specifies "30 kg gross."

(3) When articles or devices are specifically listed by name, the net quantity limitation applies to the entire article or device (less packaging and packaging materials) rather than only to its hazardous components.

(4) A package offered or intended for transportation by aircraft and which is filled with a material forbidden on passenger-carrying aircraft but permitted on cargo aircraft only, or which exceeds the maximum net quantity authorized on passenger-carrying aircraft, shall be labelled with the CARGO AIRCRAFT ONLY label specified in § 172.448 of this part.

(k) *Column 10: Vessel stowage requirements.* Column 10A (Vessel stowage) specifies the authorized stowage locations on board cargo and passenger vessels. Column 10B (Other provisions) specifies codes for stowage requirements for specific hazardous materials. The meaning of each code in Column 10B is set forth in § 176.84 of this subchapter. Section 176.63 of this subchapter sets forth the physical requirements for each of the authorized locations listed in Column 10A. (For bulk transportation by vessel, see 46 CFR parts 30 to 40, 70, 98, 148, 151, 153 and 154.) The authorized stowage locations specified in Column 10A are defined as follows:

(1) Stowage category "A" means the material may be stowed "on deck" or

"under deck" on a cargo vessel and a passenger vessel.

(2) Stowage category "B" means the material may be stowed "on deck" or "under deck" on a cargo vessel, but must be stowed "on deck" on a passenger vessel.

(3) Stowage category "C" means the material must be stowed "on deck" on a cargo vessel and on a passenger vessel.

(4) Stowage category "D" means the material must be stowed "on deck" on a cargo vessel, but is prohibited on a passenger vessel.

(5) Stowage category "E" means the material may be stowed "on deck" or "under deck" on a cargo vessel, but is prohibited on a passenger vessel.

(l) *Changes to the Table.* (1) Unless specifically stated otherwise in a rule document published in the **Federal Register** amending the Table—

(i) Such a change does not apply to the shipment of any package filled prior to the effective date of the amendment; and

(ii) Stocks of preprinted shipping papers and package markings may be continued in use, in the manner previously authorized, until depleted or for a one-year period, subsequent to the effective date of the amendment, whichever is less.

(2) Any alteration of a shipping description or associated entry which is listed in the § 172.101 Table must receive prior written approval from the Associate Administrator for Hazardous Materials Safety.

§ 172.102 Hazardous Materials Table

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Accellerene, see p-Nitrosodimethylaniline												
	Accumulators, electric, see Batteries, wet *etc.*												
D	Accumulators, pressurized, pneumatic *or* hydraulic (*containing non-flammable gas*).	2.2	NA1956		NONFLAMMABLE GAS.		306	306	None	No limit	No limit	A	
	Acetal	3	UN1088	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	E	
	Acetaldehyde	3	UN1089	I	FLAMMABLE LIQUID.	A3, B16, T20, T26, T29.	None	201	243	Forbidden	30 L	E	
A	Acetaldehyde ammonia	9	UN1841	III	CLASS 9		155	204	241	200 kg	200 kg	A	34
	Acetaldehyde oxime	3	UN2332	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	A	
	Acetic acid, glacial *or* Acetic acid solution, *more than 80 per cent acid, by mass.*	8	UN2789	II	CORROSIVE	A3, A6, A7, A10 B2, T8.	154	202	242	1 L	30 L	A	12, 21, 48
	Acetic acid solution, *more than 10 per cent but not more than 80 per cent acid, by mass.*	8	UN2790	II	CORROSIVE	A3, A6, A7, A10 B2, T8.	154	202	242	1 L	30 L	A	112
	Acetic anhydride	8	UN1715	II	CORROSIVE	A3, A6, A7, A10, B2, T8.	154	202	242	1 L	30 L	A	40
	Acetone	3	UN1090	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Acetone cyanohydrin, stabilized	6.1	UN1541	I	POISON	2, A3, B9, B14, B74, B76, B77, N34, T38, T43, T45.	None	227	244	Forbidden	30 L	D	25, 40, 49, M2
	Acetone oils	3	UN1091	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	
	Acetonitrile, see Methyl cyanide												
	Acetyl acetone peroxide with more than 9% by mass active oxygen.	Forbidden											
	Acetyl benzoyl peroxide, solid, or more than 40% in solution	Forbidden											
	Acetyl bromide	8	UN1716	II	CORROSIVE	B2, T12, T26	154	202	242	1 L	30 L	C	8, 40
	Acetyl chloride	3	UN1717	II	FLAMMABLE LIQUID, CORROSIVE.	A3, A6, A7, N34, T16, T26.	None	202	243	1 L	5 L	B	40
	Acetyl cyclohexanesulfonyl peroxide, more than 82 per cent wetted with less than 12 per cent water.	Forbidden											
	Acetylene, dissolved	2.1	UN1001		FLAMMABLE GAS.		None	303	None	Forbidden	15 kg	D	25, 40, 57
	Acetylene (liquefied)	Forbidden											
	Acetylene silver nitrate	Forbidden											
	Acetylene tetrabromide, see Tetrabromoethane												
	Acetyl iodide	8	UN1898	II	CORROSIVE	B2, T9	154	202	242	1 L	30 L	C	8, 40
	Acetyl methyl carbinol	3	UN2621	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Acetyl peroxide, *see* Diacetyl peroxide, *etc.*												
	Acetyl peroxide, solid, or more than 25 percent in solution	Forbidden											
	Acid butyl phosphate, see Butyl acid phosphate												
	Acid, sludge, *see* Sludge acid												
	Acridine	6.1	UN2713	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Acrolein dimer, stabilized	3	UN2607	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	40

+	Acrolein, inhibited	6.1	UN1092	I	POISON, FLAMMABLE LIQUID.	1, B9, B12, B14, B30, B42, B72, B77, T38, T43, T45.	None	226	244	Forbidden	Forbidden	D	40, M2
	Acrylamide	6.1	UN2074	III	KEEP AWAY FROM FOOD.	T8	153	213	240	100 kg	200 kg	A	12
	Acrylic acid, inhibited	8	UN2218	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	C	8, 12, 21, 25, 40
	Acrylonitrile, inhibited	3	UN1093	I	FLAMMABLE LIQUID, POISON.	B9	None	201	243	Forbidden	30 L	E	40
	Actuating cartridge, explosive, see Cartridges, power device												
	Adhesives, *containing a flammable liquid*	3	UN1133	II	FLAMMABLE LIQUID.	B52, T7, T30	150	173	242	5 L	60 L	E, B	M4
				III	FLAMMABLE LIQUID.	B1, B52, T7, T30.	150	173	242	60 L	220 L	E,B,A	M4
	Adiponitrile	6.1	UN2205	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A	25
	Aerosols,*corrosive, n.o.s., each not exceeding 1L capacity*	2.2	UN1950		NONFLAMMABLE GAS, CORROSIVE.		None	302, 304, 305	None	75 kg	150 kg	A	40, 48, 85
	Aerosols, *flammable, n.o.s. (each not exceeding 1 L capacity)*	2.1	UN1950		FLAMMABLE GAS.		306	302, 304, 305	None	75 kg	150 kg	A	40, 48, 85
	Aerosols, *non-flammable, n.o.s. (each not exceeding 1 L capacity).*	2.2	UN1950		NONFLAMMABLE GAS.		306, 307	302, 304, 305	None	75 kg	150 kg	A	48, 85
	Aerosols, *poison, n.o.s., each not exceeding 1L capacity*	2.3	UN1950		POISON GAS	3	None	302, 304, 305	None	Forbidden	Forbidden	A	40, 48, 85
	Air, compressed	2.2	UN1002		NONFLAMMABLE GAS.	B13	306	302	302	75 kg	150 kg	A	
	Aircraft evacuation slides, *see* Life saving appliances *etc.*												
D	Aircraft hydraulic power unit fuel tank (*containing a mixture of anhydrous hydrazine and monomethyl hydrazine*) (*M86 fuel*).	3	NA9302	I	FLAMMABLE LIQUID, POISON, CORROSIVE.		None	172	None	Forbidden	30 L	E	
	Aircraft survival kits, *see* Life saving appliances *etc.*												
	Air, refrigerated liquid (*cryogenic liquid*)	2.2	UN1003		NONFLAMMABLE GAS, OXIDIZER.		320	316	318, 319	Forbidden	150 kg	A	51
	Air, refrigerated liquid, (*cryogenic liquid*)*non-pressurized*	2.2	UN1003		NONFLAMMABLE GAS, OXIDIZER.		320	316	318, 319	Forbidden	Forbidden	A	85
	Alcoholic beverages	3	UN3065	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	5 L	60 L	A	
	Alcohols, n.o.s	3	UN1987	I	FLAMMABLE LIQUID.	T8, T31	None	201	243	1 L	30 L	E, B	M3
				II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	E, B	M3
				III	FLAMMABLE LIQUID.	T7, T30	150	203	242	60 L	220 L	A	M3
	Alcohols, toxic, n.o.s	3	UN1986	I	FLAMMABLE LIQUID, POISON.	T8, T31	None	201	243	Forbidden	30 L	E, B	40, M3
				II	FLAMMABLE LIQUID, POISON.	T8, T31	None	202	243	1 L	60 L	E, B	40, M3
	Aldehydes, n.o.s	3	UN1989	I	FLAMMABLE LIQUID.	T8, T31	None	201	243	1 L	30 L	E, B	M3
				II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	E, B	M3
				III	FLAMMABLE LIQUID.	T7, T30	150	203	242	60 L	220 L	A	M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Aldehydes, toxic, n.o.s.	3	UN1988	I	FLAMMABLE LIQUID, POISON.	T8, T31	None	201	243	Forbidden	30 L	E, B	40, M3
				II	FLAMMABLE LIQUID, POISON.	T8, T31	None	202	243	1 L	60 L	E, B	40, M3
	Aldol	6.1	UN2839	II	POISON	T8	None	202	243	5 L	60 L	A	48
D	Aldrin, *liquid*	6.1	NA2762	II	POISON		None	202	243	5 L	60 L	B	M4
D	Aldrin, *solid*	6.1	NA2761	II	POISON		None	212	242	25 kg	100 kg	A	40, M1
	Alkali metal alloys, liquid, n.o.s.	4.3	UN1421	I	DANGEROUS WHEN WET.	A2, A3, N34	None	201	244	Forbidden	1 L	D	M3
	Alkali metal amalgams	4.3	UN1389	I	DANGEROUS WHEN WET.	A2, A3, N34	None	201	244	Forbidden	1 L	D	M4
	Alkali metal amides	4.3	UN1390	II	DANGEROUS WHEN WET.	A6, A7, A8, A19, A20.	None	212	241	15 kg	50 kg	E	40
	Alkali metal dispersions, *or* Alkaline earth metal dispersions	4.3	UN1391	I	DANGEROUS WHEN WET.	A2, A3, N34	None	201	244	Forbidden	1 L	D	
	Alkaline corrosive liquids, n.o.s., see Caustic alkali liquids, n.o.s.												
	Alkaline earth metal alloys, n.o.s.	4.3	UN1393	II	DANGEROUS WHEN WET.	A19	None	212	241	15 kg	50 kg	E	M3
	Alkaline earth metal amalgams	4.3	UN1392	I	DANGEROUS WHEN WET.	A19, N34, N40	None	211	242	Forbidden	15 kg	D	M4
	Alkaloids, liquid, poisonous, n.o.s., *or* alkaloid salts, liquid, poisonous, n.o.s.	6.1	UN3140	I	POISON	A4, B38, B40, T42.	None	201	243	1 L	30 L	A	M3
				II	POISON	T14	None	202	243	5 L	60 L	A	M3
				III	KEEP AWAY FROM FOOD.	A34, T7	153	203	241	60 L	220 L	A	M3
	Alkaloids, solid, n.o.s. *or* alkaloid salts, solid, n.o.s. *poisonous*	6.1	UN1544	I	POISON		None	211	242	5 kg	50 kg	A	M3
				II	POISON		None	212	242	25 kg	100 kg	A	M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M3
	Alkylamines, n.o.s. *or* Polyalkyamines, n.o.s. *flammable, corrosive.*	3	UN2733	I	FLAMMABLE LIQUID, CORROSIVE.	T42	None	201	243	0.5 L	2.5 L	D, B	40, M3
				II	FLAMMABLE LIQUID, CORROSIVE.	T8, T31	None	202	243	1 L	5 L	D, B	40, M3
				III	FLAMMABLE LIQUID, CORROSIVE.	B1, T8, T31	None	203	242	5 L	60 L	A	40, M3
	Alkylamines, n.o.s, *or* Polyalkylamines, n.o.s., *corrosive*	8	UN2735	I	CORROSIVE	A3, A6, B4, N34, T42.	None	201	242	0.5 L	2.5 L	A	M3
				II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A	M3
				III	CORROSIVE	T8	154	203	241	5 L	60 L	A	M3
	Alkylamines, n.o.s. *or* Polyalkylamines, n.o.s.*corrosive, flammable.*	8	UN2734	I	CORROSIVE, FLAMMABLE LIQUID.	A3, A6, N34, T8, T31.	None	201	243	0.5 L	2.5 L	A	48, M3
				II	CORROSIVE, FLAMMABLE LIQUID.	T8, T31	None	202	243	1 L	30 L	A	48, M3
	Alkyl, Aryl *or* Toluene sulfonic acid, liquid, *with more than 5 per cent free sulfuric acid.*	8	UN2584	II	CORROSIVE	B2, T8, T27	154	202	242	1 L	30 L	B	9
	Alkyl, Aryl *or* Toluene sulfonic acid, liquid, *with not more than 5 per cent free sulfuric acid.*	8	UN2586	III	CORROSIVE	T8	154	203	241	5 L	60 L	B	9
	Alkyl, Aryl *or* Toluene sulfonic acid, solid, *with more than 5 per cent free sulfuric acid.*	8	UN2583	II	CORROSIVE		154	212	240	15 kg	50 kg	A	

Alkyl, Aryl *or* Toluene sulfonic acid, solid, *with not more than 5 per cent free sulfuric acid.*	8	UN2585	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
Alkyl phenols, liquid, n.o.s. (*including C2-C8 homologues*)	6.1	UN3145	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M2
Alkyl phenols, solid, n.o.s. (*including C2-C8 homologues*)	6.1	UN2430	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
Allethrin, see Pesticides, liquid, toxic, n.o.s.												
Allyl acetate	3	UN2333	II	FLAMMABLE LIQUID, POISON.	T8	None	202	243	1 L	60 L	E	40
Allyl alcohol	6.1	UN1098	I	POISON, FLAMMABLE LIQUID.	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	Forbidden	Forbidden	E	40
Allylamine	6.1	UN2334	I	POISON, FLAMMABLE LIQUID.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	E	40
Allyl bromide	3	UN1099	I	FLAMMABLE LIQUID, POISON.	T18	None	201	243	Forbidden	30 L	B	40, M2
Allyl chloride	3	UN1100	I	FLAMMABLE LIQUID, POISON.	T18, T26	None	201	243	Forbidden	30 L	E	40, M2
Allyl chlorocarbonate, see Allyl chloroformate												
+ Allyl chloroformate	8	UN1722	I	CORROSIVE, POISON.	1, A3, B9, B14, B30, B72, N41, T36, T43, T44.	None	226	244	Forbidden	2.5 L	D	21, 40, 48, 95
Allyl ethyl ether	3	UN2335	II	FLAMMABLE LIQUID, POISON.	T8	None	202	243	1 L	60 L	E	40
Allyl formate	3	UN2336	I	FLAMMABLE LIQUID, POISON.	T18, T26	None	201	243	Forbidden	30 L	E	40
Allyl glycidyl ether	3	UN2219	III	FLAMMABLE LIQUID, POISON.	B1, T7	150	203	242	60 L	220 L	A	
Allyl iodide	3	UN1723	II	FLAMMABLE LIQUID, CORROSIVE.	A3, A6, N34, T16.	None	201	243	0.5 L	2.5 L	B	40
+ Allyl isothiocyanate, stabilized	6.1	UN1545	II	POISON	2, A3, A7, B9, B14, B32, B74, T17, T38, T43, T45.	None	227	244	Forbidden	60 L	D	40
Allyltrichlorosilane, stabilized	8	UN1724	II	CORROSIVE, FLAMMABLE LIQUID.	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	12, 21, 40, 48
Aluminum alkyl halides	4.2	UN3052	I	SPONTANEOUSLY COMBUSTIBLE.	B9, B11, T28, T29, T40.	None	181	244	Forbidden	Forbidden	D	
Aluminum alkyl hydrides	4.2	UN3076	I	SPONTANEOUSLY COMBUSTIBLE.	B9, B11, B14, T28, T29, T40.	None	181	244	Forbidden	Forbidden	D	
Aluminum alkyls	4.2	UN3051	I	SPONTANEOUSLY COMBUSTIBLE.	B9, B11, T28, T29, T40.	None	181	244	Forbidden	Forbidden	D	
Aluminum borohydride *or* Aluminum borohydride in devices	4.2	UN2870	I	SPONTANEOUSLY COMBUSTIBLE, DANGEROUS WHEN WET.	B11	Done	181	244	Forbidden	Forbidden	D	
Aluminum bromide, anhydrous	8	UN1725	II	CORROSIVE		154	212	240	15 kg	50 kg	A	40
Aluminum bromide, solution	8	UN2580	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Aluminum carbide	4.3	UN1394	II	DANGEROUS WHEN WET.	A20, N41	None	212	242	15 kg	50 kg	A	
	Aluminum chloride, anhydrous	8	UN1726	III	CORROSIVE		154	212	240	15 kg	50 kg	A	40
	Aluminum chloride, solution	8	UN2581	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	
	Aluminum dross, wet or hot	Forbidden											
	Aluminum ferrosilicon powder	4.3	UN1395	II	DANGEROUS WHEN WET, POISON.	A19	None	212	242	15 kg	50 kg	A	40, 85, 103
	Aluminum hydride	4.3	UN2463	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
	Aluminum nitrate	5.1	UN1438	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
	Aluminum phosphate solution, see Corrosive liquids, n.o.s.												
	Aluminum phosphide	4.3	UN1397	I	DANGEROUS WHEN WET, POISON.	A8, A19, N40	None	211	242	Forbidden	15 kg	E	40, 85
	Aluminum phosphide pesticides	6.1	UN3048	I	POISON	A8	None	211	242	Forbidden	15 kg	E	40, 85
	Aluminum powder, coated	4.1	UN1309	II	FLAMMABLE SOLID.		151	212	240	15 kg	50 kg	A	13, 39, 101
				III	FLAMMABLE SOLID.		151	213	240	25 kg	100 kg	A	13, 39, 101
	Aluminum powder, uncoated	4.3	UN1396	II	DANGEROUS WHEN WET.	A19, A20	None	212	240	15 kg	50 kg	A	39
	Aluminum resinate	4.1	UN2715	III	FLAMMABLE SOLID.		151	213	240	25 kg	100 kg	A	
	Aluminum silicon powder, uncoated	4.3	UN1398	III	DANGEROUS WHEN WET.	A1, A19	None	213	241	25 kg	100 kg	A	40, 85, 103
	Amatols, see Explosives, blasting, type B												
	2-Amino-4-chlorophenol	6.1	UN2673	II	POISON		None	212	242	25 kg	100 kg	A	
	2-Amino-5-diethylaminopentane	6.1	UN2946	III	KEEP AWAY FROM FOOD.	T1	153	203	240	60 L	220 L	A	
	2-(2-Aminoethoxy) ethanol	8	UN3055	III	CORROSIVE	T2	154	203	241	5 L	60 L	A	
	N-Aminoethylpiperazine	8	UN2815	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	12, 48
	Aminophenols (*o-; m-; p-*)	6.1	UN2512	III	KEEP AWAY FROM FOOD.	T1	153	213	240	100 kg	200 kg	A	
	Aminopropyldiethanolamine, see Alkylamines, n.o.s.												
	n-Aminopropylmorpholine, see Alkylamines, n.o.s.												
	Aminopyridines (*o-; m-; p-*)	6.1	UN2671	II	POISON	T7	None	212	242	25 kg	100 kg	B	12, 40, 48
I	Ammonia, anhydrous, liquefied *or* Ammonia solutions *relative density less than .880 at 15 degrees C in water, with more than 50 per cent ammonia.*	2.3	UN1005		POISON GAS	4, B34	None	304	314, 315	Forbidden	25 kg	D	40, 57
D	Ammonia anhydrous liquefied or Ammonia solutions, *relative density less than 0.880 at 15 degrees C in water, with more than 50 percent ammonia.*	2.2	UN1005		NONFLAMMABLE GAS.	13	None	304	314, 315	Forbidden	25 kg	D	40, 57
	Ammonia solutions, *relative density between 0.880 and 0.957 at 15 degrees C in water, with more than 10 per cent but not more than 35 percent ammonia by mass.*	8	UN2672	III	CORROSIVE	T14	154	203	241	5 L	60 L	A	40, 85
	Ammonia solutions, *relative density less than 0.880 at 15 degrees C in water, with more than 35 per cent but not more than 50 per cent ammonia.*	2.2	UN2073		NONFLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, 57
	Ammonium arsenate	6.1	UN1546	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Ammonium azide	Forbidden											
	Ammonium bifluoride, solid, see Ammonium hydrogen fluoride, solid.												
	Ammonium bifluoride solution, see Ammonium hydrogen fluoride, solution.												

	Ammonium bromate	Forbidden											
	Ammonium chlorate	Forbidden											
	Ammonium dichromate	5.1	UN1439	II	OXIDIZER		152	212	240	5 kg	25 kg	A	
	Ammonium dinitro-o-cresolate	6.1	UN1843	II	POISON	T6	None	212	242	25 kg	100 kg	B	36, 65, 66, 77, M2
	Ammonium fluoride	6.1	UN2505	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	26
	Ammonium fluorosilicate	6.1	UN2854	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	26, M4
	Ammonium fulminate	Forbidden											
	Ammonium hydrogen fluoride, solid	8	UN1727	II	CORROSIVE	N34	154	212	240	15 kg	50 kg	A	25, 26, 40
	Ammonium hydrogen fluoride, solution	8	UN2817	II	CORROSIVE, POISON.	N34, T15	None	202	243	1 L	30 L	B	40, 95
	Ammonium hydrogen sulfate	8	UN2506	II	CORROSIVE		154	212	240	15 kg	50 kg	A	40
	Ammonium hydrosulfide, solution, see Ammonium sulfide solution.												
D	Ammonium hydroxide, *see* Ammonia solutions, *etc.*												
	Ammonium metavanadate	6.1	UN2859	II	POISON		None	212	242	25 kg	100 kg	A	
	Ammonium nitrate fertilizers, n.o.s.	5.1	UN2072	I	OXIDIZER		None	201	None	1 kg	15 kg	B	48, 59, 60, 117
				II	OXIDIZER	B10	152	212	240	5 kg	25 kg	B	48, 59, 60, 117
				III	OXIDIZER		152	213	240	25 kg	100 kg	B	48, 59, 60, 117
	Ammonium nitrate fertilizers: *uniform non-segregating mixtures of ammonium nitrate/ ammonium sulfate, with more than 45 per cent but not more than 70 per cent ammonium nitrate and not more than 0.4 per cent of total combustible material.*	5.1	UN2069	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	48, 59, 60, 117
	Ammonium nitrate fertilizers: *uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, with not less than 90 per cent ammonium nitrate and not more than 0.2 per cent combustible material (including organic material calculated as carbon), or with more than 70 per cent but less than 90 per cent ammonium nitrate and not more than 0.4 per cent total combustible material.*	5.1	UN2067	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	48, 59, 60, 117
	Ammonium nitrate fertilizers: *uniform non-segregating mixtures of ammonium nitrate with calcium carbonate and/or dolomite, with more than 80 per cent but less than 90 per cent ammonium nitrate and not more than 0.4 per cent total combustible material.*	5.1	UN2068	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	48, 59, 60, 117
	Ammonium nitrate fertilizers: *uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/phosphate/potash type, with more than 70 per cent but less than 90 per cent ammonium nitrate and not more than 0.4 per cent total combustible material.*	5.1	UN2070	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	48, 59, 60, 117
AW	Ammonium nitrate fertilizers: *uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/ phosphate/potash type, with not more than 70 per cent ammonium nitrate and not more than 0.4 per cent total added combustible material or with not more than 45 per cent ammonium nitrate with unrestricted combustible material.*	9	UN2071	III	CLASS 9		155	213	240	200 kg	200 kg	A	
D	Ammonium nitrate fertilizers *with not more than 0.2 percent carbon; which meet the definition in the Fertilizer Institute publication >Definition and Test Procedures for Ammonium Nitrate Fertilizer>, dated May 8, 1971.*	5.1	NA1942	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	48, 59, 60, 116
D	Ammonium nitrate-fuel oil mixture (containing only prilled ammonium nitrate and fuel oil).	1.5D	NA0331	II	EXPLOSIVE 1.5D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Ammonium nitrate, liquid (*hot concentrated solution*)	5.1	UN2426		OXIDIZER	B5, B17, T25	None	None	243	Forbidden	Forbidden	D	59, 60
	Ammonium nitrate, *with more than 0.2 per cent combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance.*	1.1D	UN0222	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Ammonium nitrate, *with not more than 0.2 per cent of combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance.*	5.1	UN1942	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	48, 59, 60, 116
	Ammonium nitrite	Forbidden											
	Ammonium perchlorate	5.1	UN1442	II	OXIDIZER	A9	152	212	240	5 kg	25 kg	E	58, 69, 106
	Ammonium perchlorate	1.1D	UN0402	II	EXPLOSIVE 1.1D.	107		62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Ammonium permanganate, see Permanganates, inorganic, n.o.s..												
	Ammonium persulfate	5.1	UN1444	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
	Ammonium picrate, *dry or wetted with less than 10 per cent water, by mass.*	1.1D	UN0004	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Ammonium picrate, wetted *with not less than 10 per cent water, by mass.*	4.1	UN1310	I	FLAMMABLE SOLID.	A2, N41	None	211	None	0.5 kg	0.5 kg	D	28, 36
	Ammonium polysulfide, solution	8	UN2818	II	CORROSIVE, POISON.	T14	None	202	243	1 L	30 L	B	12, 26, 40, 48, 95
	Ammonium polyvanadate	6.1	UN2861	II	POISON		None	212	242	25 kg	100 kg	A	
	Ammonium silicofluoride, see Ammonium fluorosilicate												
	Ammonium sulfide solution	8	UN2683	II	CORROSIVE, POISON, FLAMMABLE LIQUID.	T14	None	202	243	1 L	30 L	B	12, 22, 26, 48, 100
	Ammunition, blank, see Cartridges for weapons, blank												
	Ammunition, illuminating *with or without burster, expelling charge or propelling charge.*	1.2G	UN0171	II	EXPLOSIVE 1.2G.		63(b)	62	None	Forbidden	Forbidden	B	
	Ammunition, illuminating *with or without burster, expelling charge or propelling charge.*	1.3G	UN0254	II	EXPLOSIVE 1.3G.		63(b)	62	None	Forbidden	Forbidden	B	
	Ammunition, illuminating *with or without burster, expelling charge or propelling charge.*	1.4G	UN0297	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	A	24E
	Ammunition, incendiary *liquid or gel, with burster, expelling charge or propelling charge.*	1.3J	UN0247	II	EXPLOSIVE 1.3J.		63(b)	62	None	Forbidden	Forbidden	E	7E, 13E, 23E
	Ammunition, incendiary (water-activated contrivances) with burster, expelling charge or propelling charge, see Contrivances, water-activated, etc..												
	Ammunition, incendiary, white phosphorus, *with burster, expelling charge or propelling charge.*	1.2H	UN0243	II	EXPLOSIVE 1.2H.		63(b)	62	None	Forbidden	Forbidden	E	8E, 14E, 15E
	Ammunition, incendiary, white phosphorus, *with burster, expelling charge or propelling charge.*	1.3H	UN0244	II	EXPLOSIVE 1.3H.		63(b)	62	None	Forbidden	Forbidden	E	8E, 14E, 15E
	Ammunition, incendiary *with or without burster,expelling charge, or propelling charge.*	1.2G	UN0009	II	EXPLOSIVE 1.2G.		63(b)	62	None	Forbidden	Forbidden	B	
	Ammunition, incendiary *with or without burster, expelling charge, or propelling charge.*	1.3G	UN0010	II	EXPLOSIVE 1.3G.		63(b)	62	None	Forbidden	Forbidden	B	
	Ammunition, incendiary *with or without burster, expelling charge or propelling charge.*	1.4G	UN0300	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	A	24E
	Ammunition, practice	1.4G	UN0362	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	A	24E
	Ammunition, practice	1.3G	UN0488	II	EXPLOSIVE 1.3G.		63(b)	62	None	Forbidden	Forbidden	B	1E, 7E, 25E
	Ammunition, proof	1.4G	UN0363	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	A	24E
	Ammunition, rocket, see Warheads, rocket *etc.*												
	Ammunition, SA (small arms), see Cartridges for weapons, *etc.*.												
	Ammunition, smoke (water-activated contrivances), white phosphorus, with burster, expelling charge or propelling charge, see Contrivances, water-activated, *etc. (UN 0248).*												

Ammunition, smoke (water-activated contrivances), without white phosphorus or phosphides, with burster, expelling charge or propelling charge, see Contrivances, water-activated, *etc. (UN 0249).*												
Ammunition, smoke, white phosphorus *with burster, expelling charge, or propelling charge.*	1.3H	UN0246	II	EXPLOSIVE 1.3H.		63(b)	62	None	Forbidden	Forbidden	E	8E, 14E, 15E, 17E
Ammunition smoke, white phosphorus *with burster,expelling charge, or propelling charge.*	1.2H	UN0245	II	EXPLOSIVE 1.2H.		63(b)	62	None	Forbidden	Forbidden	E	8E, 14E, 15E, 17E
Ammunition, smoke *with or without burster, expelling charge or propelling charge.*	1.3G	UN0016	II	EXPLOSIVE 1.3G, CORROSIVE.		63(b)	62	None	Forbidden	Forbidden	E	20E
Ammunition, smoke *with or without burster, expelling charge or propelling charge.*	1.4G	UN0303	II	EXPLOSIVE 1.4G, CORROSIVE.		63(b)	62	None	Forbidden	75 kg	E	20E
Ammunition, smoke *with or without burster, expelling charge or propelling charge.*	1.2G	UN0015	II	EXPLOSIVE 1.2G, CORROSIVE.		63(b)	62	None	Forbidden	Forbidden	E	20E
Ammunition, sporting, see Cartridges for weapons, *etc. (UN 0012; UN 0328; UN 0339).*												
Ammunition, tear-producing, non-explosive, *without burster or expelling charge, non-fuzed.*	6.1	UN2017	II	POISON, CORROSIVE.		None	212	None	Forbidden	50 kg	E	13, 40
Ammunition, tear-producing *with burster, expelling charge or propelling charge.*	1.2G	UN0018	II	EXPLOSIVE 1.2G, CORROSIVE, POISON.		63(b)	62	None	Forbidden	Forbidden	E	20E
Ammunition, tear-producing *with burster, expelling charge or propelling charge.*	1.3G	UN0019	II	EXPLOSIVE 1.3G, CORROSIVE, POISON.		63(b)	62	None	Forbidden	Forbidden	E	20E
Ammunition, tear-producing *with burster, expelling charge or propelling charge.*	1.4G	UN0301	II	EXPLOSIVE 1.4G, CORROSIVE, POISON.		63(b)	62	None	Forbidden	75 kg	E	20E
Ammunition, toxic, nonexplosive, *without burster or expelling charge, non-fuzed.*	6.1	UN2016	II	POISON		None	212	None	Forbidden	100 kg	E	13, 40
Ammunition, toxic (water-activated contrivances), with burster, expelling charge or propelling charge, see Contrivances, water-activated, *etc.,*												
Ammunition, toxic *with burster, expelling charge, or propelling charge.*	1.2K	UN0020	II	EXPLOSIVE 1.2K, POISON.		63(b)	62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E
Ammunition, toxic *with burster, expelling charge, or propelling charge.*	1.3K	UN0021	II	EXPLOSIVE 1.3K, POISON.		63(b)	62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E
Amorces, see Caps, toy												
Amyl acetates	3	UN1104	III	FLAMMABLE LIQUID.	T1	150	203	241	60 L	220 L	A	
Amyl acid phosphate	8	UN2819	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	
Amyl alcohols	3	UN1105	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
			III	FLAMMABLE LIQUID.	B2, T1	150	203	242	60 L	220 L	A	
Amylamines	3	UN1106	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
Amyl butyrates	3	UN2620	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Amyl chlorides	3	UN1107	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
n-Amylene	3	UN1108	I	FLAMMABLE LIQUID.	T14	150	201	243	1 L	30 L	E	
Amyl formates	3	UN1109	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Amyl mercaptans	3	UN1111	II	FLAMMABLE LIQUID.	A3, T8	None	202	242	5 L	60 L	B	95, 102, M2
Amyl methyl ketone	3	UN1110	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Amyl nitrate	3	UN1112	III	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	A	40

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Amyl nitrites	3	UN1113	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	40
	Amyltrichlorosilane	8	UN1728	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40
	Anhydrous hydrofluoric acid, see Hydrogen fluoride, anhydrous.												
+	Aniline	6.1	UN1547	II	POISON	T8	None	202	243	5 L	60 L	A	40
	Aniline hydrochloride	6.1	UN1548	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Aniline oil, see Aniline												
	Anisidines	6.1	UN2431	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A	M2
	Anisole	3	UN2222	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Anisoyl chloride	8	UN1729	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	C	8, 40
	Anti-freeze liquid, see Flammable liquids, n.o.s.												
	Antimonous chloride, see Antimony trichloride												
	Antimony compounds, inorganic, liquid, n.o.s.	6.1	UN3141	I	POISON	A4, B38, B40, T42.	None	201	243	1 L	30 L	A	
				II	POISON	T14	None	202	243	5 L	60 L	A	
				III	KEEP AWAY FROM FOOD.	A34, T7	153	203	241	60 L	220 L	A	
	Antimony compounds, inorganic, solid, n.o.s.	6.1	UN1549	I	POISON		None	211	242	5 kg	50 kg	A	
				II	POISON		None	212	242	25 kg	100 kg	A	
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Antimony lactate	6.1	UN1550	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Antimony pentachloride, liquid	8	UN1730	II	CORROSIVE	B2, T6, T26	None	202	242	1 L	30 L	C	8, 40, M2
	Antimony pentachloride, solutions	8	UN1731	II	CORROSIVE	B2, T8, T27	154	202	242	1 L	30 L	C	8, 40, M2
	Antimony pentafluoride	8	UN1732	II	CORROSIVE; POISON.	A3, A6, A7, A10, N3, T12, T26.	None	202	243	Forbidden	30 L	D	40, 95
	Antimony potassium tartrate	6.1	UN1551	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Antimony powder	6.1	UN2871	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Antimony sulfide and a chlorate, mixtures of	Forbidden											
	Antimony sulfide, solid, see Antimony compounds, inorganic, n.o.s.												
D	Antimony tribromide, solid	8	NA1549	II	CORROSIVE		154	212	240	25 kg	100 kg	A	13
D	Antimony tribromide, solution	8	NA1549	II	CORROSIVE	B2	154	202	242	1 L	30 L	C	13
	Antimony trichloride, liquid	8	UN1733	II	CORROSIVE	B2	154	202	242	1 L	30 L	C	40
	Antimony trichloride, solid	8	UN1733	II	CORROSIVE		154	212	240	15 kg	50 kg	A	40
D	Antimony trifluoride, solid	8	NA1549	II	CORROSIVE		154	212	240	25 kg	25 kg	A	13
D	Antimony trifluoride solution	8	NA1549	II	CORROSIVE	B2	154	202	242	1 L	30 L	C	13
	Aqua ammonia, see Ammonia solution, *etc.*												
	Argon, compressed	2.2	UN1006		NONFLAMMABLE GAS.		306	302	314, 315	75 kg	150 kg	A	
	Argon, refrigerated liquid (*cryogenic liquid*)	2.2	UN1951		NONFLAMMABLE GAS.		320	316	318	50 kg	500 kg	B	
	Arsenic	6.1	UN1558	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Arsenic acid, liquid	6.1	UN1553	I	POISON	T18, T27	None	201	243	1 L	30 L	B	M2
	Arsenic acid, solid	6.1	UN1554	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Arsenical dust	6.1	UN1562	II	POISON		None	212	242	25 kg	100 kg	A	M2

Arsenical pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2760	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	40, M3
			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	40, M3
Arsenical pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN2993	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M2
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M2
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, T14	153	203	241	60 L	220 L	A	40, M2
Arsenical pesticides, liquid, toxic, n.o.s.	6.1	UN2994	I	POISON	T42	None	201	243	1 L	30 L	B	40, M2
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M2
			III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M2
Arsenical pesticides, solid, toxic, n.o.s.	6.1	UN2759	I	POISON		None	211	242	5 kg	50 kg	A	40, M2
			II	POISON		None	212	242	25 kg	100 kg	A	40, M2
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M2
Arsenic bromide	6.1	UN1555	II	POISON		None	212	242	25 kg	100 kg	A	12, 40, M2
Arsenic chloride, see Arsenic trichloride												
Arsenic compounds, liquid, n.o.s. *including arsenates n.o.s.; arsenites, n.o.s.; arsenic sulfides, n.o.s.; and organic compounds of arsenic, n.o.s.*	6.1	UN1556	I	POISON		None	201	243	1 L	30 L	B	40, M2
			II	POISON		None	202	243	5 L	60 L	B	40, M2
			III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	B	40, M2
Arsenic compounds, solid, n.o.s. *including arsenates, n.o.s.; arsenites, n.o.s.; arsenic sulfides, n.o.s.; and organic compounds of arsenic, n.o.s.*	6.1	UN1557	I	POISON		None	211	242	5 kg	50 kg	A	M2
			II	POISON		None	212	242	25 kg	100 kg	A	M2
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
Arsenic pentoxide	6.1	UN1559	II	POISON		None	212	242	25 kg	100 kg	A	M2
D Arsenic sulfide	6.1	NA1557	II	POISON		None	212	242	25 kg	100 kg	A	M2
Arsenic sulfide and a chlorate, mixtures of	Forbidden											
Arsenic trichloride	6.1	UN1560	I	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	1L	30L	B	40, M2
Arsenic trioxide	6.1	UN1561	II	POISON		None	212	242	25 kg	100 kg	A	M2
D Arsenic trisulfide	6.1	NA1557	II	POISON		None	212	242	25 kg	100 kg	A	M2
Arsenic, white, solid, see Arsenic trioxide												
Arsenious acid, solid, see Arsenic trioxide												
Arsenious and mercuric iodide solution, see Arsenic compounds, liquid, n.o.s.												
Arsine	2.3	UN2188		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	192	245	Forbidden	Forbidden	D	40
Articles, explosive, extremely insensitive; (Articles, EEI)	1.6N	UN0486	II	EXPLOSIVE 1.6N.	101		62	None	Forbidden	Forbidden	B	
Articles, explosive, n.o.s.	1.4S	UN0349	II	EXPLOSIVE 1.4S.	101		62	None	25 kg	100 kg	A	9E
Articles, explosive, n.o.s.	1.4B	UN0350	II	EXPLOSIVE 1.4B.	101		62	None	Forbidden	Forbidden	A	24E
Articles, explosive, n.o.s.	1.4C	UN0351	II	EXPLOSIVE 1.4C.	101		62	None	Forbidden	Forbidden	A	24E
Articles, explosive, n.o.s.	1.4D	UN0352	II	EXPLOSIVE 1.4D.	101		62	None	Forbidden	Forbidden	A	24E
Articles, explosive, n.o.s.	1.4G	UN0353	II	EXPLOSIVE 1.4G.	101		62	None	Forbidden	Forbidden	A	24E

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Articles, explosive, n.o.s.	1.1L	UN0354	II	EXPLOSIVE 1.1L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 17E
	Articles, explosive, n.o.s.	1.2L	UN0355	II	EXPLOSIVE 1.2L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 17E
	Articles, explosive, n.o.s.	1.3L	UN0356	II	EXPLOSIVE 1.3L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 17E
	Articles, explosive, n.o.s.	1.1C	UN0462	II	EXPLOSIVE 1.1C.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.1D	UN0463	II	EXPLOSIVE 1.1D.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.1E	UN0464	II	EXPLOSIVE 1.1E.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.1F	UN0465	II	EXPLOSIVE 1.1F.	101		62	None	Forbidden	Forbidden	E	
	Articles, explosive, n.o.s.	1.2C	UN0466	II	EXPLOSIVE 1.2C.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.2D	UN0467	II	EXPLOSIVE 1.2D.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.2E	UN0468	II	EXPLOSIVE 1.2E.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.2F	UN0469	II	EXPLOSIVE 1.2F.	101		62	None	Forbidden	Forbidden	E	
	Articles, explosive, n.o.s.	1.3C	UN0470	II	EXPLOSIVE 1.3C.	101		62	None	Forbidden	Forbidden	B	
	Articles, explosive, n.o.s.	1.4E	UN0471	II	EXPLOSIVE 1.4E.	101		62	None	Forbidden	75kg	A	24E
	Articles, explosive, n.o.s.	1.4F	UN0472	II	EXPLOSIVE 1.4F.	101		62	None	Forbidden	Forbidden	E	
	Articles, pyrophoric	1.2L	UN0380	II	EXPLOSIVE 1.2L.			62	None	Forbidden	Forbidden	E	2E, 8E, 17E
	Articles, pyrotechnic *for technical purposes*	1.1G	UN0428	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
	Articles, pyrotechnic *for technical purposes*	1.2G	UN0429	II	EXPLOSIVE 1.2G.			62	None	Forbidden	Forbidden	B	
	Articles, pyrotechnic *for technical purposes*	1.3G	UN0430	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	
	Articles, pyrotechnic *for technical purposes*	1.4G	UN0431	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
	Articles, pyrotechnic *for technical purposes*	1.4S	UN0432	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Asbestos, blue or brown, see Blue asbestos *etc.*												
	Asbestos, white, see White asbestos *etc.*												
	Ascaridole (organic peroxide)	Forbidden											
D	Asphalt, *at or above its flashpoint*	3	NA1999	III	None		150	203	242	Forbidden	Forbidden	D	M4
D	Asphalt, cut back, *see* Tars, liquid, *etc.*												
	Auto alarms, see Alarm devices, explosive												
	Automobile, motorcycle, tractor, or other self-propelled vehicle, engine, or other mechanical apparatus, see Vehicles, self-propelled.												
	Azaurolic acid (salt of) (dry)	Forbidden											
	Azidodithiocarbonic acid	Forbidden											
	Azidoethyl nitrate	Forbidden											

	Azido guanidine picrate (dry)	Forbidden												
	5-Azido-1-hydroxy tetrazole	Forbidden												
	Azido hydroxy tetrazole (mercury and silver salts)	Forbidden												
	Azido hydroxy tetrazole (mercury and silver salts)	Forbidden												
	3-Azido-1,2-Propylene glycol dinitrate	Forbidden												
D	Azinphos methyl *liquid*	6.1	NA3018	II	POISON		None	202	243	1 L	30 L	A		40, M4
D	Azinphos methyl *solid*	6.1	NA2783	II	POISON		None	212	242	25 kg	100 kg	A		40, M1
	1-Aziridinyl phosphine oxide-(tris), see Tri-(1-aziridinyl) phosphine oxide, solution.													
	2,2'-Azodi-(2,4-dimethyl-4-methoxyvaleronitrile	4.1	UN2955	II	FLAMMABLE SOLID.		None	224	None	Forbidden	Forbidden	D		2
	2,2'-Azodi-(2,4 dimethylvaleronitrile)	4.1	UN2953	II	FLAMMABLE SOLID.		None	224	None	Forbidden	Forbidden	D		2
	1,1'-Azodi-(hexahydrobenzonitrile)	4.1	UN2954	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	B		12, 61, 65
	Azodiisobutyronitrile	4.1	UN2952	II	FLAMMABLE SOLID, EXPLOSIVES.	41, 53	None	224	None	Forbidden	Forbidden	D		2
	2,2'-Azodi (2-methyl-butyronitrile)	4.1	UN3030	II	FLAMMABLE SOLID.		None	224	None	Forbidden	Forbidden	D		2, 61
	Azotetrazole (dry)	Forbidden												
	Barium	4.3	UN1400	II	DANGEROUS WHEN WET.	A19	None	212	241	15 kg	50 kg	E		
	Barium alloys, pyrophoric	4.2	UN1854	I	SPONTANEOUSLY COMBUSTIBLE.		None	181	None	Forbidden	Forbidden	D		
	Barium azide, *dry or wetted with less than 50 per cent water, by mass.*	1.1A	UN0224	II	EXPLOSIVE 1.1A, Poison.	111, 117		62	None	Forbidden	Forbidden	E		2E, 6E
	Barium azide, wetted *with not less than 50 per cent water, by mass.*	4.1	UN1571	I	FLAMMABLE SOLID, POISON.	A2	None	182	None	Forbidden	0.5 kg	D		28, 36
	Barium bromate	5.1	UN2719	II	OXIDIZER, POISON.		None	212	242	5 kg	25 kg	A		56, 58, 106
	Barium chlorate	5.1	UN1445	II	OXIDIZER, POISON.	A9, N34, T8	None	212	242	5 kg	25 kg	A		56, 58, 106
	Barium compounds, n.o.s.	6.1	UN1564	I	POISON		None	211	242	5 kg	50 kg	A		M3
				II	POISON		None	212	242	25 kg	100 kg	A		M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		M3
	Barium cyanide	6.1	UN1565	I	POISON	N74, N75	None	211	242	5 kg	50 kg	A		26, 40, M2
	Barium hypochlorite *with more than 22 per cent available chlorine.*	5.1	UN2741	II	OXIDIZER	A7, A9, N34	152	212	None	5 kg	25 kg	B		56, 58, 106
	Barium nitrate	5.1	UN1446	II	OXIDIZER, POISON.		None	212	242	5 kg	25 kg	A		
	Barium oxide	6.1	UN1884	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		
	Barium perchlorate	5.1	UN1447	II	OXIDIZER, POISON.	T8	None	212	242	5 kg	25 kg	A		56, 58, 106
	Barium permanganate	5.1	UN1448	II	OXIDIZER, POISON.		None	212	242	5 kg	25 kg	D		56, 58, 69, 106, 107
	Barium peroxide	5.1	UN1449	II	OXIDIZER, POISON.		None	212	2	5 kg	25 kg	A		13, 75, 106
	Barium selenate, *see* Selenates *or* Selenites													
	Barium selenite, *see* Selenates *or* Selenites													
D	Barium styphnate	1.1A	NA0473	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E		2E, 6E
	Batteries, dry, containing potassium hydroxide solid, *electric storage.*	8	UN3028	III	CORROSIVE		159	159	None	25 kg gross	230 kg gross.	A		
	Batteries, wet, filled with acid, *electric storage*	8	UN2794	III	CORROSIVE		159	159	None	25 kg gross	No limit	A		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Batteries, wet, filled with alkali, *electric storage*	8	UN2795	III	CORROSIVE		159	159	None	25 kg gross	No limit	A	
AW	Batteries, wet, non-spillable, *electric storage*	8	UN2800	III	CORROSIVE		159	159	None	No Limit	No Limit	A	
	Battery fluid, acid	8	UN2796	II	CORROSIVE	A3, A7, B2, B15, N6, N34, T9, T27.	154	202	242	1 L	30 L	B	
	Battery fluid, alkali	8	UN2797	II	CORROSIVE	B2, N6, T8	154	202	242	1 L	30 L	A	
	Battery lithium type, see Lithium batteries												
	Battery, wet, filled with acid or alkali with automobile (or named self-propelled vehicle or mechanical equipment containg internal combustion engine) see Vehicles, self-propelled etc..												
	Battery, wet, with wheelchair, see Wheelchair, electric												
	Benzene	3	UN1114	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
	Benzene diazonium chloride (dry)	Forbidden											
	Benzene diazonium nitrate (dry)	Forbidden											
	Benzene-1,3-disulfohydrazide, *not more than 52 per cent as a paste.*	4.1	UN2971	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	B	12, 61, 65
	Benzene phosphorus dichloride, see Phenyl phosphorus dichloride.												
	Benzene phosphorus thiodichloride, see Phenyl phosphorus thiodichloride.												
	Benzene sulfohydrazide	4.1	UN2970	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	B	12, 61, 65
	Benzene sulfonyl chloride	8	UN2225	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	40
	Benzenethiol, see Phenyl mercaptan												
	Benzene triozonide	Forbidden											
	Benzidine	6.1	UN1885	II	POISON		None	212	242	25 kg	100 kg	A	
	Benzoic derivative pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2770	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	E	M3
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	M3
	Benzoic derivative pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3003	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T18	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T18	153	203	241	60 L	220 L	A	40, M3
	Benzoic derivative pesticides, liquid, toxic, n.o.s.	6.1	UN3004	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
	Benzoic derivative pesticides, solid, toxic, n.o.s.	6.1	UN2769	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Benzol, see Benzene												
	Benzonitrile	6.1	UN2224	II	POISON	T14	None	202	243	5 L	60 L	A	26, 40

Benzoquinone	6.1	UN2587	II	POISON		None	212	242	25 kg	100 kg	A		
Benzotrichloride	8	UN2226	II	CORROSIVE	B2, T15	154	202	242	1 L	30 L	A	40	
Benzotrifluoride	3	UN2338	II	FLAMMABLE LIQUID.	T2	150	202	242	5 L	60 L	B	40	
Benzodiazoles (dry)	Forbidden												
Benzoyl azide	Forbidden												
Benzoyl chloride	8	UN1736	II	CORROSIVE	B2, T9, T26	154	202	242	1 L	30 L	C	8, 40	
Benzoyl peroxide, see Dibenzoyl peroxide, *etc.*													
Benzyl bromide	6.1	UN1737	II	POISON, CORROSIVE.	A3, A7, N33, N34, T12, T26.	None	202	243	1 L	30 L	D	13, 40	
Benzyl chloride	6.1	UN1738	II	POISON, CORROSIVE.	A3, A7, B41, B70, N33, N43, T12, T26.	None	202	243	1 L	30 L	D	13, 40	
Benzyl chloride *unstabilized*	6.1	UN1738	II	POISON, CORROSIVE.	A3, A7, B6, B11, N33, N34, N43, T12, T26.	None	202	243	1 L	30 L	D	13, 20	
Benzyl chloroformate	8	UN1739	I	CORROSIVE	A3, A6, B4; N41, T18, T26.	None	201	242	Forbidden	2.5 L	D	40, M2	
Benzyldimethylamine	8	UN2619	II	CORROSIVE	B2, T1	154	202	242	1 L	30 L	A	12, 21, 40, 48	
4-(Benzyl(ethyl)amino)-3-ethoxybenzenediazonium zinc chloride.	4.1	UN3037	II	FLAMMABLE SOLID.		None	224	None	Forbidden	Forbidden	D	2	
Benzylidene chloride	6.1	UN1886	III	POISON	T8	None	202	243	5 L	60 L	D	40	
Benzyl Iodide	6.1	UN2653	III	POISON	T8	None	202	243	5 L	60 L	B	12, 40, 48	
4-(Benzyl(methyl)amino)3-ethoxybenzenediazonium zinc chloride.	4.1	UN3038	II	FLAMMABLE SOLID.		None	224	None	Forbidden	Forbidden	D	2	
Beryllium compounds, n.o.s.	6.1	UN1566	II	POISON		None	212	242	25 kg	100 kg	A		
Beryllium nitrate	5.1	UN2464	II	OXIDIZER, POISON.		None	212	242	5 kg	25 kg	A		
Beryllium, powder	6.1	UN1567	II	POISON, FLAMMABLE SOLID.		None	212	242	15 kg	50 kg	A		
Bifluorides, n.o.s. *solid*	8	UN1740	II	CORROSIVE	N3, N34	None	212	240	15 kg	50 kg	A	25, 26, 40, M3	
Bifluorides, n.o.s. *solutions*	8	UN1740	II	CORROSIVE	N3, N34	None	202	243	1 L	30 L	A	25, 26, 40, M3	
Biphenyl triozonide	Forbidden												
Bipyridilium pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2782	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	E	M3	
			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	M3	
Bipyridilium pesticides, liquid, toxic, flammable, n.o.s. *flash-point not less than 23 degrees C.*	6.1	UN3015	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	21, 40, 48, M3	
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	21, 40, 48, M3	
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, T14	153	203	242	60 L	220 L	A	21, 40, 48, M3	
Bipyridilium pesticides, liquid, toxic, n.o.s.	6.1	UN3016	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3	
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M3	
			III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3	
Bipyridilium pesticides, solid, toxic, n.o.s.	6.1	UN2781	I	POISON		None	211	242	5 kg	50 kg	A	40, M3	
			II	POISON		None	212	242	25 kg	100 kg	A	40, M3	
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3	
bis (Aminopropyl) piperazine, see Corrosive liquid, n.o.s.													

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Bisulfites, inorganic, aqueous solutions, n.o.s.	8	UN2693	III	CORROSIVE	T8	154	203	241	1 L	30 L	A	8, 26, 40, M3
	Black powder (Gunpowder), compressed *or* Black powder (Gunpowder), in pellets.	1.1D	UN0028	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Black powder (Gunpowder), *granular or as a meal*	1.1D	UN0027	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	10E, 26E
	Blasting agent, n.o.s., see Explosives, blasting												
	Blasting cap assemblies, see Detonator assemblies, non-electric, *for blasting.*												
	Blasting caps, electric, see Detonators, electric *for blasting*												
	Blasting caps, non-electric, see Detonators, non-electric, *for blasting*												
	Bleaching powder, see Calcium hypochlorite mixtures, *etc.*												
	Blue Asbestos (*Crocidolite*) *or* Brown asbestos (*amosite, mysorite*).	9	UN2212	II	None		155	216	240	Forbidden	Forbidden	A	34, 40
	Bombs, photo-flash	1.1F	UN0037	II	EXPLOSIVE 1.1F.		63(b)	62	None	Forbidden	Forbidden	E	
	Bombs, photo-flash	1.1D	UN0038	II	EXPLOSIVE 1.1D.		63(b)	62	None	Forbidden	Forbidden	B	
	Bombs, photo-flash	1.2G	UN0039	II	EXPLOSIVE 1.2G.		63(b)	62	None	Forbidden	Forbidden	B	
	Bombs, photo-flash	1.3G	UN0299	II	EXPLOSIVE 1.3G.		63(b)	62	None	Forbidden	Forbidden	B	
	Bombs, smoke, non-explosive, *with corrosive liquid, without initiating device.*	8	UN2028	II	CORROSIVE		None	160	None	Forbidden	50 kg	E	40
	Bombs, *with bursting charge*	1.1F	UN0033	II	EXPLOSIVE 1.1F.		63(b)	62	None	Forbidden	Forbidden	E	
	Bombs, *with bursting charge*	1.1D	UN0034	II	EXPLOSIVE 1.1D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Bombs, *with bursting charge*	1.2D	UN0035	II	EXPLOSIVE 1.2D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Bombs, *with bursting charge*	1.2F	UN0291	II	EXPLOSIVE 1.2F.		63(b)	62	None	Forbidden	Forbidden	E	
	Bombs with flammable liquid, *with bursting charge*	1.1J	UN0399	II	EXPLOSIVE 1.1J.		63(b)	62	None	Forbidden	Forbidden	E	7E, 16E, 23E
	Bombs with flammable liquid, *with bursting charge*	1.2J	UN0400	II	EXPLOSIVE 1.2J.		63(b)	62	None	Forbidden	Forbidden	E	7E, 16E, 23E
	Boosters with detonator	1.1B	UN0225	II	EXPLOSIVE 1.1B.			62	None	Forbidden	Forbidden	B	2E, 6E
C	Boosters with detonator	1.2B	NA0268	II	EXPLOSIVE 1.2B.			62	None	Forbidden	Forbidden	E	1E, 7E
D	Boosters with detonator	1.4B	NA0350	II	EXPLOSIVE 1.4B.	115		62	None	Forbidden	75 kg	A	24E
	Boosters, *without detonator*	1.1D	UN0042	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Boosters, *without detonator*	1.2D	UN0283	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Borate and chlorate mixtures, see Chlorate and borate mixtures.												
	Borneol	4.1	UN1312	III	FLAMMABLE SOLID.	A1		213	240	25 kg	100 kg	A	
+	Boron tribromide	8	UN2692	I	CORROSIVE, POISON.	2, A3, A7, B9, B14, B32, B74, N34, T16, T27, T38, T43, T45.	None	227	244	Forbidden	2.5 L	C	12
	Boron trichloride	2.3	UN1741		POISON GAS, CORROSIVE.	1, B9, B13, B14, B30, B72.	None	304	245	Forbidden	Forbidden	E	25, 40

Boron trifluoride	2.3	UN1008		POISON GAS	2, B9, B13, B14, B31, B73.	None	302	245	Forbidden	Forbidden	D	40
Boron trifluoride acetic acid complex	8	UN1742	II	CORROSIVE	B2, B6, T9, T27.	154	202	242	1 L	30 L	A	
Boron trifluoride diethyl etherate	8	UN2604	I	CORROSIVE, FLAMMABLE LIQUID.	A19, T8, T26	None	202	243	0.5 L	2.5 L	D	12, 21, 40, 48
Boron trifluoride dihydrate	8	UN2851	II	CORROSIVE	T8, T27	154	212	240	15 kg	50 kg	B	12, 40, 48
Boron trifluoride dimethyl etherate	4.3	UN2965	II	DANGEROUS WHEN WET, CORROSIVE, FLAMMABLE LIQUID.	A19, T8, T26	None	202	243	1 L	5 L	D	21, 28, 40, 49, 100
Boron trifluoride propionic acid complex	8	UN1743	II	CORROSIVE	B2, T9, T27	154	202	242	1 L	30 L	A	
Box toe gum, see Nitrocellulose												
Brake fluid, *hydraulic*	3	UN1118	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	
			III	FLAMMABLE LIQUID.	B1, T7	150	203	242	60 L	220 L	A	
Bromates, inorganic, n.o.s.	5.1	UN1450	II	OXIDIZER		152	212	240	5 kg	25 kg	A	56, 58, 106, M3
Bromide chloride	2.3	UN2901		POISON GAS, CORROSIVE, OXIDIZER.	2, B9, B12, B13, B14, B31, B73.	None	304	244	Forbidden	Forbidden	D	40, 89, 99
+ Bromine	8	UN1744	I	CORROSIVE, POISON.	1, A3, A6, B9, B12, B14, B30, B64, B72, N34, N43, T18, T38, T41, T43, T44.	None	226	244	Forbidden	2.5 L	D	12, 40, 66, 74, 89, 90, 95
Bromine azide	Forbidden											
+ Bromine pentafluoride	5.1	UN1745	I	OXIDIZER, POISON, CORROSIVE.	1, B9, B14, B30, B72, T38, T43, T44.	None	228	244	Forbidden	Forbidden	D	25, 40, 66, 90
Bromine solutions	8	UN1744	I	CORROSIVE, POISON.	5, N34, T14, T18.	None	201	249	Forbidden	2.5 L	D	12, 40, 66, 74, 89, 90, 95
+ Bromine trifluoride	5.1	UN1746	I	OXIDIZER, POISON, CORROSIVE.	2, B9, B14, B32, B74, T38, T43, T45.	None	228	244	Forbidden	Forbidden	D	25, 40, 66, 90
Bromoacetic acid, *solid*	8	UN1938	II	CORROSIVE	A7, N34, T9	154	212	240	15 kg	50 kg	A	
Bromoacetic acid, *solution*	8	UN1938	II	CORROSIVE	B2, T9	154	202	242	1 L	30 L	A	40
+ Bromoacetone	6.1	UN1569	II	POISON, FLAMMABLE LIQUID.	2, B9, B14, B32, B74, T38, T43, T45.	None	183	244	Forbidden	Forbidden	D	40
Bromoacetyl bromide	8	UN2513	II	CORROSIVE	B2, T9, T26	154	202	242	1 L	30 L	C	8
Bromobenzene	3	UN2514	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Bromobenzyl cyanides, *liquid*	6.1	UN1694	I	POISON	T18	None	201	243	Forbidden	30 L	D	12, 40, M4
Bromobenzyl cyanides, *solid*	6.1	UN1694	I	POISON	T18	None	211	241	Forbidden	50 kg	D	12, 40, M4
2-Bromobutane	3	UN2339	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	40
Bromochloromethane	6.1	UN1887	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	
4-Bromo-1,2-dinitrobenzene	Forbidden											
4-Bromo-1,2-dinitrobenzene (unstable at 59 deg C.)	Forbidden											
2-Bromoethyl ethyl ether	3	UN2340	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	40
Bromoform	6.1	UN2515	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	12, 40, 48, M2
1-Bromo-3-methylbutane	3	UN2341	III	FLAMMABLE LIQUID.	T7, T30	150	203	242	60 L	220 L	A	
Bromomethylpropanes	3	UN2342	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	1-Bromo-3-nitrobenzene (unstable at 56 deg. C)	Forbidden											
	2-Bromopentane	3	UN2343	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	2-Bromopropane	3	UN2344	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	40
	3-Bromopropyne	3	UN2345	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	D	40
	Bromosilane	Forbidden											
	Bromotoluene-alpha, see Benzyl bromide												
	Bromotrifluoroethylene	2.1	UN2419		FLAMMABLE GAS.	B13	None	304	244	Forbidden	150 kg	B	40
	Bromotrifluoromethane	2.2	UN1009		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	Brucine	6.1	UN1570	I	POISON		None	212	242	5 kg	50 kg	A	
	Bursters, *explosive*	1.1D	UN0043	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Butadienes, inhibited	2.1	UN1010		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	B	40
	Butane *or* Butane mixtures *see also* Petroleum gases, liquified	2.1	UN1011		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, M3
	Butane, butane mixtures and mixtures having similar properties in cartridges each not exceeding 500 grams, see Receptacles, *etc.*.												
	Butanedione	3	UN2346	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	1,2,4-Butanetriol trinitrate	Forbidden											
	Butanols	3	UN1120	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
				III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	tert-Butoxycarbonyl azide	Forbidden											
	Butoxyl	3	UN2708	III	FLAMMABLE LIQUID.	T1	150	203	241	60 L	220 L	A	
	Butyl acetates	3	UN1123	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
				III	FLAMMABLE LIQUID.	B1, T1	150	202	241	60 L	220 L	A	
	Butyl acid phosphate	8	UN1718	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	
	Butylacrylate	3	UN2348	III	FLAMMABLE LIQUID.	B1, T7, T30	150	202	241	60 L	220 L	A	
	Butyl alcohols, see Butanols												
	n-Butylamine	3	UN1125	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
	N-Butylaniline	6.1	UN2738	II	POISON	T8	None	202	243	5 L	60 L	A	40
	Butyl benzenes	3	UN2709	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	M2
	n-Butyl bromide	3	UN1126	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	n-Butyl chloride, see Chlorobutanes												
D	sec-Butylchloroformate	6.1	NA2743	I	POISON, CORROSIVE.	2, B9, B14, B32, B77, T38, T43, T45.	None	227	244	1 L	30 L	A	12, 13, 22, 25, 40, 48, 100

	n-Butylchloroformate	6.1	UN2743	I	POISON. CORROSIVE.	2, B9, B14, B32, B74, T18, T38, T43, T45.	None	227	244	1 L	30 L	A	12, 13, 22, 25, 40, 46, 100
D	sec-Butyl chloroformate	6.1	NA2742	I	POISON. FLAMMABLE LIQUID. CORROSIVE.	2, B9 B14, B32, B74, T38, T43, T45.	None	227	244	1 L	30 L	A	12, 13, 22, 25, 40, 46, 100, M3
	tert-Butylcyclohexylchloroformate	6.1	UN2747	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	12, 13, 25, 48
	Butylene *see also* Petroleum gases, liquefied	2.1	UN1012		FLAMMABLE GAS.		None	304	314, 315	Forbidden	150 kg	E	40, M3
	1,2-Butylene oxide, stabilized	3	UN3022	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	49
	Butyl ethers, see Dibutyl ethers												
	Butyl ethyl ether, see Ethyl butyl ether												
	n-Butyl formate	3	UN1128	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	tert-Butyl hydroperoxide, more than 90 per cent with water	Forbidden											
	N-n-Butyl imidazole	6.1	UN2690	II	POISON	T8	None	202	243	5 L	60 L	A	40
+	Tert-Butyl isocyanate	3	UN2484	II	FLAMMABLE LIQUID. POISON.	1, A7, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	30L	D	40
+	n-Butyl isocyanate	3	UN2485	II	FLAMMABLE LIQUID, POISON.	1, A7, B9, B14, B30, B72, B77, T38, T43, T44.	None	226	244	Forbidden	60L	D	40
	Butyl mercaptans	3	UN2347	II	FLAMMABLE LIQUID.	A3, T8	150	202	242	5 L	60 L	D, B	26, 85, 102
	n-Butyl methacrylate	3	UN2227	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Butyl methyl ether	3	UN2350	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Butyl nitrites	3	UN2351	I	FLAMMABLE LIQUID.	T8	150	202	242	1 L	30 L	E,B	40
				II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
				III	FLAMMABLE LIQUID.	T8	150	202	242	60 L	220 L	A	40
	tert-Butyl peroxyacetate, more than 76 per cent in solution	Forbidden											
	n-Butyl peroxydicarbonate, see Di-n-butyl peroxidicarbonate, *etc.*.												
	n-Butyl peroxydicarbonate, more than 52 percent in solution	Forbidden											
	tert-Butyl peroxyisobutyrate, more than 77 per cent in solution	Forbidden											
	Butylphenols, liquid	6.1	UN2228	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M2
	Butylphenols, solid	6.1	UN2229	III	KEEP AWAY FROM FOOD.	T7, T38	153	213	240	100 kg	200 kg	A	M2
	Butyl phosphonic acid, see Butyl acid phosphate												
	Butylpropionate	3	UN1914	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Butyltoluenes	6.1	UN2667	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A	M4
	Butyltrichlorosilane	8	UN1747	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	12, 21, 40, 46
	5-tert-Butyl-2,4,6-trinitro-m-xylene; (musk xylene)	4.1	UN2956	III	FLAMMABLE SOLID,.		None	214	None	Forbidden	Forbidden	D	12
	Butyl vinyl ether, inhibited	3	UN2352	II	FLAMMABLE LIQUID	T7	150	202	242	5 L	60 L	B	40
	1,4-Butynediol	6.1	UN2716	III	KEEP AWAY FROM FOOD.	A1	None	213	240	100 kg	200 kg	A	61, 70
	Butyraldehyde	3	UN1129	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Butyraldoxime	3	UN2840	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Butyric acid	8	UN2820	III	CORROSIVE	T1	154	203	241	5 L	60 L	A	12, 48
	Butyric anhydride	8	UN2739	III	CORROSIVE	T2	154	203	241	5 L	60 L	A	
	Butyronitrile	3	UN2411	II	FLAMMABLE LIQUID, POISON.	T14	None	202	243	1 L	60 L	E	40
	Butyryl chloride	3	UN2353	II	FLAMMABLE LIQUID, CORROSIVE.	T9, T26	None	202	243	1 L	5 L	C	40
	Cabazide	Forbidden											
	Cacodylic acid	6.1	UN1572	II	POISON		None	212	242	25 kg	100 kg	E	26, M2
	Cadmium compounds	6.1	UN2570	I	POISON		None	211	242	5 kg	50 kg	A	M4
				II	POISON		None	212	242	25 kg	100 kg	A	M4
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M4
	Caesium hydroxide, solid	8	UN2682	II	CORROSIVE		154	212	240	15 kg	50 kg	A	
	Caesium hydroxide solution	8	UN2681	II	CORROSIVE	B2, T6	154	202	242	1 L	30 L	A	
	Calcium	4.3	UN1401	II	DANGEROUS WHEN WET.		None	212	241	15 kg	50 kg	E	
	Calcium arsenate	6.1	UN1573	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Calcium arsenate and calcium arsenite, mixtures, solid	6.1	UN1574	II	POISON		None	212	242	25 kg	100 kg	A	M2
D	Calcium arsenite, solid	6.1	NA1574	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Calcium bisulfite solution, see Bisulfites, inorganic, aqueous solutions, n.o.s.												
	Calcium carbide	4.3	UN1402	II	DANGEROUS WHEN WET.	A1, A8, B55, N34.	None	212	241	15 kg	50 kg	B	
	Calcium chlorate	5.1	UN1452	II	OXIDIZER	N34	152	212	240	5 kg	25 kg	A	56, 58, 106
	Calcium chlorate solution	5.1	UN2429	II	OXIDIZER	A2, N41, T8	152	202	242	1 L	5 L	B	56, 58, 106
	Calcium chlorite	5.1	UN1453	II	OXIDIZER	A9, N34	152	212	240	5 kg	25 kg	A	56, 58, 106
	Calcium cyanamide *with more than 0.1 per cent of calcium carbide.*	4.3	UN1403	III	DANGEROUS WHEN WET.	A1, A19	None	213	241	25 kg	100 kg	A	
	Calcium cyanide	6.1	UN1575	I	POISON	N79, N80	None	211	242	5 kg	50 kg	A	26, 40, M2
	Calcium dithionite (calcium hydrosulfite)	4.2	UN1923	II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20	None	212	241	15 kg	50 kg	E	13
	Calcium hydride	4.3	UN1404	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
	Calcium hydrosulfite, *see* Calcium dithionite												
	Calcium hypochlorite, dry or Calcium hypochlorite mixtures dry *with more than 39 per cent available chlorine (8.8 per cent available oxygen).*	5.1	UN1748	II	OXIDIZER	A7, A9, N34	152	212	None	5 kg	25 kg	D	48, 56, 58, 69, 106, 118
	Calcium hypochlorite, hydrated or Calcium hypochlorite, hydrated mixtures, *with not less than 5.5 per cent but not more than 10 per cent water.*	5.1	UN2880	II	OXIDIZER		152	212	240	5 kg	25 kg	A	50, 56, 58, 69, 106
	Calcium hypochlorite mixtures, dry, *with more than 10 per cent but not more than 39 per cent available chlorine.*	5.1	UN2208	III	OXIDIZER	A1, A29, N34	152	213	240	25 kg	100 kg	A	56, 58, 69, 106
	Calcium manganese silicon	4.3	UN2844	III	DANGEROUS WHEN WET.	A1, A19	None	213	241	25 kg	100 kg	A	85, 103
	Calcium nitrate	5.1	UN1454	III	OXIDIZER	T2	152	213	240	25 kg	100 kg	A	
	Calcium oxide	8	UN1910	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Calcium perchlorate	5.1	UN1455	II	OXIDIZER	T8	152	212	240	5 kg	25 kg	A	56, 58, 106
	Calcium permanganate	5.1	UN1456	II	OXIDIZER		152	212	240	5 kg	25 kg	D	56, 58, 69, 106, 107
	Calcium peroxide	5.1	UN1457	II	OXIDIZER		152	212	240	5 kg	25 kg	A	13, 75, 106

Calcium phosphide	4.3	UN1360	I	DANGEROUS WHEN WET, POISON.	A8, A19, N40	None	211	242	Forbidden	15 kg	E	40, 85		
Calcium, pyrophoric *or* Calcium alloys, pyrophoric	4.2	UN1855	I	SPONTANEOUSLY COMBUSTIBLE.		None	187	None	Forbidden	Forbidden	D	M3		
Calcium resinate	4.1	UN1313	III	FLAMMABLE SOLID.	A1, A19		213	240	25 kg	100 kg	A			
Calcium resinate, fused	4.1	UN1314	III	FLAMMABLE SOLID.	A1, A19		213	240	25 kg	100 kg	A			
Calcium selenate, *see* Selenates *or* Selenites														
Calcium silicide	4.3	UN1405	II	DANGEROUS WHEN WET.	A19	None	212	241	15 kg	50 kg	B	85, 103		
			III	DANGEROUS WHEN WET.	A1, A19	None	213	241	25 kg	100 kg	B	85, 103		
Camphor oil	3	UN1130	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	M2		
Camphor, *synthetic*	4.1	UN2717	III	FLAMMABLE SOLID.	A1		213	240	25 kg	100 kg	A			
Cannon primers, see Primers, tubular														
Caproic acid	8	UN2829	III	CORROSIVE	T1	154	203	241	5 L	60 L	A			
Capryloyl peroxide, see n-Octanoyl peroxide														
Caps, blasting, see Detonators, *etc.*														
Carbamate pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2758	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	40, M3		
			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	40, M3		
Carbamate pesticides, liquid, toxic, flammable, n.o.s. *flash point not less than 23 degrees C.*	6.1	UN2991	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3		
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3		
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, T14	153	203	242	60 L	220 L	A	40, M3		
Carbamate pesticides, liquid, toxic, n.o.s.	6.1	UN2992	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3		
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M3		
			III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3		
Carbamate pesticides, solid, toxic, n.o.s.	6.1	UN2757	I	POISON		None	211	242	5 kg	50 kg	A	40, M3		
			II	POISON		None	212	242	25 kg	100 kg	A	40, M3		
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3		
Carbolic acid, see Phenol, solid *or* Phenol, molten														
Carbolic acid solutions, see Phenol solutions														
I Carbon, activated	4.2	UN1362	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	0.5 kg	0.5 kg	A	12		
I Carbon, *animal or vegetable origin*	4.2	UN1361	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	Forbidden	Forbidden	A	12		
Carbon bisulfide, see Carbon disulfide														
Carbon dioxide	2.2	UN1013		NONFLAMMABLE GAS.		306	302, 304	302, 314, 315	75 kg	150 kg	A			
Carbon dioxide and ethylene oxide mixtures *with more than 6 per cent ethylene oxide.*	2.3	UN1041		POISON GAS, FLAMMABLE GAS.	3, B9, B13, B14, B33, B75.	None	304	244	Forbidden	25 kg	D	40		

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Carbon dioxide and ethylene oxide mixtures *with not more than 6 per cent ethylene oxide.*	2.2	UN1952		NONFLAMMABLE GAS.	B13	None	304	244	75 kg	150 kg	B	
	Carbon dioxide and nitrous oxide mixtures	2.2	UN1015		NONFLAMMABLE GAS.	B13	306	304	244	75 kg	150 kg	A	
	Carbon dioxide and oxygen mixtures	2.2	UN1014		NONFLAMMABLE GAS.	B13	306	304	244	75 kg	150 kg	A	
	Carbon dioxide, refrigerated liquid (*cryogenic liquid*)	2.2	UN2187		NONFLAMMABLE GAS.	B43	306	None	314, 315	50 kg	500 kg	B	
AW	Carbon dioxide, solid; (dry ice)	9	UN1845	III	None	B12	217	217	240	200 kg	200 kg	C	40
	Carbon disulfide	9	UN1131	I	FLAMMABLE LIQUID, POISON.	B16, T18, T26, T29.	None	201	243	Forbidden	Forbidden	D	18, 40, 115, M2
	Carbon monoxide	2.3	UN1016		POISON GAS, FLAMMABLE GAS.	4	None	302	None	Forbidden	25 kg	D	40
	Carbon monoxide and hydrogen mixture	2.3	UN2600		POISON GAS, FLAMMABLE GAS.	4, B13	None	302	302	Forbidden	Forbidden	D	40
D	Carbon monoxide, refrigerated liquid (*cryogenic liquid*)	2.3	NA9202		POISON GAS, FLAMMABLE GAS.	4	None	316	316	Forbidden	Forbidden	D	
	Carbon tetrabromide	6.1	UN2516	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	25, M2
	Carbon tetrachloride	6.1	UN1846	II	POISON	N36, T8	None	202	243	5 L	60 L	A	40, M2
	Carbonyl chloride, see Phosgene												
	Carbonyl fluoride	2.3	UN2417		POISON GAS	2, B9, B13, B14, B31, B73.	None	302	244	Forbidden	Forbidden	D	40
	Carbonyl sulfide	2.3	UN2204		POISON GAS, FLAMMABLE GAS.	2, B9, B13, B14, B31, B73.	None	304	244	Forbidden	25 kg	D	40
	Cartridge cases, empty primed, see Cases, cartridge, empty, with primer.												
	Cartridges, actuating, for aircraft ejector seat catapult, fire extinguisher, canopy removal or apparatus, see Cartridges, power device.												
	Cartridges, explosive, see Charges, demolition												
	Cartridges, flash	1.1G	UN0049	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
	Cartridges, flash	1.3G	UN0050	II	EXPLOSIVE 1.3G.			62	None	Forbidden	75 kg	B	
	Cartridges for weapons, blank	1.1C	UN0326	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	
	Cartridges for weapons, blank	1.2C	UN0413	II	EXPLOSIVE 1.2C.			62	None	Forbidden	Forbidden	B	
	Cartridges for weapons, blank; (Cartridges, small arms, blank)	1.3C	UN0327	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	
	Cartridges for weapons, blank; (Cartridges, small arms, blank)	1.4C	UN0338	II	EXPLOSIVE 1.4C.			62	None	Forbidden	75 kg	A	24E
	Cartridges for weapons, blank; (Cartridges, small arms, blank)	1.4S	UN0014	II	None	112		62	None	25 kg	100 kg	A	9E
	Cartridges for weapons, inert projectile (cartridges, small arms)	1.2C	UN0328	II	EXPLOSIVE 1.2C.			62	None	Forbidden	Forbidden	B	
	Cartridges for weapons; inert projectile (cartridges, small arms), other than blank.	1.4S	UN0012	II	None	112		62	None	25 kg	100 kg	A	9E
	Cartridges for weapons, inert projectile (cartridges, small arms)	1.4C	UN0339	II	EXPLOSIVE 1.4C.			62	None	Forbidden	75 kg	B	
	Cartridges for weapons, inert projectile (cartridges, small arms)	1.3C	UN0417	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	

	Cartridges for weapons, *with bursting charge*	1.1F	UN0005	II	EXPLOSIVE 1.1F.			62	None	Forbidden	Forbidden	E		
	Cartridges for weapons, *with bursting charge*	1.2F	UN0007	II	EXPLOSIVE 1.2F.			62	None	Forbidden	Forbidden	E		
	Cartridges for weapons, *with bursting charge*	1.4F	UN0348	II	EXPLOSIVE 1.4F.			62	None	Forbidden	Forbidden	E		
	Cartridges for weapons, *with bursting charge*	1.4E	UN0412	II	EXPLOSIVE 1.4E.			62	None	Forbidden	75 kg	A		24E
	Cartridges for weapons, *with bursting charge*	1.1E	UN0006	II	EXPLOSIVE 1.1E.			62	None	Forbidden	Forbidden	B		
	Cartridges for weapons, *with bursting charge*	1.2E	UN0321	II	EXPLOSIVE 1.2E.			62	None	Forbidden	Forbidden	B		
	Cartridges, oil well	1.3C	UN0277	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B		
	Cartridges, oil well	1.4C	UN0278	II	EXPLOSIVE 1.4C.			62	None	Forbidden	75 kg	A		24E
	Cartridges, power device	1.3C	UN0275	II	EXPLOSIVE 1.3C.	110	63(e)	62	None	Forbidden	75 kg	B		
	Cartridges, power device	1.4C	UN0276	II	EXPLOSIVE 1.4C.	110		62	None	Forbidden	75 kg	A		24E
	Cartridges, power device	1.2C	UN0381	II	EXPLOSIVE 1.2C.		63(e)	62	None	Forbidden	Forbidden	B		
	Cartridges, power device	1.4S	UN0323	II	EXPLOSIVE 1.4S.	110, 112		62	None	25 kg	100 kg	A		9E
	Cartridges, safety, blank, *see* Cartridges for weapons, blank (*UN 0014*).													
	Cartridges, safety, *see* Cartridges for weapons, *other than blank* or Cartridges, power device (*UN 0323*).													
	Cartridges, signal	1.3G	UN0054	II	EXPLOSIVE 1.3G.			62	None	Forbidden	75 kg	B		
	Cartridges, signal	1.4G	UN0312	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A		24E
	Cartridges, signal	1.4S	UN0405	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A		9E
D	Cartridges, small arms	ORM-D	None		None	112	220	None	None	30 kg gross	30 kg gross	A		
	Cartridges, sporting, see Cartridges for weapons, *other than blank.*													
	Cartridges, starter, jet engine, see Cartridges, power device													
I	Cases, cartridge, empty with primer	1.4S	UN0055	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A		9E
	Cases, cartridges, empty with primer	1.4C	UN0379	II	EXPLOSIVE 1.4C.			62	None	Forbidden	75 kg	A		24E
	Cases, combustible, empty, without primer	1.3C	UN0447	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B		
	Cases, combustible, empty, without primer	1.4C	UN0446	II	EXPLOSIVE 1.4C.			62	None	Forbidden	75 kg	A		24E
	Casinghead gasoline see Natural gasoline													
AW	Castor beans *or* Castor meal *or* Castor pomace *or* Castor flake.	9	UN2969	II	None		155	204	240	No limit	No limit	E		34, 40, 44, 120
	Caustic alkali liquids, n.o.s.	8	UN1719	I	CORROSIVE		None	201	242	0.5 L	2.5 L	A		M3
				II	CORROSIVE	B2, T14	154	202	242	1 L	30 L	A		M3
				III	CORROSIVE		154	203	240	5 L	60 L	A		M3
	Caustic potash, see Potassium hydroxide *etc.*													
	Caustic soda, (etc.) see Sodium hydroxide *etc.*													
	Celluloid, *in block, rods, rolls, sheets, tubes, etc., except scrap*	4.1	UN2000	III	FLAMMABLE SOLID.		None	213	240	25 kg	100 kg	A		
	Celluloid, scrap	4.2	UN2002	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	Forbidden	Forbidden	D		
	Cement, see Adhesives *containing flammable liquid*													
	Cerium, *slabs, ingots, or rods*	4.1	UN1333	II	FLAMMABLE SOLID.	N34	None	212	240	15 kg	50 kg	A		74, 81
	Cerium, *turnings or gritty powder*	4.3	UN3078	II	DANGEROUS WHEN WET.	A1	None	213	240	15 kg	50 kg	E		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Cesium or Caesium	4.3	UN1407	I	DANGEROUS WHEN WET.	A19, A22, N34, N40.	None	211	242	Forbidden	15 kg	D	
	Cesium nitrate *or* Caesium nitrate	5.1	UN1451	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
D	Charcoal *briquettes, shell, screenings, wood, etc.*	4.2	NA1361	III	SPONTANEOUSLY COMBUSTIBLE.		151	213	240	25 kg	100 kg	A	12
	Charges, bursting, plastics bonded	1.1D	UN0457	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Charges, bursting, plastics bonded	1.2D	UN0458	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Charges, bursting, plastics bonded	1.4D	UN0459	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75kg	A	24E
	Charges, bursting, plastics bonded	1.4S	UN0460	II	Explosive 1.4S.			62	None	25 kg	100 kg	A	9E
	Charges, demolition	1.1D	UN0048	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Charges, depth	1.1D	UN0056	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	3E, 7E
	Charges, expelling, explosive, for fire extinguishers, see Cartridges, power device.												
	Charges, explosive, commercial *without detonator*	1.1D	UN0442	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Charges, explosive, commercial *without detonator*	1.2D	UN0443	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Charges, explosive, commercial *without detonator*	1.4D	UN0444	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75 kg	A	24E
	Charges, explosive, commercial *without detonator*	1.4S	UN0445	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Charges, propelling, for cannon	1.2C	UN0414	II	EXPLOSIVE 1.2C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Charges, propelling, for cannon	1.3C	UN0242	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Charges, propelling, for cannon	1.1C	UN0279	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Charges, propelling, for rocket motors	1.1C	UN0271	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	
	Charges, propelling, for rocket motors	1.3C	UN0272	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	
	Charges, propelling, for rocket motors	1.2C	UN0415	II	EXPLOSIVE 1.2C.			62	None	Forbidden	Forbidden	B	
	Charges, propelling, for rocket motors, *composite mixture*	1.1C	UN0273	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	
	Charges, propelling, for rocket motors, *composite mixture*	1.3C	UN0274	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	
	Charges, propelling, for rocket motors, *composite mixture*	1.2C	UN0416	II	EXPLOSIVE 1.2C.			62	None	Forbidden	Forbidden	B	
	Charges, shaped, commercial *without detonator*	1.2D	UN0439	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Charges, shaped, commercial *without detonator*	1.4D	UN0440	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75 kg	A	24E
	Charges, shaped, commercial *without detonator*	1.4S	UN0441	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Charges, shaped, commercial, *without detonator*	1.1D	UN0059	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Charges, shaped, flexible, linear	1.4D	UN0237	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75 kg	A	24E

	Charges, shaped, flexible, linear	1.1D	UN0288	II	EXPLOSIVE 1.1D.	101			62	None	Forbidden	Forbidden	B		
	Charges, supplementary explosive	1.1D	UN0060	II	EXPLOSIVE 1.1D.				62	None	Forbidden	Forbidden	B		1E, 5E
D	Chemical kit	8	NA1760	II	CORROSIVE			154	161	None	1 L	30 L	B		40, M3
	Chemical kits (*must be classified and labelled according to the hazard class of the constituents*).														
	Chloroacetophenone (*CN*), *solid*	6.1	UN1697	II	POISON	A3, N12, N32, N33, N34.		None	212	None	Forbidden	100 kg	D		12, 40
	Chloral, anhydrous, inhibited	6.1	UN2075	II	POISON	T14		None	212	243	25 kg	100 kg	D		40
	Chlorate and borate mixtures	5.1	UN1458	II	OXIDIZER	A9, N34		152	212	240	5 kg	25 kg	A		56, 58, 106, M4
	Chlorate and magnesium chloride mixtures	5.1	UN1459	II	OXIDIZER	A9, N34, T8		152	212	240	5 kg	25 kg	A		56, 58, 106, M4
	Chlorate of potash, see Potassium chlorate														
	Chlorate of soda, see Sodium chlorate														
	Chlorates, inorganic, n.o.s.	5.1	UN1461	II	OXIDIZER	A9, N34		152	212	240	5 kg	25 kg	A		56, 58, 106, M3
	Chloric acid solution, *with not more than 10 per cent chloric acid.*	5.1	UN2626	I	OXIDIZER	T25		None	229	243	Forbidden	Forbidden	D		56, 58, 106
	Chloride of phosphorus, see Phosphorus trichloride														
	Chloride of sulfur, see Sulfur chloride														
	Chlorinated lime, see Calcium hypochlorite mixtures, *etc.*														
	Chlorine	2.3	UN1017		POISON GAS	2, B9, B13, B14, B31, B73.		None	304	314, 315	Forbidden	Forbidden	D		40, 51, 55, 62, 68, M2
	Chlorine azide	Forbidden													
D	Chlorine dioxide, hydrate, frozen	5.1	NA9191	II	OXIDIZER, POISON.			None	229	None	Forbidden	Forbidden	E		
	Chlorine dioxide (*not hydrate*)	Forbidden													
	Chlorine pentafluoride	2.3	UN2548		POISON GAS, OXIDIZER, CORROSIVE.	1, B9, B14, B30, B72.		None	304	245	Forbidden	Forbidden	D		40, 89, 90
	Chlorine trifluoride	2.3	UN1749		POISON GAS, OXIDIZER, CORROSIVE.	1, B7, B9, B14, B30, B72.		None	304	245	Forbidden	Forbidden	D		40, 89, 90
	Chromates, inorganic, n.o.s.	5.1	UN1462	II	OXIDIZER	A7, N34, T8		152	212	240	5 kg	25 kg	A		56, 58, 106, M3
+	Chloroacetaldehyde	6.1	UN2232	II	POISON	2, B9, B14, B32, B74, T17, T36, T43, T45.		None	227	244	5 L	60 L	D		40
	Chloroacetic acid, liquid	8	UN1750	II	CORROSIVE, POISON.	A7, N34		None	202	243	1 L	30 L	A		40
	Chloroacetic acid, solid	8	UN1751	II	CORROSIVE	A3, A7, N34		None	212	242	15 kg	50 kg	A		40
+	Chloroacetone, stabilized	6.1	UN1695	II	POISON	2, B9, B14, B32, B74, N12, N32, N34, T38, T43, T45.		None	227	244	Forbidden	Forbidden	D		40
	Chloroacetone (*unstabilized*)	Forbidden													
+	Chloroacetonitrile	6.1	UN2668	II	POISON	2, B9, B14, B32, B74, T38, T43, T45.		None	227	244	Forbidden	60 L	A		12, 26, 40, 48
	Chloroacetophenone (*CN*) *liquid*	6.1	UN1697	II	POISON	A3, N12, N32, N33.		None	202	242	Forbidden	60 L	D		12, 40
+	Chloroacetyl chloride	8	UN1752	II	CORROSIVE, POISON	2, A3, A6, A7, B2, B8, B9, B14, B32, B74, N34, N43, T8, T26, T38, T43, T45.		None	227	244	Forbidden	Forbidden	D		40
	Chloroanilines, liquid	6.1	UN2019	II	POISON	T14		None	202	243	5 L	60 L	A		
	Chloroanilines, solid	6.1	UN2018	II	POISON	T14, T38		None	212	242	25 kg	100 kg	A		
	Chloroanisidines	6.1	UN2233	III	KEEP AWAY FROM FOOD			153	213	240	100 kg	200 kg	A		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Chlorobenzene	3	UN1134	III	FLAMMABLE LIQUID.	T1	150	203	241	60 L	220 L	A	
	Chlorobenzol, see Chlorobenzene												
	Chlorobenzotrifluorides	3	UN2234	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	40
	p-Chlorobenzoyl peroxide, *see* Di-4-chlorobenzoyl peroxide, *etc.*.												
	Chlorobenzylchlorides	6.1	UN2235	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	M2
	1-Chloro-3-bromopropane	6.1	UN2688	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A	
	Chlorobutanes	3	UN1127	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E, B	M5
	Chlorocresols, *liquid*	6.1	UN2669	II	POISON	T8	None	202	243	5 L	60 L	A	12
	Chlorocresols, *solid*	6.1	UN2669	II	POISON		None	212	242	25 kg	100 kg	A	12
	3-Chloro-4-diethylaminobenzenediazonium zinc chloride	4.1	UN3033	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	C	
	Chlorodifluorobromomethane	2.2	UN1974		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	1-Chloro-1,1-difluoroethane, see Chlorodifluoroethanes												
	Chlorodifluoroethanes *or* Difluorochloroethanes	2.1	UN2517		FLAMMABLE GAS.	B51	306	304	314, 315	Forbidden	150 kg	B	40
	Chlorodifluoromethane	2.2	UN1018		NONFLAMMABLE GAS.	B51	306	304	314, 315	75 kg	150 kg	A	
	Chlorodifluoromethane and chloropentafluoroethane mixture *with fixed boiling point, with approximately 49 per cent chlorodifluoromethane.*	2.2	UN1973		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	Chlorodinitrobenzenes	6.1	UN1577	II	POISON	T14	None	212	242	25 kg	100 kg	A	91, M2
	Chloroform	6.1	UN1888	II	POISON	N36, T14	None	202	243	5 L	60 L	A	40, M2
+	Chloroformates, n.o.s., *flash point not less than 23 degrees C*	6.1	UN2742	II	POISON, CORROSIVE.	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	1 L	30 L	A	12, 13, 22, 25, 40, 48, 100, M3
	Chloromethylchloroformate	6.1	UN2745	II	POISON, CORROSIVE.	T18	None	202	243	1 L	30 L	A	12, 13, 22, 25, 40, 48, 100
	Chloromethyl ethyl ether	3	UN2354	II	FLAMMABLE LIQUID, POISON.	T8	None	202	243	1 L	60 L	E	40
	3-Chloro-4-methylphenylisocyanate	6.1	UN2236	II	POISON		None	202	243	5 L	60 L	B	40
	Chloronitroanilines	6.1	UN2237	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
+	Chloronitrobenzene, *ortho, liquid*	6.1	UN1578	II	POISON	T14	None	202	243	5 L	60 L	A	
+	Chloronitrobenzenes *meta or para, solid*	6.1	UN1578	II	POISON	T14	None	212	242	25 kg	100 kg	A	
	Chloronitrotoluenes *liquid*	6.1	UN2433	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	M2
	Chloronitrotoluenes, *solid*	6.1	UN2433	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
	Chloropentafluoroethane	2.2	UN1020		NONFLAMMABLE GAS.	B51	306	304	314, 315	75 kg	150 kg	A	
	Chlorophenates, liquid	8	UN2904	III	CORROSIVE		154	203	241	5 L	60 L	A	M1
	Chlorophenates, solid	8	UN2905	III	CORROSIVE		154	213	240	25 kg	100 kg	A	M1
	Chlorophenols, liquid	6.1	UN2021	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M4
	Chlorophenols, solid	6.1	UN2020	III	KEEP AWAY FROM FOOD.	T7	153	213	240	100 kg	200 kg	A	M4
	Chlorophenyltrichlorosilane	8	UN1753	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40, M2

▲	Chloropicrin	6.1	UN1580	I	POISON	2, B7, B9, B14, B32, B46, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	40
	Chloropicrin and methyl bromide mixtures	2.3	UN1581		POISON GAS	2, B9, B13, B14, B31, B73.	None	193	244	Forbidden	Forbidden	D	25, 40
	Chloropicrin and methyl chloride mixtures	2.3	UN1582		POISON GAS	2, B9, B13, B14, B31, B73.	None	193	244	Forbidden	Forbidden	D	25, 40
	Chloropicrin mixture, flammable (pressure not exceeding 14.7 psia at 115 degrees F flash point below 100 deg F) see Poisonous liquids, flammable, n.o.s..												
	Chloropicrin mixtures, n.o.s	6.1	UN1583	I	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	C	40, M3
				II	POISON		None	201	243	Forbidden	Forbidden	C	40, M3
				III	KEEP AWAY FROM FOOD.		153	203	241	Forbidden	Forbidden	C	40, M3
D	Chloropivaloyl chloride	6.1	NA9264	I	POISON, CORROSIVE.	2, B9, B14, B32, T38, T43, T45.	None	227	244	Forbidden	Forbidden	B	40, M3
	Chloroplatinic acid, solid	8	UN2507	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Chloroprene, uninhibited	Forbidden											
	2-Chloropropane	3	UN2356	I	FLAMMABLE LIQUID.	N36, T14	150	201	243	1 L	30 L	E	M2
	3-Chloropropanol-1	6.1	UN2849	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	
	2-Chloropropene	3	UN2456	I	FLAMMABLE LIQUID.	A3, N36, T14	150	201	243	1 L	30 L	E	M2
	Chloropropene, inhibited	3	UN1991	I	FLAMMABLE LIQUID, POISON.	B57, T15	None	201	243	Forbidden	30 L	D	40, M2
	alpha-Chloropropionic acid	8	UN2511	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	8
	2-Chloropyridine	6.1	UN2822	II	POISON	T14	None	202	243	5 L	60 L	A	40
	Chlorosilanes, n.o.s.	8	UN2987	II	CORROSIVE	B2	154	202	242	1 L	30 L	C	40, M3
	Chlorosilanes, n.o.s. *flashpoint less than 23 degrees C*	3	UN2985	II	FLAMMABLE LIQUID, CORROSIVE.		None	201	243	1 L	5 L	B	40, M3
	Chlorosilanes, n.o.s., *flash point not less than 23 degrees C*	8	UN2986	II	CORROSIVE, FLAMMABLE LIQUID.		None	202	243	1 L	30 L	C	23, 40, M3
	Chlorosilanes, n.o.s., *which in contact with water emit flammable gases*	4.3	UN2988	I	DANGEROUS WHEN WET, FLAMMABLE LIQUID, CORROSIVE.	A2	None	201	244	Forbidden	1 L	D	21, 28, 40 49, 100, M3
▲	Chlorosulfonic acid (*with or without sulfur trioxide*)	8	UN1754	I	CORROSIVE, POISON.	2, A3, A6, A10, B4, B9, B14, B32, B74, T12, T27, T38, T43, T45.	None	227	244	0.5 L	2.5 L	C	8, 40
	Chlorotetrafluoroethane	2.2	UN1021		NONFLAMMABLE GAS.	B51	306	304	314, 315	75 kg	150 kg	A	
	Chlorotoluenes	3	UN2238	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	M2
	4-Chloro-o-toluidine hydrochloride	6.1	UN1579	III	KEEP AWAY FROM FOOD.		153	213	241	100 kg	200 kg	A	
	Chlorotoluidines *liquid*	6.1	UN2239	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	
	Chlorotoluidines *solid*	6.1	UN2239	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Chlorotrifluoroethane	2.2	UN1983		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	Chlorotrifluoromethane	2.2	UN1022		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	Chlorotrifluoromethane and trifluoromethane azeotropic mixture *with approximately 60 per cent chlorotrifluoromethane.*	2.2	UN2599		NONFLAMMABLE GAS		306	304	314, 315	75 kg	150 kg	A	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
D	Chromic acid, solid	5.1	NA1463	II	OXIDIZER, CORROSIVE.		None	212	240	5 kg	25 kg	A	
	Chromic acid solution	8	UN1755	II	CORROSIVE	B2, T9, T27	154	202	242	1 L	30 L	C	40
	Chromic anhydride, see Chromium trioxide, anhydrous												
	Chromic fluoride, solid	8	UN1756	II	CORROSIVE		154	212	240	15 kg	50 kg	A	26
	Chromic fluoride, solution	8	UN1757	II	CORROSIVE	B2, T6	154	202	242	1 L	30 L	A	
	Chromium nitrate	5.1	UN2720	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
	Chromium oxychloride	8	UN1758	I	CORROSIVE	A3, A6, A7, B4, N34, T12, T26.	None	201	242	0.5 L	2.5 L	C	8, 40, 66, 74, 89, 90, M2
	Chromium trioxide, anhydrous	5.1	UN1463	II	OXIDIZER, CORROSIVE.		None	212	240	5 kg	25 kg	A	
	Chromosulfuric acid	8	UN2240	I	CORROSIVE	A3, A6, A7, B4, B6, N34, T12, T27.	None	201	242	0.5 L	2.5 L	B	8, 9, 40, 66, 74, 89, 90
	Chromyl chloride, see Chromium oxychloride												
	Cigar and cigarette lighter fluid, see Lighter fluids												
	Cigar and cigarette lighters, charged with fuel, see Lighters for cigars, cigarettes, *etc.*.												
	Coal briquettes, hot	Forbidden											
	Coal gas	2.3	UN1023		POISON GAS, FLAMMABLE GAS.	3, B13, B14, B33, B36, B75.	None	302	245	Forbidden	25 kg	D	40
	Coal tar distillates, flammable	3	UN1136	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
	Coal tar dye, corrosive, liquid, n.o.s, see Dyes, n.o.s. *or* Dye intermediates, n.o.s., *corrosive.*												
	Coating solution	3	UN1139	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	M4
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	M4
	Cobalt naphthenates, powder	4.1	UN2001	III	FLAMMABLE SOLID.	A19	151	213	240	25 kg	100 kg	A	
	Cobalt resinate, precipitated	4.1	UN1318	III	FLAMMABLE SOLID.	A1, A19	151	213	240	25 kg	100 kg	A	
	Cocculus	6.1	UN1584	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Coke, hot	Forbidden											
	Collodion, see Nitrocellulose *etc.*												
D	Combustible liquid, n.o.s.	Combustible liquid	NA1993	III	None	T1	150	203	241	60 L	220 L	A	M3
D	Compounds, cleaning liquid	8	NA1760	I	CORROSIVE	A7, B4, N37 T42.	None	201	242	0.5 L	2.5 L	B	40, M3
				II	CORROSIVE	B2, N37, T14	154	202	242	1 L	30 L	B	40, M3
				III	CORROSIVE	N37, T7	154	203	240	5 L	60 L	A	40, M3
D	Compounds, cleaning liquid	3	NA1993	I	FLAMMABLE LIQUID.	T42	150	201	243	1 L	30 L	E,B	M3
				II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	E,B	M3
				III	FLAMMABLE LIQUID.	B1, B52, T7, T30.	150	203	242	60 L	220 L	A	M3
	Components, explosive train, n.o.s.	1.2B	UN0382	II	EXPLOSIVE 1.2B.	101		62	None	Forbidden	Forbidden	B	1E, 6E

	Components, explosive train, n.o.s.	1.4B	UN0383	II	EXPLOSIVE 1.4B.	101		62	None	Forbidden	75 kg	A	24E
	Components, explosive train, n.o.s.	1.4S	UN0384	II	EXPLOSIVE 1.4S.	101		62	None	25 kg	100 kg	A	9E
	Components, explosive train, n.o.s.	1.1B	UN0461	II	EXPLOSIVE 1.1B.	101		62	None	Forbidden	Forbidden	B	1E, 6E
	Composition B, see Hexolite, *etc.*												
	Compressed *or* Liquefied gases, flammable, n.o.s.	2.1	UN1954		FLAMMABLE GAS.	B13	306	302, 304, 305	244	Forbidden	150 kg		40, 105, M3
	Compressed *or* Liquefied gases, flammable, toxic, n.o.s.	2.3	UN1953		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	302, 304, 305	245	Forbidden	Forbidden	D	40, 95
	Compressed *or* Liquefied gases, flammable, toxic, n.o.s.	2.3	UN1953		POISON GAS, FLAMMABLE GAS.	2, B9, B13, B14, B31, B73.	None	302, 304, 305	244	Forbidden	Forbidden	D	40
	Compressed *or* Liquefied gases, flammable, toxic, n.o.s.	2.3	UN1953		POISON GAS, FLAMMABLE GAS.	3, B13, B14, B33, B75.	None	302, 304, 305	244	Forbidden	Forbidden	D	40
	Compressed *or* Liquefied gases, flammable, toxic, n.o.s.	2.3	UN1953		POISON GAS, FLAMMABLE GAS.	4, B13, B34	None	302, 304, 305	244	Forbidden	Forbidden	D	40
	Compressed *or* Liquefied gases, n.o.s.	2.2	UN1956		NONFLAMMABLE GAS.	B13	306, 307	302, 304, 305	244	75 kg	150 kg	A	
	Compressed *or* Liquefied gases, toxic, n.o.s.	2.3	UN1955		POISON GAS.	1, B9, B14, B30, B72.	None	302, 304, 305	245	Forbidden	Forbidden	D	40, M3
	Compressed *or* Liquefied gases, toxic, n.o.s.	2.3	UN1955		POISON GAS.	2, B9, B13, B14, B31, B73.	None	302, 304, 305	244	Forbidden	Forbidden	D	40
	Compressed *or* Liquefied gases, toxic, n.o.s.	2.3	UN1955		POISON GAS.	3, B13, B14, B33, B75.	None	302, 304, 305	244	Forbidden	Forbidden	D	40
	Compressed *or* Liquefied gases, toxic, n.o.s.	2.3	UN1955		POISON GAS.	4, B13, B34	None	302, 304, 305	244	Forbidden	Forbidden	D	40
D	Consumer commodity	ORM-D	None		None		156, 306	156, 306	None	30 kg gross	30 kg gross	A	
	Contrivances, water-activated, *with burster, expelling charge or propelling charge.*	1.2L	UN0248	II	EXPLOSIVE 1.2L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E
	Contrivances, water-activated, *with burster, expelling charge or propelling charge.*	1.3L	UN0249	II	EXPLOSIVE 1.3L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E
	Copper acetoarsenite	6.1	UN1585	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Copper acetylide	Forbidden											
	Copper amine azide	Forbidden											
	Copper arsenite	6.1	UN1586	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Copper based pesticides, liquid, flammable, toxic n.o.s., *flash point less than 23 degrees C.*	3	UN2776	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	40
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	40
	Copper based pesticides, liquid, toxic, flammable, n.o.s. *flash-point not less than 23 degrees C.*	6.1	UN3009	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1	153	203	241	60 L	220 L	A	40, M3
	Copper based pesticides, liquid, toxic, n.o.s.	6.1	UN3010	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
	Copper based pesticides, solid, toxic, n.o.s.	6.1	UN2775	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Copper chlorate	5.1	UN2721	II	OXIDIZER	A1	152	212	240	5 kg	25 kg	A	56, 58, 106
	Copper chloride	8	UN2802	III	CORROSIVE		154	213	240	25 kg	100 kg	A	M2
	Copper cyanide	6.1	UN1587	II	POISON		None	204	242	25 kg	100 kg	A	26, M1
	Copper selenate, *see* Selenates *or* Selenites												
	Copper selenite, *see* Selenates *or* Selenites												
	Copper tetramine nitrate	Forbidden											
AW	Copra	4.2	UN1363	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	Forbidden	Forbidden	A	13, 19, 48, 119
	Cord, detonating, *flexible*	1.1D	UN0065	II	EXPLOSIVE 1.1D.	102	63(a)	62	None	Forbidden	Forbidden	B	
	Cord, detonating, *flexible*	1.4D	UN0289	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75 kg	A	24E
	Cordeau detonant fuse, see Cord (Fuse), detonating, *etc.*; Cord, detonating, *flexible*.												
	Cord (Fuse), detonating, *metal clad*	1.2D	UN0102	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Cord (Fuse), detonating, *metal clad*	1.1D	UN0290	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Cord (Fuse), detonating, mild effect *metal clad*	1.4D	UN0104	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75 kg	A	24E
	Cord, igniter	1.4G	UN0066	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
	Cordite, see Powder, smokeless												
	Corrosive liquids, flammable, n.o.s.	8	UN2920	I	CORROSIVE, FLAMMABLE LIQUID.	B4, T42	None	201	243	0.5 L	2.5 L	C	12, 21, 25, 40, 48, M3
				II	CORROSIVE, FLAMMABLE LIQUID.	B2, T15, T26	None	202	243	1 L	30 L	C	12, 21, 25, 40, 48, M3
	Corrosive liquids, n.o.s.	8	UN1760	I	CORROSIVE	A7, B4, T42	None	201	242	0.5 L	2.5 L	B	40, M3
				II	CORROSIVE	B2, T14	154	202	242	1 L	30 L	B	40, M3
				III	CORROSIVE	T7	154	203	240	5 L	60 L	A	40, M3
	Corrosive liquids, oxidizing, n.o.s.	8	UN3093	I	CORROSIVE, OXIDIZER.		None	201	243	Forbidden	2.5 L	C	89, M3
				II	CORROSIVE, OXIDIZER.		None	202	243	1 L	30 L	C	89, M3
	Corrosive liquids, poisonous, n.o.s.	8	UN2922	I	CORROSIVE, POISON.		None	201	243	0.5 L	2.5 L	B	40, 95, M3
				II	CORROSIVE, POISON.		None	202	243	1 L	30 L	B	40, 95, M3
	Corrosive liquids, which in contact with water emit flammable gases, n.o.s.	8	UN3094	I	CORROSIVE, DANGEROUS WHEN WET.		None	201	243	Forbidden	1 L	E	M3
				II	CORROSIVE, DANGEROUS WHEN WET		None	202	243	1 L	5 L	E	M3

	Corrosive solids, flammable, n.o.s.	8	UN2921	I	CORROSIVE, FLAMMABLE SOLID.		None	211	242	1 kg	25 kg	B	12, 24, 25, 48, M3
				II	CORROSIVE, FLAMMABLE SOLID.		None	212	242	15 kg	50 kg	B	12, 24, 25, 48, M3
	Corrosive solids, n.o.s.	8	UN1759	I	CORROSIVE		None	211	240	1 kg	25 kg	B	M3
				II	CORROSIVE		154	212	240	15 kg	50 kg	A	M3
				III	CORROSIVE		154	213	240	25 kg	100 kg	A	M3
	Corrosive solids, oxidizing, n.o.s.	8	UN3084	I	CORROSIVE, OXIDIZER.		None	211	240	1 kg	25 kg	C	89, M3
				II	CORROSIVE, OXIDIZER.		None	212	240	15 kg	50 kg	C	89, M3
	Corrosive solids, poisonous, n.o.s.	8	UN2923	I	CORROSIVE, POISON.		None	211	242	1 kg	25 kg	B	40, 95, M3
				II	CORROSIVE, POISON.		None	212	240	15 kg	50 kg	B	40, 95, M3
	Corrosive solids, self heating, n.o.s.	8	UN3095	I	CORROSIVE, SPONTANEOUSLY COMBUSTIBLE.		None	211	241	1 kg	25 kg	C	M3
				II	CORROSIVE, SPONTANEOUSLY COMBUSTIBLE.		None	212	242	15 kg	50 kg	C	M3
	Corrosive solids, which in contact with water emit flammable gases, n.o.s.	8	UN3096	I	CORROSIVE, DANGEROUS WHEN WET.		None	211	241	1 kg	25 kg	E	M3
				II	CORROSIVE, DANGEROUS WHEN WET.		None	212	242	15 kg	50 kg	E	M3
DW	Cotton	9	NA1365	III	CLASS 9	W41	155	None	240	No limit	No limit	A	
I	Cotton waste, oily	4.2	UN1364	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	None	Forbidden	Forbidden	A	54
AIW	Cotton, wet	4.2	UN1365	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	Forbidden	Forbidden	A	
	Coumarin derivative pesticides, liquid, flammable, toxic, n.o.s. *flashpoint less than 23 deg C.*	3	UN3024	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	40, M3
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	40, M3
	Coumarin derivative pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3025	I	POISON, FLAMMABLE LIQUID.		None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.		None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1	153	203	241	60 L	220 L	A	40, M3
	Coumarin derivative pesticides, liquid, toxic, n.o.s.	6.1	UN3026	I	POISON		None	201	243	1 L	30 L	B	40, M3
				II	POISON		None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	40, M3
	Coumarin derivatve pesticides, solid, toxic, n.o.s.	6.1	UN3027	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
D	Creosote, coal tar	3	NA1993	III	FLAMMABLE LIQUID.		150	203	241	60 L	220 L	A	M3
	Cresols (*o-; m-; p-*)	6.1	UN2076	II	POISON	T8	None	202	243	5 L	60 L	A	M2
	Cresylic acid	6.1	UN2022	II	POISON	T8	None	202	243	5 L	60 L	A	M2
+	Crotonaldehyde, stabilized	3	UN1143	II	FLAMMABLE LIQUID, POISON.	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	Forbidden	60 L	B	40, M2
	Crotonic acid *liquid*	8	UN2823	III	CORROSIVE		154	203	240	5 L	60 L	A	12, 48
	Crotonic acid, *solid*	8	UN2823	III	CORROSIVE		154	213	240	25 kg	100 kg	A	12, 48
	Crotonylene	3	UN1144	I	FLAMMABLE LIQUID.	T20	150	201	243	1 L	30 L	E	
	Cumene hydroperoxide, *see* Cumyl hydroperoxide												
	Cuprietylenediamine solution	8	UN1761	II	CORROSIVE. POISON.	T8. T26	154	202	243	1 L	30 L	A	95, M2
	Cutters, cable, explosive	1.4S	UN0070	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Cyanide or cyanide mixtures, dry, see Cyanides, inorganic, n.o.s.												
	Cyanides, inorganic, n.o.s.	6.1	UN1588	I	POISON	N74, N75	None	211	242	5 kg	50 kg	A	52, M2
				II	POISON	N74, N75	None	212	242	25 kg	100 kg	A	52, M2
				III	KEEP AWAY FROM FOOD.	N74, N75	153	203	241	100 kg	200 kg	A	52, M2
	Cyanide solutions	6.1	UN1935	I	POISON	B37, T18, T26	None	201	243	1 L	30 L	B	40, 52, M2
				II	POISON	T18, T26	None	202	243	5 L	60 L	A	40, 52, M2
				III	KEEP AWAY FROM FOOD.	T18, T26	153	203	241	60 L	220 L	A	40, 52, M2
	Cyanogen bromide	6.1	UN1889	I	POISON, CORROSIVE.	1, A6, A8, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	25 kg	D	40, M2
	Cyanogen chloride, inhibited	2.3	UN1589		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	192	245	Forbidden	Forbidden	D	40, M2
	Cyanogen, liquefied	2.3	UN1026		POISON GAS, FLAMMABLE GAS.	2, B9, B13, B14, B31, B73.	None	192	245	Forbidden	Forbidden	D	40
	Cyanuric chloride	8	UN2670	III	CORROSIVE		None	213	240	25 kg	100 kg	A	12, 40, 48
	Cyanuric triazide	Forbidden											
	Cyclobutane	2.1	UN2601		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	B	40
	Cyclobutylchloroformate	6.1	UN2744	II	POISON. CORROSIVE.	T18	None	202	243	1 L	30 L	A	12, 13, 22, 25, 40, 48, 100
	1,5,9-Cyclododecatriene	6.1	UN2518	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	40
	Cycloheptane	3	UN2241	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	40
	Cycloheptatriene	3	UN2603	II	FLAMMABLE LIQUID, POISON.	T14	None	202	243	1 L	60 L	E	40
	Cycloheptene	3	UN2242	II	FLAMMABLE LIQUID.	T7	150	202	241	5 L	60 L	B	
	Cyclohexane	3	UN1145	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
	Cyclohexanone	3	UN1915	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	

	Cyclohexene	3	UN2256	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	E	
	Cyclohexenyltrichlorosilane	8	UN1762	II	CORROSIVE	A7, B2, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40
	Cyclohexyl acetate	3	UN2243	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Cyclohexylamine	8	UN2357	II	CORROSIVE, FLAMMABLE LIQUID.	T8, T26	None	202	243	1 L	30 L	A	12, 21, 40, 48
+	Cyclohexyl isocyanate	6.1	UN2488	II	POISON	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	5 L	60 L	D	40
	Cyclohexyl mercaptan	3	UN3054	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	40, 95, 102
	Cyclohexyltrichlorosilane	8	UN1763	II	CORROSIVE	A7, B2, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40
	Cyclonite, *see* Cyclotrimethylenetrinitramine, *etc.*												
	Cyclooctadiene phosphines, *see* 9-Phosphabicyclononanes												
	Cyclooctadienes	3	UN2520	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Cyclooctatetraene	3	UN2358	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Cyclopentane	3	UN1146	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	E	
	Cyclopentane, methyl, see Methyl cyclopentane												
	Cyclopentanol	3	UN2244	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Cyclopentanone	3	UN2245	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Cyclopentene	3	UN2246	II	FLAMMABLE LIQUID.	T13	150	202	242	5 L	60 L	E	
	Cyclopropane, liquified	2.1	UN1027		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	E	40, M3
	Cyclotetramethylene tetranitramine (dry or unphlegmatized) (HMX).	Forbidden											
	Cyclotetramethylenetetranitramine (HMX; Octogen), wetted *with not less than 15 per cent water, by mass.*	1.1D	UN0226	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Cyclotetramethylenetetranitramine; (Octogen; HMX), desensitized.	1.1D	UN0484	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Cyclotrimethylenetrinitramine (Cyclonite; Hexogen; RDX), and Cyclotetramethylenetetranitramine (HMX; Octogen) mixtures, wetted *with not less than 15 per cent water by mass, or* Cyclotrimethylenetrinitramine (Cyclonite; Hexogen; RDX) and Cyclotetramethylenetetranitramine (HMX; Octogen) mixtures desensitized *with not less than 10 per cent phlegmatizer by mass.*	1.1D	UN0391	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Cyclotrimethylenetrinitramine; (Cyclonite; Hexogen; RDX), desensitized.	1.1D	UN0483	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Cyclotrimethylenetrinitramine (Cyclonite; Hexogen; RDX) wetted *with not less than 15 per cent water, by mass.*	1.1D	UN0072	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Cymenes	3	UN2046	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Decaborane	4.1	UN1868	II	FLAMMABLE SOLID, POISON.	A19, A20	None	212	None	Forbidden	50 kg	A	
	Decahydronaphthalene	3	UN1147	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	n-Decane	3	UN2247	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Decanoyl peroxide, *see* Didecanoyl peroxide, *technically pure*												
	Deflagrating metal salts of aromatic nitroderivatives, n.o.s	1.3C	UN0132	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Delay electric igniter, see Igniters												
D	Denatured alcohol	3	NA1986	II	FLAMMABLE LIQUID.		150	202	242	5 L	60 L	B	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				III	FLAMMABLE LIQUID.	B1	150	203	242	60 L	220 L	A	
	Depth charges, see Charges, depth												
	Detonating relays, see Detonators, *etc.*												
	Detonator assemblies, non-electric *for blasting*	1.1B	UN0360	II	EXPLOSIVE 1.1B.			62	None	Forbidden	Forbidden	B	1E, 2E, 6E
	Detonator assemblies, non-electric, *for blasting*	1.4B	UN0361	II	EXPLOSIVE 1.4B.	103	63(f), 63(g)	62	None	Forbidden	75 kg	A	1E, 2E, 6E, 24E
	Detonators, electric, *for blasting*	1.1B	UN0030	II	EXPLOSIVE 1.1B.		63(f), 63(g)	62	None	Forbidden	Forbidden	B	
	Detonators, electric, *for blasting*	1.4B	UN0255	II	EXPLOSIVE 1.4B.	103	63(f), 63(g)	62	None	Forbidden	75 kg	A	24E
	Detonators, electric *for blasting*	1.4S	UN0456	II	EXPLOSIVE 1.4S.	104	63(f), 63(g)	62	None	25 kg	100 kg	A	9E
	Detonators for ammunition	1.1B	UN0073	II	EXPLOSIVE 1.1B.			62	None	Forbidden	Forbidden	B	2E, 6E, 25E
	Detonators for ammunition	1.2B	UN0364	II	EXPLOSIVE 1.2B.			62	None	Forbidden	Forbidden	B	2E, 6E
	Detonators for ammunition	1.4B	UN0365	II	EXPLOSIVE 1.4B.	103		62	None	Forbidden	75 kg	A	24E
	Detonators for ammunition	1.4S	UN0366	II	EXPLOSIVE 1.4S.	104		62	None	25 kg	100 kg	A	9E
	Detonators, non-electric, *for blasting*	1.1B	UN0029	II	EXPLOSIVE 1.1B.			62	None	Forbidden	Forbidden	B	1E, 2E, 6E
	Detonators, non-electric, *for blasting*	1.4B	UN0267	II	EXPLOSIVE 1.4B.	103	63(f), 63(g)	62	None	Forbidden	75 kg	B	
	Detonators, non-electric *for blasting*	1.4S	UN0455	II	EXPLOSIVE 1.4S.	104		62	None	25 kg	100 kg	A	9E
	Deuterium	2.1	UN1957		FLAMMABLE GAS.		306	302	None	Forbidden	150 kg	E	40
	Devices, small, hydrocarbon gas powered or hydrocarbon gas refills for small devices *with release device.*	2.1	UN3150		FLAMMABLE GAS.		306	304		Forbidden	150 kg	B	40
	Diacetone alcohol	3	UN1148	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Diacetone alcohol peroxides, more than 57% in solution with more than 9% hydrogen peroxide, less than 26% diacetone alcohol and less than 9% water; total active oxygen content more than 9% by mass.	Forbidden											
	Diacetyl, see Butanedione												
	Diacetyl peroxide, solid, or more than 25% in solution	Forbidden											
	Diallylamine	3	UN2359	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
	Diallylether	3	UN2360	II	FLAMMABLE LIQUID. POISON.	N12, T8	None	202	243	1 L	60 L	E	40
	4,4'-Diaminodiphenyl methane	6.1	UN2651	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Di-n-amylamine	6.1	UN2841	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	
	p-Diazidobenzene	Forbidden											
	1,2-Diazidoethane	Forbidden											
	1,1'-Diazoaminonaphthalene	Forbidden											

	Diazoaminotetrazole (dry)	Forbidden													
	Diazodinitrophenol (dry)	Forbidden													
	Diazodinitrophenol, wetted *with not less than 40 per cent water or mixture of alcohol and water, by mass.*	1.1A	UN0074	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Diazodiphenylmethane	Forbidden													
	2-Diazo-1-naphthol-4-sulpho-chloride	4.1	UN3042	II	FLAMMABLE SOLID, EXPLOSIVE.	53	None	224	None	Forbidden	Forbidden	D	
	2-Diazo-1-naphthol-5-sulpho-chloride	4.1	UN3043	II	FLAMMABLE SOLID, EXPLOSIVE.	53	None	224	None	Forbidden	Forbidden	D	
	Diazonium nitrates (dry)	Forbidden													
	Diazonium perchlorates (dry)	Forbidden													
	1,3-Diazopropane	Forbidden													
	Dibenzyldichlorosilane	8	UN2434	II	CORROSIVE	B2, T8, T26	154	202	242	1 L	30 L	C	40
	Dibenzyl peroxydicarbonate, more than 87 per cent with water	Forbidden											
	Diborane	2.3	UN1911		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	302	245	Forbidden	Forbidden	D	40, 57
D	Diborane mixtures	2.3	NA1911		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B35, B72.	None	302	245	Forbidden	Forbidden	D	40, 57
	Dibromoacetylene	Forbidden											
	Dibromobenzene	3	UN2711	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	1,2-Dibromobutan-3-one	6.1	UN2648	II	POISON		None	202	243	5 L	60 L	B	40
	Dibromochloropropane	6.1	UN2872	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	
A	Dibromodifluoromethane	9	UN1941	III	None	T13	155	203	241	100 L	220 L	A	25
	1,2-Dibromoethane, see Ethylene dibromide												
	Dibromomethane	6.1	UN2664	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	M2
	Di-n-butylamine	8	UN2248	II	CORROSIVE, FLAMMABLE LIQUID.		None	202	243	1 L	30 L	A	12, 21, 48
	Dibutylaminoethanol	6.1	UN2873	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A	
	Dibutyl ethers	3	UN1149	III	FLAMMABLE LIQUID.	B1, T1	150	201	242	60 L	220 L	A	
	2,2-Di-(tert-butylperoxy) butane, more than 55 per cent in solution.	Forbidden											
	Di-n-butyl peroxydicarbonate, more than 52 per cent in solution.	Forbidden											
	Di-(tert-butylperoxy) phthalate, more than 55 per cent in solution.	Forbidden											
	N,N'-Dichlorazodicarbonamidine (salts of) (dry)	Forbidden											
	Dichloroacetic acid	8	UN1764	II	CORROSIVE	A3, A6, A7, B2, N34, T9, T27.	154	202	242	1 L	30 L	A	
	1,3-Dichloroacetone	6.1	UN2649	II	POISON		None	212	243	25 kg	100 kg	B	12, 40, 48
	Dichloroacetyl chloride	8	UN1765	II	CORROSIVE	A3, A6, A7, B2, B6, N34, T8, T26.	154	202	242	1 L	30 L	D	40
	Dichloroacetylene	Forbidden											
	Dichloroanilines, solid or liquid	6.1	UN1590	II	POISON	T14	None	202	242	5 L	60 L	A	40, M2
	o-Dichlorobenzene	6.1	UN1591	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M2

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	p-Dichlorobenzene	6.1	UN1592	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
D	Dichlorobutene	8	NA2920	I	CORROSIVE, FLAMMABLE LIQUID.		None	201	243	0.5 L	2.5 L	C	12, 21, 25, 40, 48, M4
	2,2-Dichlorodiethyl ether	6.1	UN1916	II	POISON, FLAMMABLE LIQUID.	N33, N34, T8	None	202	243	5 L	60 L	A	M2
	Dichlorodifluoromethane	2.2	UN1028		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	Dichlorodifluoromethane and difluoroethane azeotropic mixture *with approximately 74 per cent dichlorodifluoromethane.*	2.2	UN2602		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
	Dichlorodifluoromethane and ethylene oxide mixture, *with not more than 12% ethylene oxide*	2.3	UN3070		POISON GAS.	4, B13, B14, B33, B34.	None	304	244	Forbidden	25 kg	D	40
	Dichlorodimethyl ether, symmetrical	6.1	UN2249	I	POISON	T25	None	201	243	Forbidden	Forbidden	D	40, 105
	1,1-Dichloroethane	3	UN2362	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	40, M2
	1,2-Dichloroethane, see Ethylene dichloride												
	Dichloroethylene	3	UN1150	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	B	
	Dichloroethyl sulfide	Forbidden											
	Dichloroisocyanuric acid, dry *or* Dichloroisocyanuric acid salts	5.1	UN2465	II	OXIDIZER	28	152	212	240	5 kg	25 kg	A	13
	Dichloroisopropyl ether	6.1	UN2490	II	POISON	T8	None	202	243	5 L	60 L	B	
	Dichloromethane	6.1	UN1593	III	KEEP AWAY FROM FOOD.	N36, T13	153	203	241	60 L	220 L	A	
	Dichloromonofluoromethane	2.2	UN1029		NONFLAMMABLE GAS.	B51	306	304	314, 315	75 kg	150 kg	A	
	1,1-Dichloro-1-nitroethane	6.1	UN2650	II	POISON	T8	None	202	243	5 L	60 L	A	12, 40, 48
	Dichloropentanes	3	UN1152	III	FLAMMABLE LIQUID.	B1, T1	150	202	241	60 L	220 L	A	
	Dichlorophenyl isocyanates	6.1	UN2250	II	POISON		None	212	242	25 kg	100 kg	A	25, 40, 48
	Dichlorophenyltrichlorosilane	8	UN1766	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40, M2
	Dichloropropane, see Propylene dichloride												
	1,3-Dichloropropanol-2	6.1	UN2750	II	POISON	T8	None	202	243	5 L	60 L	A	12, 40, 48
	Dichloropropene	3	UN2047	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	A	M2
	Dichloropropene and propylene dichloride mixture, see Propylene dichloride.												
	Dichlorosilane	2.3	UN2189		POISON GAS, FLAMMABLE GAS.	2, B9, B13, B14, B31, B73.	None	304	244	Forbidden	Forbidden	D	40
	Dichlorotetrafluoroethane	2.2	UN1958		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
D	3,5 Dichloro-2,4,6 trifluoropyridine	6.1	NA2810	I	POISON	2, B9, B14, B32, T38, T43, T45.		227	244	Forbidden	Forbidden	A	40, 95, M3
	Dichlorovinylchloroarsine	Forbidden											
	Dicycloheptadiene, *see* Norbornadiene												
	Dicyclohexylamine	8	UN2565	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	
	Dicyclohexylammonium nitrite	4.1	UN2687	III	FLAMMABLE SOLID.		153	213	240	25 kg	100 kg	A	48
	Dicyclopentadiene	3	UN2048	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	

	2,2-Di-(4,4-di-tert-butylperoxycyclohexyl) propane, more than 42 per cent with inert solid.	Forbidden													
	Di-2,4-dichlorobenzoyl peroxide, more than 75 per cent with water.	Forbidden													
	1,2-Di-(dimethylamino) ethane	3	UN2372	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B			
	Didymium nitrate	5.1	UN1465	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A			
D	Dieldrin	6.1	NA2761	II	POISON		None	212	242	0.5 kg	5 kg	A		40, M4	
D	Diesel fuel	3	NA1993	III	None		150	203	241	60 L	220 L	A			
	Diethanol nitrosamine dinitrate (dry)	Forbidden													
	Diethoxymethane	3	UN2373	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E, B			
	2,5-Diethoxy-4-morpholinobenzenediazonium zinc chloride	4.1	UN3036	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	C		2	
	3,3-Diethoxypropene	3	UN2374	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B			
	Diethylamine	3	UN1154	II	FLAMMABLE LIQUID.	N34, T8	150	202	242	5 L	60 L	E			
	Diethylaminoethanol	3	UN2686	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A			
AW	Diethylaminopropylamine	8	UN2684	III	CORROSIVE, FLAMMABLE LIQUID.	B1, B2, T8	154	203	243	5 L	60 L	A		12, 21, 48	
	N,N-Diethyl aniline	6.1	UN2432	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A			
	Diethylbenzene	3	UN2049	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A			
	Diethyl carbonate	3	UN2366	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A			
	Diethyl cellosolve, see Ethylene glycol diethyl ether														
	Diethyldichlorosilane	8	UN1767	II	CORROSIVE, FLAMMABLE LIQUID.	A7, B6, N34, T8, T26.	None	202	243	Forbidden	30 L	C		21, 40	
	Diethylene glycol dinitrate	Forbidden													
	Diethyleneglycol dinitrate, desensitized *with not less than 25 percent non-volatile water-insoluble phlegmatizer, by mass.*	1.1D	UN0075	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B		1E, 4E, 21E	
	Diethylenetriamine	8	UN2079	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A		40	
	Diethyl ether; (ethyl ether)	3	UN1155	I	FLAMMABLE LIQUID.	T21	150	201	243	1 L	30 L	E		40	
	N,N-Diethylethylenediamine	8	UN2685	II	CORROSIVE, FLAMMABLE LIQUID.	T8	None	202	243	1 L	30 L	A		12, 21, 48	
	Diethylgold bromide	Forbidden													
	Di-2-ethylhexyl phosphoric acid, see Diisooctyl acid phosphate														
	Diethyl ketone	3	UN1156	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B			
	Diethyl peroxydicarbonate, more than 27 per cent in solution	Forbidden													
	Diethyl sulfate	6.1	UN1594	II	POISON	T14	None	202	243	5 L	60 L	C			
	Diethyl sulfide	3	UN2375	II	FLAMMABLE LIQUID.	T14	None	202	243	1 L	60 L	E			
	Diethylthiophosphoryl chloride	8	UN2751	II	CORROSIVE	B2, T8	None	202	242	15 kg	50 kg	D		12, 40	
	Diethylzinc	4.2	UN1366	I	SPONTANEOUSLY COMBUSTIBLE.	B11, T28, T40	None	181	244	Forbidden	Forbidden	D		18	
	Difluorochloroethanes, *see* Chlorodifluoroethanes														
	Difluoroethane	2.1	UN1030		FLAMMABLE GAS.	B51	306	304	314, 315	Forbidden	150 kg	B		40	
	1,1-Difluoroethylene	2.1	UN1959		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	E		40	
	Difluorophosphoric acid, anhydrous	8	UN1768	II	CORROSIVE	A6, A7, B2, N5, N34, T9, T27.	None	202	242	1 L	30 L	A		40	

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(5)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	2,3-Dihydropyran	3	UN2376	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
	1,8-Dihydroxy-2,4,5,7-tetranitroanthraquinone (chrysamminic acid).	Forbidden											
	Di-(1-hydroxytetrazole) (dry)	Forbidden											
	Diiodoacetylene	Forbidden											
	Diisobutylamine	3	UN2361	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Diisobutylene, isomeric compounds	3	UN2050	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Diisobutyl ketone	3	UN1157	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Diisooctyl acid phosphate	8	UN1902	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	
	Diisopropylamine	3	UN1158	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Diisopropylbenzene hydroperoxide, *see* Isopropylcumyl hydroperoxide, *etc.*												
	Diisopropylbenzene hydroperoxide, more than 72 percent in solution.	Forbidden											
	Diisopropyl ether	3	UN1159	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	40
+	Diketene, inhibited	3	UN2521	III	FLAMMABLE LIQUID, POISON.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	60 L	220 L	A	49
	1,1-Dimethoxyethane	3	UN2377	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	E, B	
	1,2-Dimethoxyethane	3	UN2252	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
	Dimethylamine, anhydrous	2.1	UN1032		FLAMMABLE GAS		None	304	314, 315	Forbidden	Forbidden	D	40
	Dimethylamine solution	3	UN1160	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E, B	
	2-Dimethylaminoacetonitrile	3	UN2378	II	FLAMMABLE LIQUID. POISON.	T8	None	202	243	1 L	60 L	A	26, 40
	4-Dimethylamino-6-(2-dimethylaminoethoxy) toluene-2-diazonium zinc chloride.	4.1	UN3039	II	FLAMMABLE SOLID.		None	224	None	Forbidden	Forbidden	D	2
	Dimethylaminoethyl methacrylate	6.1	UN2522	II	POISON	T8	None	202	243	5 L	60 L	B	40
	N,N-Dimethylaniline	6.1	UN2253	II	POISON	T8	None	202	243	5 L	60 L	A	
	2,3-Dimethylbutane	3	UN2457	II	FLAMMABLE LIQUID.	T13	150	202	242	5 L	60 L	E	
	1,3-Dimethylbutylamine	3	UN2379	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Dimethylcarbamoyl chloride	8	UN2262	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A	40
	Dimethyl carbonate	3	UN1161	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Dimethyl chlorothiophosphate, see Corrosive liquid, poisonous, n.o.s.												
	Dimethylcyclohexanes	3	UN2263	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Dimethylcyclohexylamine	8	UN2264	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A	12, 21, 40, 46
	Dimethyldichlorosilane	3	UN1162	I	FLAMMABLE LIQUID, CORROSIVE.	B77	None	201	243	Forbidden	Forbidden	B	40

Dimethyldiethoxysilane	3	UN2380	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
2,5-Dimethyl-2,5-dihydroperoxy hexane, more than 82 per cent with water.	Forbidden											
Dimethyldioxanes	3	UN2707	II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	B	
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
Dimethyl disulfide	3	UN2381	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
Dimethylethanolamine	3	UN2051	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
Dimethyl ether	2.1	UN1033		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	B	40
N,N-Dimethylformamide	3	UN2265	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Dimethylhexane dihydroperoxide, see 2,5-Dimethyl2,5-dihydroperoxy hexane, *etc.*												
Dimethylhexane dihydroperoxide (dry)	Forbidden											
+ Dimethylhydrazine, symmetrical	3	UN2382	I	FLAMMABLE LIQUID, POISON.	2, A7, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	Forbidden	30 L	E	40
Dimethylhydrazine, unsymmetrical	6.1	UN1163	I	POISON, FLAMMABLE LIQUID, CORROSIVE.	2, A7, B9, B14, B32, B58, B79, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	21, 40, 49, 61, 100
2,2-Dimethylpropane *other than pentane and isopentane*	2.1	UN2044		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	E	40, M3
Dimethyl-N-propylamine	3	UN2266	II	FLAMMABLE LIQUID, CORROSIVE.	T14, T26	None	202	243	1 L	5 L	B	40
Dimethyl sulfate	6.1	UN1595	I	POISON, CORROSIVE.	2, B9, B14, B32, B74, T18, T26, T38, T43, T45.	None	227	244	Forbidden	2.5L	D	40
Dimethyl sulfide	3	UN1164	II	FLAMMABLE LIQUID.	T14	None	201	243	1 L	30 L	E	40
+ Dimethyl thiophosphoryl chloride	8	UN2267	III	CORROSIVE, POISON.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	5 L	60 L	B	8
Dimethylzinc	4.2	UN1370	I	SPONTANEOUSLY COMBUSTIBLE.	B11, B16, T28, T29, T40.	None	181	244	Forbidden	Forbidden	D	18
Di-(1-naphthoyl) peroxide	Forbidden											
Dinitroanilines	6.1	UN1596	II	POISON	T14	None	212	242	25 kg	100 kg	A	91
Dinitrobenzenes, *liquid*	6.1	UN1597	II	POISON	11, T14	None	202	243	5 L	60 L	A	91
Dinitrobenzenes, *solid*	6.1	UN1597	II	POISON	11	None	212	242	25 kg	100 kg	A	91
Dinitrochlorobenzene, see Chlorodinitrobenzene												
Dinitro-o-cresol, *solid*	6.1	UN1598	II	POISON	T14	None	212	242	25 kg	100 kg	A	M2
Dinitro-o-cresol, *solution*	6.1	UN1598	II	POISON	T14	None	202	243	5 L	60 L	A	M2
Dinitro-7,8-dimethylglycoluril (dry)	Forbidden											
1,3-Dinitro-5,5-dimethyl hydantoin	Forbidden											
1,3-Dinitro-4,5-dinitrosobenzene	Forbidden											
1,2-Dinitroethane	Forbidden											
1,1-Dinitroethane (dry)	Forbidden											
Dinitrogen tetraoxide; (Nitrogen dioxide), liquefied	2.3	UN1067		POISON GAS, OXIDIZER.	1, B7, B9, B12, B14, B45, B46, B72.	None	338	245	Forbidden	Forbidden	D	40, 43

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Dinitroglycoluril	Forbidden											
	Dinitroglycoluril; (dingu)	1.1D	UN0489	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 25E
	Dinitromethane	Forbidden											
	Dinitrophenolates *alkali metals, dry or wetted with less than 15 per cent water, by mass.*	1.3C	UN0077	II	EXPLOSIVE 1.3C, POISON.			62	None	Forbidden	Forbidden	B	1E, 5E, M2
	Dinitrophenolates, wetted *with not less than 15 per cent water, by mass.*	4.1	UN1321	I	FLAMMABLE SOLID, POISON.	A8, A19, A20, N41.	None	211	None	1 kg	15 kg	E	28, 36, M2
	Dinitrophenol, *dry or wetted with less than 15 per cent water, by mass.*	1.1D	UN0076	II	EXPLOSIVE 1.1D, POISON.			62	None	Forbidden	Forbidden	B	1E, 5E, M2
	Dinitrophenol solutions	6.1	UN1599	II	POISON	T8	None	202	243	5 L	60 L	A	36, M2
	Dinitrophenol, wetted *with not less than 15 per cent water, by mass.*	4.1	UN1320	I	FLAMMABLE SOLID, POISON.	A8, A19, A20, N41.	None	211	None	1 kg	15 kg	E	28, 36, M2
	Dinitropropylene glycol	Forbidden											
	Dinitroresorcinol, *dry or wetted with less than 15 per cent water, by mass.*	1.1D	UN0078	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	4,6-Dinitroresorcinol (heavy metal salts of) (dry)	Forbidden											
	2,4-Dinitroresorcinol (heavy metal salts of) (dry)	Forbidden											
	Dinitroresorcinol, wetted *with not less than 15 per cent water, by mass.*	4.1	UN1322	I	FLAMMABLE SOLID.	A8, A19, A20, N41.	None	211	None	1 kg	15 kg	E	28, 36
	3,5-Dinitrosalicylic acid (lead salt) (dry)	Forbidden											
	Dinitrosobenzene	1.3C	UN0406	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Dinitrosobenzylamidine and salts of (dry)	Forbidden											
	N,N'-Dinitroso-N,N'-dimethyl terephthalamide *not more than 72% as a paste.*	4.1	UN2873	II	FLAMMABLE SOLID, EXPLOSIVE.	41, 53	None	224	None	Forbidden	Forbidden	D	12, 61
	N,N'-Dinitrosopentamethylenetetramine *not more than 82% with phlegmatizer.*	4.1	UN2972	II	FLAMMABLE SOLID. EXPLOSIVE.	41, 53	None	224	None	Forbidden	Forbidden	D	12, 61
	2,2-Dinitrostilbene	Forbidden											
	1,4-Dinitro-1,1,4,4-tetramethylolbutanetetranitrate (dry)	Forbidden											
	Dinitrotoluenes, *liquid*	6.1	UN2038	II	POISON	T14, T38	None	202	243	5 L	60 L	A	
	Dinitrotoluenes, molten	6.1	UN1600	II	POISON	T14, T38	None	202	243	Forbidden	Forbidden	C	
	Dinitrotoluenes, *solid*	6.1	UN2038	II	POISON	T8, T38	None	212	242	25 kg	100 kg	A	
	2,4-Dinitro-1,3,5-trimethylbenzene	Forbidden											
	Di-(beta-nitroxyethyl) ammonium nitrate	Forbidden											
	a,a'-Di-(nitroxy) methylether	Forbidden											
	1,9-Dinitroxy pentamethylene-2,4, 6,8-tetramine (dry)	Forbidden											
	Dioxane	3	UN1165	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	

Dioxolane	3	UN1166	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40	
Dipentene	3	UN2052	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A		
Diphenylamine chloroarsine	6.1	UN1698	I	POISON		None	227	None	Forbidden	Forbidden	D	40, M1	
Diphenylchloroarsine, solid *or* liquid	6.1	UN1699	I	POISON	A6, B14, B32, N33, N34.	None	211	244	Forbidden	15 kg	D	40, M1	
Diphenyldichlorosilane	8	UN1769	II	CORROSIVE	A7, B2, N34, T8, T26.	None	202	244	Forbidden	30 L	C	40	
Diphenylmethane-4,4'diisocyanate	6.1	UN2489	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	48, 108	
Diphenylmethyl bromide	8	UN1770	II	CORROSIVE		154	212	240	15 kg	50 kg	D	40	
Diphenyloxide-4,4'disulfohydrazide	4.1	UN2951	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	B	12, 61, 65	
Dipicrylamine, *see* Hexanitrodiphenylamine													
Dipicryl sulfide, *dry or wetted with less than 10 per cent water, by mass.*	1.1D	UN0401	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 18E	
Dipicryl sulfide, wetted *with not less than 10 per cent water, by mass.*	4.1	UN2852	I	FLAMMABLE SOLID.	A2, N41	None	211	None	Forbidden	0.5 kg	D	28, 36	
Dipropionyl peroxide, more than 28 per cent in solution	Forbidden												
Dipropylamine	3	UN2383	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B		
4-Dipropylaminobenzenediazonium zinc chloride	4.1	UN3034	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	C		
Dipropyl ether	3	UN2384	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	E, B		
Dipropylketone	3	UN2710	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
Disinfectants, corrosive liquid, n.o.s.	8	UN1903	II	CORROSIVE	B2	154	202	242	1 L	30 L	A	M3	
Disinfectants, liquid, n.o.s *poisonous*	6.1	UN3142	I	POISON	A4, B38, B40, T42.	None	201	243	1 L	30 L	A	40, M3	
			II	POISON	T14	None	202	243	5 L	60 L	A	40, M3	
			III	KEEP AWAY FROM FOOD.	A34, T7	153	203	241	60 L	220 L	A	40, M3	
Disinfectants, solid, n.o.s. *poisonous*	6.1	UN1601	II	POISON		None	212	242	25 kg	100 kg	A	40, M3	
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3	
Dispersant gas, see Compressed *or* liquefied gases, *etc.*													
Dithiocarbamate pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23deg C.*	3	UN2772	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	40	
			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	40	
Dithiocarbamate pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3005	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3	
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3	
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T14	153	203	241	60 L	220 L	A	40, M3	
Dithiocarbamate pesticides, liquid, toxic, n.o.s.	6.1	UN3006	I	POISON		None	201	243	1 L	30 L	B	40, M3	
			II	POISON		None	202	243	5 L	60 L	B	40, M3	
			III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	40, M3	
Dithiocarbamate pesticides, solid, toxic, n.o.s.	6.1	UN2771	I	POISON		None	211	242	5 kg	50 kg	A	40, M3	
			II	POISON		None	212	242	25 kg	100 kg	A	40, M3	
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3	
Divinyl ether, inhibited	3	UN1167	I	FLAMMABLE LIQUID.	T14	None	202	241	5 L	60 L	E	40	
D Dodecylbenzenesulfonic acid	8	NA2584	II	CORROSIVE	B2	154	202	242	1 L	30 L	B	9	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Dodecyltrichlorosilane	8	UN1771	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40
	Dry ice, *see* Carbon dioxide, solid												
	Dyes, liquid, n.o.s. *or* dye intermediates, liquid, n.o.s. *corrosive*	8	UN2801	II	CORROSIVE	11, B2, T14	154	202	242	1 L	30 L	A	23, M3
				III	CORROSIVE	11, T14	154	203	241	5 L	60 L	A	23, M3
	Dyes,liquid, n.o.s *or* dye intermediates, liquid, n.o.s. *poisonous*	6.1	UN1602	II	POISON		None	202	243	5 L	60 L	A	M3
				III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220	A	M3
	Dyes, solid, n.o.s. *or* Dye intermediates, solid, n.o.s. *corrosive*	8	UN3147	II	CORROSIVE		154	212	240	15 kg	50 kg	A	M3
				III	CORROSIVE		154	213	240	25 kg	100 kg	A	M3
	Dyes, solid, n.o.s. *or* dye intermediates, solid, n.o.s. *poisonous*	6.1	UN3143	I	POISON	A5	None	211	242	5kg	50kg	A	M3
				II	POISON		None	212	242	25 kg	100 kg	A	M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M3
	Dynamite, see Explosive, blasting, type A												
	EDTA, *see* Ethylenediaminetetraacetic acid												
	Electrolyte (acid or alkali) for batteries, see Battery fluid, acid *or* Battery fluid, alkali.												
	Engines, internal combustion, *see* Vehicle, self-propelled												
	Engine starting fluid, *with flammable gas*	2.1	UN1960		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	D	40
	Environmentally hazardous substances, liquid, n.o.s.	9	UN3082	III	CLASS 9	8	155	203	241	None	None	A	M6
	Environmentally hazardous substances, solid, n.o.s.	9	UN3077	III	CLASS 9	8, B54	155	213	240	None	None	A	M6
	Epibromohydrin	6.1	UN2558	I	POISON		None	201	243	Forbidden	Forbidden	D	40
	Epichlorohydrin	6.1	UN2023	II	POISON		None	202	243	5 L	60 L	A	40
	1,2-Epoxy-3-ethoxypropane	3	UN2752	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Etching acid, liquid, n.o.s., see Hydrofluoric acid, solution												
	Ethane, compressed	2.1	UN1035		FLAMMABLE GAS.	B13	306	304	302	Forbidden	150 kg	E	40
D	Ethane-Propane mixture, refrigerated liquid (*cryogenic liquid*)	2.1	NA1961		FLAMMABLE GAS.	B13	None	316	314, 315	Forbidden	Forbidden	D	40
	Ethane, refrigerated liquid (*cryogenic liquid*)	2.1	UN1961		FLAMMABLE GAS.	B13	None	316	315	Forbidden	Forbidden	D	40
	Ethanol amine dinitrate	Forbidden											
	Ethanolamine *or* Ethanolamine solutions	8	UN2491	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	
	Ethanol; (ethyl alcohol) *or* Ethanol Solutions; (ethyl alcohol solutions).	3	UN1170	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	A	
				III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ether, see Diethyl ether												
	Ethyl acetate	3	UN1173	II	FLAMMABLE LIQUID.	T2	150	202	242	5 L	60 L	B	
	Ethylacetylene, inhibited	2.1	UN2452		FLAMMABLE GAS.	B13	None	304	244	Forbidden	150 kg	B	40
	Ethyl acrylate, inhibited	3	UN1917	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40, M2
	Ethyl alcohol, *see* Ethanol												
	Ethyl aldehyde, see Acetaldehyde												
	Ethylamine	2.1	UN1036		FLAMMABLE GAS.	B13, B64, B77	None	321	244	Forbidden	Forbidden	D	40
	Ethylamine, aqueous solution *with not less than 50 per cent but not more than 70 per cent ethylamine.*	3	UN2270	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	E, B	40
	Ethyl amyl ketone	3	UN2271	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	

N-Ethylaniline	6.1	UN2272	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A		
2-Ethylaniline	6.1	UN2273	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A		
Ethylbenzene	3	UN1175	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
N-Ethyl-N-benzylaniline	6.1	UN2274	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A		
N-Ethylbenzyltoluidines solid *or* liquid	6.1	UN2753	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A		
Ethyl borate	3	UN1176	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B		
Ethyl bromide	6.1	UN1891	II	POISON	T17	None	202	243	5 L	60 L	B	40	
Ethyl bromoacetate	6.1	UN1603	II	POISON	T14	None	202	243	Forbidden	Forbidden	D	40	
2-Ethylbutanol	3	UN2275	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
2-Ethylbutyl acetate	3	UN1177	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
Ethyl butyl ether	3	UN1179	II	FLAMMABLE LIQUID.	B1, T1	150	202	242	5 L	60 L	B		
2-Ethylbutyraldehyde	3	UN1178	II	FLAMMABLE LIQUID.	B1, T1	150	202	242	5 L	60 L	B		
Ethyl butyrate	3	UN1180	III	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	A		
Ethyl chloride	2.1	UN1037		FLAMMABLE GAS.	B13, B63, B77	None	322	244	Forbidden	150 kg	B	40	
Ethyl chloroacetate	6.1	UN1181	II	POISON	T14	None	202	243	5 L	60 L	A		
Ethyl chloroformate	6.1	UN1182	I	POISON, FLAMMABLE LIQUID, CORROSIVE.	2, A3, A6, A7, B9, B14, B32, B74, N34, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	21, 40, 100	
Ethyl-2-chloropropionate	3	UN2935	III	FLAMMABLE LIQUID.	B1	150	203	242	60 L	220 L	A		
+ Ethyl chlorothioformate	8	UN2826	II	CORROSIVE, POISON.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	1 L	30 L	A	12, 21, 40, 48, M2	
Ethyl crotonate	3	UN1862	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
Ethyl cyanoacetate	6.1	UN2666	III	KEEP AWAY FROM FOOD.	T6	153	203	241	60 L	220 L	A	26	
Ethyldichloroarsine	6.1	UN1892	I	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	40, M1	
Ethyldichlorosilane	4.3	UN1183	I	DANGEROUS WHEN WET. CORROSIVE, FLAMMABLE LIQUID.	A2, A3, A7, N34, T18, T26.	None	201	244	Forbidden	1 L	D	21, 28, 40, 49, 100	
Ethylene, acetylene and propylene in mixtures, refrigerated liquid (*cryogenic liquids*)*containing at least 71.5 per cent ethylene with not more than 22.5 per cent acetylene and not more than 6 per cent propylene.*	2.1	UN3138		FLAMMABLE GAS.		None	316	316, 319	Forbidden	Forbidden	D	40	
+ Ethylene chlorohydrin	6.1	UN1135	II	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	60 L	A	40	
Ethylene, compressed	2.1	UN1962		FLAMMABLE GAS.	B13	306	304	302	Forbidden	150 kg	E	40	
Ethylenediamine	8	UN1604	II	CORROSIVE, FLAMMABLE LIQUID.	T14	154	202	243	1 L	30 L	A	12, 21, 40, 48	
Ethylene diamine diperchlorate	Forbidden												
+ Ethylene dibromide	6.1	UN1605	II	POISON	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	5 L	60 L	A	40, M2	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Ethylene dibromide and methyl bromide liquid mixtures, see Methyl bromide and ethylene dibromide, liquid mixtures.												
	Ethylene dichloride	3	UN1184	II	FLAMMABLE LIQUID, POISON.	T14	None	202	243	1 L	60 L	B	40, M2
	Ethylene glycol diethyl ether	3	UN1153	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ethylene glycol dinitrate	Forbidden											
	Ethylene glycol monobutyl ether	6.1	UN2369	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	
	Ethylene glycol monoethyl ether	3	UN1171	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ethylene glycol monoethyl ether acetate	3	UN1172	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ethylene glycol monomethyl ether	3	UN1188	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ethylene glycol monomethyl ether acetate	3	UN1189	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ethyleneimine, inhibited	6.1	UN1185	I	POISON, FLAMMABLE LIQUID.	1, B9, B14, B30, B72, B77, N25, N32, T38, T43, T44.	None	226	244	Forbidden	Forbidden	D	40
	Ethylene oxide and carbon dioxide mixtures, see Carbon dioxide and ethylene oxide mixtures, *etc.*												
	Ethylene oxide and propylene oxide mixtures, *not more than 30 per cent ethylene oxide.*	3	UN2983	I	FLAMMABLE LIQUID, POISON.	A11, N4, N34	None	201	243	Forbidden	30 L	E	40
	Ethylene oxide, *pure or with nitrogen* at 50 degrees C	2.3	UN1040		POISON GAS, FLAMMABLE GAS.	3, B13, B14, B33, B75.	None	323	244	Forbidden	25 kg	D	40
	Ethylene, refrigerated liquid (*cryogenic liquid*)	2.1	UN1038		FLAMMABLE GAS.		None	316	318, 319	Forbidden	Forbidden	D	40
	Ethyl ether, *see* Diethyl ether												
	Ethyl fluoride	2.1	UN2453		FLAMMABLE GAS.	B13	None	304	244	75 kg	150 kg	E	40
	Ethyl formate	3	UN1190	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
	Ethylhexaldehyde, see Octyl aldehydes *etc.*												
	2-Ethylhexylamine	8	UN2276	III	CORROSIVE	T2	154	203	241	5 L	60 L	A	12, 21, 40, 48
	2-Ethylhexylchloroformate	6.1	UN2748	II	POISON, CORROSIVE.	T42	None	202	243	1 L	30 L	A	12, 13, 25, 40, 48, 95
	Ethyl hydroperoxide	Forbidden											
	Ethyl isobutyrate	3	UN2385	II	FLAMMABLE LIQUID.		150	202	242	5 L	60 L	B	
+	Ethyl isocyanate	3	UN2481	II	FLAMMABLE LIQUID, POISON.	1, A7, B9, B13, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	30 L	D	40
	Ethyl lactate	3	UN1192	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Ethyl mercaptan	3	UN2363	I	FLAMMABLE LIQUID.	T21	None	202	243	Forbidden	30 L	E	95, 102
	Ethyl methacrylate	3	UN2277	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	

	Ethyl methyl ether	2.1	UN1039		FLAMMABLE GAS.	B13, B63	None	324	244	Forbidden	150 kg	B	40
	Ethyl methyl ketone *or* methyl ethyl ketone	3	UN1193	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Ethyl nitrite solutions	3	UN1194	I	FLAMMABLE LIQUID, POISON.		None	201	None	Forbidden	Forbidden	E	40, 105
	Ethyl orthoformate	3	UN2524	III	FLAMMABLE LIQUID.		150	203	242	60 L	220 L	A	
	Ethyl oxalate	6.1	UN2525	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	
	Ethyl perchlorate	Forbidden											
	Ethylphenyldichlorosilane	8	UN2435	II	CORROSIVE	A7, B2, N34, T8, T26.	None	202	242	Forbidden	30 L	C	
D	Ethyl phosphonothioic dichloride, anhydrous	6.1	NA2927	I	POISON, CORROSIVE.	2, B9, B14, B32, B74, T38, T43, T45.	None	27	244	Forbidden	Forbidden	D	20, 40, 95
D	Ethyl phosphonous dichloride, anhydrous	6.1	NA2845	I	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	18, M3
D	Ethyl phosphorodichloridate	6.1	NA2927	I	POISON, CORROSIVE.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	20, 40, 95
	1-Ethylpiperidine	3	UN2386	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Ethyl propionate	3	UN1195	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Ethyl propyl ether	3	UN2615	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
	Ethyl silicate, see Tetraethyl silicate												
	Ethylsulfuric acid	8	UN2571	II	CORROSIVE	B2, T9, T27	154	202	242	1 L	30 L	C	14
	N-Ethyltoluidines	6.1	UN2754	II	POISON	T14	None	202	243	5 L	60 L	A	48
	Ethyltrichlorosilane	3	UN1196	II	FLAMMABLE LIQUID, CORROSIVE.	A7, N34	None	201	243	Forbidden	2.5 L	B	40
	Etiologic agent, see Infectious substances, *etc.*												
	Explosive articles, see Articles, explosive												
	Explosive, blasting, type A	1.1D	UN0081	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E, 21E
	Explosive, blasting, type B	1.1D	UN0082	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Explosive, blasting, type B *or* Explosive, agent blasting, Type B.	1.5D	UN0331	II	EXPLOSIVE 1.5D.	105, 106		62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Explosive, blasting, type C	1.1D	UN0083	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 22E
	Explosive, blasting, type D	1.1D	UN0084	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Explosive, blasting, type E	1.1D	UN0241	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Explosive, blasting, type E *or* Explosive, agent blasting, Type E.	1.5D	UN0332	II	EXPLOSIVE 1.5D.	105, 106		62	None	Forbidden	Forbidden	B	1E, 5E
	Explosive, forbidden. See Sec. 173.51	Forbidden											
D	Explosive pest control devices	1.1E	NA0006	II	EXPLOSIVE 1.1E.			62	None	Forbidden	Forbidden	E	
D	Explosive pest control devices	1.4E	NA0412	II	EXPLOSIVE 1.4E.			62	None	Forbidden	75 kg	A	24E
	Explosives, slurry, see Explosive, blasting, type E												
	Explosive substances, see Substances, explosive												
	Explosives, water gels, see Explosive, blasting, type E												
	Extracts, aromatic, liquid	3	UN1169	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	M4
				III	FLAMMABLE LIQUID.	T7, T30	150	203	242	60 L	220 L	B, A	M4

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Extracts, flavoring, liquid	3	UN1197	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	M4
				III	FLAMMABLE LIQUID.	T7, T30	150	203	242	60 L	220 L	B, A	M4
	Fabric with animal or vegetable oil, see Fibers *or* fabrics, *etc.*												
	Ferric arsenate	6.1	UN1606	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Ferric arsenite	6.1	UN1607	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Ferric chloride	8	UN1773	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Ferric chloride, solution	8	UN2582	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	
	Ferric nitrate	5.1	UN1466	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
	Ferrocerium	4.1	UN1323	II	FLAMMABLE SOLID.	A19	151	212	240	15 kg	50 kg	A	
	Ferrosilicon, *with 30 percent or more but less than 90 percent silicon*	4.3	UN1408	III	DANGEROUS WHEN WET, KEEP AWAY FROM FOOD.	A1, A19	None	213	242	25 kg	100 kg	A	13, 40, 85, 103
	Ferrous arsenate	6.1	UN1608	II	POISON		None	212	242	25 kg	100 kg	A	M2
D	Ferrous chloride, solid	8	NA1759	II	CORROSIVE		154	212	240	15 kg	50 kg	A	M4
D	Ferrous chloride, solution	8	NA1760	II	CORROSIVE	B2	154	202	242	1 L	30 L	B	40, M4
	Ferrous metal borings, shavings, turnings *or* cuttings *in a form liable to self-heating.*	4.2	UN2793	III	SPONTANEOUSLY COMBUSTIBLE.	A1, A19	None	213	241	25 kg	100 kg	A	
	Fertilizer ammoniating solution *with free ammonia*	2.2	UN1043		NONFLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	E	40
AIW	Fibers *or* Fabrics, animal *or* vegetable, *n.o.s. with animal or vegetable oil*	4.2	UN1373	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	Forbidden	Forbidden	A	
	Films, nitrocellulose base, from which gelatine has been removed; film scrap, see Celluloid scrap.												
	Films, nitrocellulose base, *gelatine coated (except scrap)*	4.1	UN1324	III	FLAMMABLE SOLID.		None	189	None	25 kg	100 kg	D	91
	Fire extinguisher charges, *corrosive liquid*	8	UN1774	II	CORROSIVE	N41	154	202	None	1 L	30 L	A	
	Fire extinguisher charges, expelling, explosive, see Cartridges, power device.												
	Fire extinguishers *containing compressed or liquefied gas*	2.2	UN1044		NONFLAMMABLE GAS.		306	306	None	75 kg	150 kg	A	
	Firelighters, solid *with flammable liquid*	4.1	UN2623	II	FLAMMABLE SOLID.	A19	None	212	None	15 kg	50 kg	A	119, M3
				III	FLAMMABLE SOLID.	A1, A19	None	213	None	25 kg	100 kg	A	119, M3
	Fireworks	1.1G	UN0333	II	EXPLOSIVE 1.1G.	108		62	None	Forbidden	Forbidden	B	
	Fireworks	1.2G	UN0334	II	EXPLOSIVE 1.2G.	108		62	None	Forbidden	Forbidden	B	
	Fireworks	1.3G	UN0335	II	EXPLOSIVE 1.3G.	108		62	None	Forbidden	Forbidden	B	
	Fireworks	1.4G	UN0336	II	EXPLOSIVE 1.4G.	108		62	None	Forbidden	75 kg	A	24E
	Fireworks	1.4S	UN0337	II	EXPLOSIVE 1.4S.	108		62	None	25 kg	100 kg	A	9E
AW	Fish meal; *or* fish scrap stabilized	9	UN2216	III	None	A1	155	218	219	No limit	No limit	A	88, 120
	Fish meal *or* fish scrap, unstabilized	4.2	UN1374	II	SPONTANEOUSLY COMBUSTIBLE.	A1, A19	None	212	241	15 kg	50 kg	A	119, 120

Fissile radioactive materials, see Radioactive material, fissile, n.o.s..												
Flammable compressed gas, see Compressed *or* Liquefied gas, flammable, *etc.*.												
Flammable compressed gas (small receptacles not fitted with a dispersion device, not refillable), see Receptacles, *etc.*.												
Flammable gas in lighters, *see* Lighters for cigars *or* cigarettes, *with flammable gas.*												
Flammable liquids, corrosive, n.o.s.	3	UN2924	I	FLAMMABLE LIQUID, CORROSIVE.	T42	None	201	243	0.5 L	2.5 L	E, B	40, M3
			II	FLAMMABLE LIQUID, CORROSIVE.	T15, T26	None	202	243	1 L	5 L	E, B	40, M3
			III	FLAMMABLE LIQUID, CORROSIVE.	B1, T15, T26	150	203	242	5 L	60 L	A	40, M3
Flammable liquids, n.o.s.	3	UN1993	I	FLAMMABLE LIQUID.	T42	150	201	243	1 L	30 L	E, B	M3
			II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	E, B	M3
			III	FLAMMABLE LIQUID.	B1, B52, T7, T30.	150	203	242	60 L	220 L	A	M3
Flammable liquids, poisonous, n.o.s.	3	UN1992	I	FLAMMABLE LIQUID, POISON.	B38, T42	None	201	243	Forbidden	30 L	E, B	40, M3
			II	FLAMMABLE LIQUID, POISON.	T18	None	202	243	1 L	60 L	E, B	40, M3
Flammable solids, corrosive, n.o.s.	4.1	UN2925	II	FLAMMABLE SOLID, CORROSIVE.		None	212	242	15 kg	50 kg	D	40, M3
			III	FLAMMABLE SOLID, CORROSIVE.	A1	151	213	242	25 kg	100 kg	D	40, M3
Flammable solids, n.o.s.	4.1	UN1325	II	FLAMMABLE SOLID.		151	212	240	15 kg	50 kg	B	M3
			III	FLAMMABLE SOLID.		151	213	240	25 kg	100 kg	B	M3
Flammable solids, poisonous, n.o.s.	4.1	UN2926	II	FLAMMABLE SOLID, POISON.		None	212	242	15 kg	50 kg	B	40, M3
			III	FLAMMABLE SOLID, KEEP AWAY FROM FOOD.	A1	151	213	242	25 kg	100 kg	B	40, M3
Flares, aerial	1.3G	UN0093	II	EXPLOSIVE 1.3G.			62	None	Forbidden	75 kg	B	
Flares, aerial	1.4G	UN0403	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
Flares, aerial	1.4S	UN0404	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
Flares, aerial	1.1G	UN0420	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
Flares, aerial	1.2G	UN0421	II	EXPLOSIVE 1.2G.			62	None	Forbidden	Forbidden	B	
Flares, airplane, see Flares, aerial												
Flares, signal, see Cartridges, signal												
Flares surface	1.1G	UN0418	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
Flares, surface	1.2G	UN0419	II	EXPLOSIVE 1.2G.			62	None	Forbidden	Forbidden	B	
Flares, surface	1.3G	UN0092	II	EXPLOSIVE 1.3G.			62	None	Forbidden	75 kg	B	
Flares, water-activated, see Contrivances, water-activated, *etc.*.												

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Flash powder	1.1G	UN0094	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	1E, 5E
	Flash powder	1.3G	UN0305	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	1E, 5E
	Flash powder, in units, see Photo-flash powder, in units												
	Flue dusts, poisonous, see Arsenical dust												
	Fluoboric acid	8	UN1775	II	CORROSIVE	A6, A7, B2, B15, N3, N34, T15, T27.	154	202	242	1 L	30 L	A	
	Fluoric acid, see Hydrofluoric acid, solution, *etc.*												
	Fluorine, compressed	2.3	UN1045		POISON GAS, OXIDIZER.	1, B9, B14, B30, B72.	None	302	245	Forbidden	Forbidden	D	40
	Fluoroacetic acid	6.1	UN2642	I	POISON		None	211	242	1 kg	15 kg	E	
	Fluoroanilines	6.1	UN2941	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	
	Fluorobenzene	3	UN2387	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Fluorophosphoric acid anhydrous	8	UN1776	II	CORROSIVE	A6, A7, B2, N3, N34, T9, T27.	None	202	242	1 L	30 L	A	
	Fluorosilicates, n.o.s.	6.1	UN2856	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	26, M3
	Fluorosilicic acid	8	UN1778	II	CORROSIVE	A6, A7, B2, B15, N3, N34, T12, T27.	None	202	242	1 L	30 L	A	
	Fluorosulfonic acid	8	UN1777	I	CORROSIVE	A3, A6, A7, A10, B4, B6, B41, N3, T12, T27.	None	201	242	0.5 L	2.5 L	D	40
	Fluorotoluenes	3	UN2388	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
	Forbidden materials. See 173.21	Forbidden											
	Formaldehyde, solutions	9	UN2209	III	None	T1	155	204	240	100 L	220 L	A	
	Formaldehyde, solutions, *flammable*	3	UN1198	III	FLAMMABLE LIQUID.	B1, T8	150	203	242	60 L	220 L	A	40
	Formalin, see Formaldehyde, solutions												
	Formic acid	8	UN1779	II	CORROSIVE	B2, B12, B28, T8.	154	202	242	1 L	30 L	A	40
	Fracturing devices, explosive, *without detonators for oil wells*	1.1D	UN0099	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Fuel, aviation, turbine engine	3	UN1863	I	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
				II	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	B	
D	Fuel oil(*No. 1, 2, 4, 5 or 6*)	3	NA1993	III	FLAMMABLE LIQUID.		150	203	241	60 L	220 L	A	
	Fulminate of mercury (dry)	Forbidden											
	Fulminate of mercury, wet, see Mercury fulminate, *etc.*												
	Fulminating gold	Forbidden											
	Fulminating mercury	Forbidden											
	Fulminating platinum	Forbidden											
	Fulminating silver	Forbidden											

	Fulminic acid	Forbidden												
	Fumaryl chloride	8	UN1780	II	CORROSIVE	B2, T2, T26	154	202	242	1 L	30 L	C	8, 40
D	Fusee (*railway or highway*)	4.1	NA1325	II	FLAMMABLE SOLID.		None	184	None	15 kg	50 kg	B	
	Furan	3	UN2389	I	FLAMMABLE LIQUID.		None	201	242	1 L	30 L	E	40
	Furfural	3	UN1199	III	FLAMMABLE LIQUID.	T1	150	203	241	60 L	220 L	A	
	Furfuryl alcohol	6.1	UN2874	III	KEEP AWAY FROM FOOD.	T2	150	203	240	60 L	220 L	A	26, 74
	Furfurylamine	3	UN2526	III	FLAMMABLE LIQUID.	T1	150	200	241	60 L	220 L	A	40
	Fuse, detonating, *metal clad, see* Cord, detonating, *metal clad*												
	Fuse, detonating, mild effect, *metal clad, see* Cord, detonating, mild effect, *metal clad.*												
	Fuse, igniter *tubular metal clad*	1.4G	UN0103	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
	Fuse, instantaneous, non-detonating (Quickmatch)	1.3G	UN0101	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	
	Fusel oil	3	UN1201	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
				III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Fuse, safety	1.4S	UN0105	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Fuses, tracer see Tracers for ammunition												
	Fuses, combination percussion and time, see Fuzes, detonating (*UN 0257, UN 0367*); Fuzes, igniting (UN 0317, UN 0368).												
	Fuzes, detonating	1.1B	UN0106	II	EXPLOSIVE 1.1B.			62	None	Forbidden	Forbidden	B	2E, 6E
	Fuzes, detonating	1.2B	UN0107	II	EXPLOSIVE 1.2B.			62	None	Forbidden	Forbidden	B	2E, 6E
	Fuzes, detonating	1.4B	UN0257	II	EXPLOSIVE 1.4B.	116		62	None	Forbidden	75 kg	A	24E
	Fuzes, detonating	1.4S	UN0367	II	EXPLOSIVE 1.4S.	116		62	None	25 kg	100 kg	A	9E
	Fuzes, detonating, *with protective features*	1.1D	UN0408	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Fuzes, detonating, *with protective features*	1.2D	UN0409	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Fuzes, detonating, *with protective features*	1.4D	UN0410	II	EXPLOSIVE 1.4D.	116		62	None	Forbidden	75 kg	A	24E
	Fuzes, igniting	1.3G	UN0316	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	
	Fuzes, igniting	1.4G	UN0317	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	B	
	Fuzes, igniting	1.4S	UN0368	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Galactsan trinitrate	Forbidden											
	Gallium	8	UN2803	III	CORROSIVE		None	162	240	20 kg	20 kg	B	46
	Gas drips, *hydrocarbon*	3	UN1864	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	M4
	Gas generator assemblies (aircraft), *containing a non-flammable non-toxic gas and a propellant cartridge.*	2.2			NONFLAMMABLE GAS.		None	995	None	75 kg	150 kg	A	
D	Gas identification set	2.3	NA9035		POISON GAS	6	None	194	None	Forbidden	Forbidden	D	
D	Gasohol (*gasoline mixed with ethyl alcohol, max. 20% alcohol*).	3	NA1203	II	FLAMMABLE LIQUID.		150	202	242	5 L	60 L	E	M2
	Gas oil	3	UN1202	III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
	Gasoline	3	UN1203	II	FLAMMABLE LIQUID.	T6	150	202	242	5 L	60 L	E	M2
	Gasoline, casinghead, see Natural gasoline												
	Gelatine, blasting, see Explosive, blasting, type A												
	Gelatine dynamites, see Explosive, blasting, type A												

Symbols (1)	Hazardous materials descriptions and proper shipping names (2)	Hazard class or Division (3)	Identification Numbers (4)	Packing group (5)	Label(s) required (if not excepted) (6)	Special provisions (7)	(8) Packaging authorizations (§173.***) Exceptions (8A)	Non-bulk packaging (8B)	Bulk packaging (8C)	(9) Quantity limitations Passenger aircraft or railcar (9A)	Cargo aircraft only (9B)	(10) Vessel stowage requirements Vessel stowage (10A)	Other stowage provisions (10B)
	Germane	2.3	UN2192		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	192	245	Forbidden	Forbidden	D	40
	Glycerol-1,3-dinitrate	Forbidden											
	Glycerol gluconate trinitrate	Forbidden											
	Glycerol lactate trinitrate	Forbidden											
	Glycerol alpha-monochlorohydrin	6.1	UN2689	III	KEEP AWAY FROM FOOD.	T2	153	203	241	60 L	220 L	A	
	Glyceryl trinitrate, see Nitroglycerin, *etc.*												
	Glycidaldehyde	3	UN2622	II	FLAMMABLE LIQUID, POISON.	T8	150	202	243	1 L	60 L	A	40
D	Grenades, empty primed	1.4S	NA0349	II	None	None		62	None	25 kg	100 kg	A	9E
	Grenades, *hand or rifle, with bursting charge*	1.1D	UN0284	II	EXPLOSIVE 1.1D.		63(b)	62	None	Forbidden	Forbidden	B	
	Grenades, *hand or rifle, with bursting charge*	1.2D	UN0285	II	EXPLOSIVE 1.2D.		63(b)	62	None	Forbidden	Forbidden	B	
	Grenades, *hand or rifle, with bursting charge*	1.1F	UN0292	II	EXPLOSIVE 1.1F.		63(b)	62	None	Forbidden	Forbidden	E	
	Grenades, *hand or rifle, with bursting charge*	1.2F	UN0293	II	EXPLOSIVE 1.2F		63(b)	62	None	Forbidden	Forbidden	E	
	Grenades, illuminating, see Ammunition, illuminating, *etc.*												
	Grenades practice *Hand or rifle*	1.4G	UN0452	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	B	
	Grenades, practice, *hand or rifle*	1.4S	UN0110	II	EXPLOSIVE 1.4S.		63(b)	62	None	25 kg	100 kg	A	9E
	Grenades, practice, *hand or rifle*	1.3G	UN0318	II	EXPLOSIVE 1.3G.		63(b)	62	None	Forbidden	Forbidden	B	
	Grenades, practice, *hand or rifle*	1.2G	UN0372	II	EXPLOSIVE 1.2G.		63(b)	62	None	Forbidden	Forbidden	B	
	Grenades, smoke, see Ammunition, smoke, *etc.*												
	Guanidine nitrate	5.1	UN1467	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A	73
	Guanyl nitrosaminoguanylidene hydrazine (dry)	Forbidden											
	Guanyl nitrosaminoguanylidene hydrazine, wetted *with not less than 30 per cent water, by mass.*	1.1A	UN0113	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Guanyl nitrosaminoguanyltetrazene (dry)	Forbidden											
	Guanyl nitrosaminoguanyltetrazene (Tetrazene), wetted *with not less than 30 per cent water or mixture of alcohol and water, by mass.*	1.1A	UN0114	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Gunpowder, compressed *or* Gunpowder in pellets, *see* Black powder (*UN 0028*).												
	Gunpowder, *granular or as a meal, see* Black powder (*UN 0027*).												
D	Guthion, *see* Azinphos methyl												
	Hafnium powder, dry	4.2	UN2545	I	SPONTANEOUSLY COMBUSTIBLE.		None	211	242	Forbidden	Forbidden	D	
				II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20, N34	None	212	241	15 kg	50 kg	D	

			III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	25 kg	100 kg	D		
	Hafnium powder, wetted *with not less than 25 per cent water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns.*	4.1	UN1326	II	FLAMMABLE SOLID.	A6, A19, A20, N34.	None	212	241	15 kg	50 kg	E		
	Halogenated irritating liquids, n.o.s.	6.1	UN1610	I	POISON	T42	None	201	243	Forbidden	Forbidden	D		40, M3
				II	POISON	T14	None	202	243	5 L	60 L	D		40, M3
				III	KEEP AWAY FROM FOOD.	T14	153	202	241	60 L	220 L	D		40, M3
	Hand signal device, see Signal devices, hand													
	Hay, straw, *or* bhusa, *wet, damp or contaminated with oil*	4.1	UN1327	III	FLAMMABLE SOLID.		151	213	240	25 kg	100 kg	A		30
D	Hazardous waste, liquid, n.o.s.	9	NA3082	III	CLASS 9		155	203	241	No limit	No limit	A		M6
D	Hazardous waste, solid, n.o.s.	9	NA3077	III	CLASS 9	B54	155	213	240	No limit	No limit	A		M6
	Helium, compressed	2.2	UN1046		NONFLAMMABLE GAS.		306	302	302, 314	75 kg	150 kg	A		85
	Helium-oxygen mixture, see Rare gases and oxygen mixtures													
	Helium, refrigerated liquid (*cryogenic liquid*)	2.2	UN1963		NONFLAMMABLE GAS.		320	316	318	50 kg	500 kg	B		
	n-Heptaldehyde	3	UN3056	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
	Heptanes	3	UN1206	II	FLAMMABLE LIQUID.	T2	150	202	242	5 L	60 L	B		
	n-Heptene	3	UN2278	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B		
	Hexachloroacetone	6.1	UN2661	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	B		12, 40
	Hexachlorobenzene	6.1	UN2729	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A		
	Hexachlorobutadiene	6.1	UN2279	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A		M1
	Hexachlorocyclopentadiene	6.1	UN2646	I	POISON	2, B9, B14, B32, B74, B77, T38, T43, T44.	None	227	244	Forbidden	Forbidden	D		40
	Hexachlorophene	6.1	UN2875	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		
	Hexadecyltrichlorosilane	8	UN1781	II	CORROSIVE	A7, B2, B6, N24, T8.	None	202	242	Forbidden	30 L	C		40
	Hexadienes	3	UN2458	II	FLAMMABLE LIQUID.	T7	None	202	242	5 L	60 L	E, B		
	Hexaethyl tetraphosphate and compressed gas mixtures	2.3	UN1612		POISON GAS	3	None	334	None	Forbidden	Forbidden	D		40
	Hexaethyl tetraphosphate *liquid*	6.1	UN1611	I	POISON	A4	None	201	243	1 L	30 L	E		40, M2
				II	POISON	N76	None	202	243	5 L	60 L	E		40, M2
				III	KEEP AWAY FROM FOOD.	N77	None	203	241	60 L	220 L	E		40, M2
	Hexaethyl tetraphosphate mixture, see Organophosphorous pesticide *etc.*													
	Hexaethyl tetraphosphate, *solid*	6.1	UN1611	I	POISON		None	211	242	Forbidden	15 kg	E		95, M2
				II	POISON	N76	None	212	242	25 kg	100 kg	E		95, M2
				III	KEEP AWAY FROM FOOD.	N77	153	213	240	100 kg	200 kg	E		34, M2
	Hexafluoroacetone	2.3	UN2420		POISON GAS	2, B9, B13, B14, B31, B73.	None	304	244	Forbidden	25 kg	D		40
	Hexafluoroacetone hydrate	6.1	UN2552	II	POISON		None	202	243	5 L	60 L	B		40
	Hexafluoroethane	2.2	UN2193		NONFLAMMABLE GAS.	B13	306	304	244	75 kg	150 kg	A		
	Hexafluorophosphoric acid	8	UN1782	II	CORROSIVE	A6, A7, B2, N3, N34, T9, T27.	None	202	242	1 L	30 L	A		
	Hexafluoropropylene	2.2	UN1858		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A		
D	Hexafluoropropylene oxide	2.2	NA1956		NONFLAMMABLE GAS.	B13	306	304	244, 314	75 kg	150 kg	A		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Hexaldehyde	3	UN1207	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Hexamethylenediamine, solid	8	UN2280	III	CORROSIVE		154	213	242	25 kg	100 kg	A	12, 46
	Hexamethylenediamine solution	8	UN1783	II	CORROSIVE	T8	None	202	243	1 L	30 L	A	
	Hexamethylenediisocyanate	6.1	UN2281	II	POISON	T14	None	202	243	5 L	60 L	B	13, 40
	Hexamethyleneimine	3	UN2493	II	FLAMMABLE LIQUID, CORROSIVE.	T8	None	202	243	1 L	5 L	B	40
	Hexamethylene triperoxide diamine (dry)	Forbidden											
	Hexamethylol benzene hexanitrate	Forbidden											
	Hexamine	4.1	UN1328	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A	
	Hexanes	3	UN1208	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
	Hexanitroazoxy benzene	Forbidden											
	2,2',4,4',6,6'-Hexanitro-3,3'-dihydroxyazobenzene (dry)	Forbidden											
	2,2',3',4,4',6-Hexanitrodiphenylamine	Forbidden											
	Hexanitrodiphenylamine (Dipicrylamine; Hexyl)	1.1D	UN0079	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	2,3',4,4',6,6'-Hexanitrodiphenylether	Forbidden											
	N,N'-(hexanitrodiphenyl) ethylene dinitramine (dry)	Forbidden											
	Hexanitrodiphenyl urea	Forbidden											
	Hexanitroethane	Forbidden											
	Hexanitrooxanilide	Forbidden											
	Hexanitrostilbene	1.1D	UN0392	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Hexanoic acid, see Corrosive liquid, n.o.s.												
	Hexanols	3	UN2282	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Hexatonal, cast	1.1D	UN0393	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	1-Hexene	3	UN2370	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
	Hexogen, *see* Cyclotrimethylenetrinitramine, *etc.*												
	Hexolite, *dry or wetted with less than 15 per cent water, by mass.*	1.1D	UN0118	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Hexyl, *see* Hexanitrodiphenylamine												
	Hexyltrichlorosilane	8	UN1784	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40
	High explosives, see individual explosives' entries												
	HMX, *see* Cyclotetramethylene-tetranitramine, *etc.*												
	Hydrazine, anhydrous *or* Hydrazine aqueous solutions *with more than 64 per cent hydrazine, by mass.*	3	UN2029	I	FLAMMABLE LIQUID, POISON, CORROSIVE.	A3, A6, A7, A10, B16, B24, B53, T25	None	201	243	Forbidden	2.5 L	D	21, 40, 42, 100
	Hydrazine azide	Forbidden											

Hydrazine chlorate	Forbidden												
Hydrazine dicarbonic acid diazide	Forbidden												
Hydrazine hydrate *or* Hydrazine aqueous solutions, *with not more than 64 per cent hydrazine, by mass.*	8	UN2030	II	CORROSIVE, POISON.	B16, B24, B53, T15.	None	202	243	Forbidden	30 L	D	40, 42, B2
Hydrazine perchlorate	Forbidden												
Hydrazine selenate	Forbidden												
Hydrides, metal, *n.o.s.*	4.3	UN1409	I	DANGEROUS WHEN WET	A19, N34, N40	None	211	242	Forbidden	15 kg	D	M3
Hydriodic acid, anhydrous, see Hydrogen iodide, anhydrous													
Hydriodic acid, solution	8	UN1787	II	CORROSIVE	A3, A6, B2, N41, T9, T27	154	202	242	1 L	30 L	C	8
Hydrobromic acid, anhydrous, see Hydrogen bromide, anhydrous.													
Hydrobromic acid solution	8	UN1788	II	CORROSIVE	A3, A6, B2, B15, N41.	154	202	242	1 L	30 L	C	8
Hydrocarbon gases, compressed, n.o.s. *or* Hydrocarbon gases mixtures, compressed, n.o.s.	2.1	UN1964		FLAMMABLE GAS.	B13	306	302	314	Forbidden	150 kg	E	40, M3
Hydrocarbon gases, liquefied, n.o.s *or* Hydrocarbon gases mixtures, liquefied, n.o.s.	2.1	UN1965		FLAMMABLE GAS.	B13	306	304	314	Forbidden	150 kg	E	40, M3
Hydrochloric acid, anhydrous, see Hydrogen chloride, anhydrous.													
Hydrochloric acid, solution	8	UN1789	II	CORROSIVE	A3, A6, B2, B15, N41, T9, T27	154	202	242	1 L	30 L	C	8
Hydrocyanic acid, anhydrous, see Hydrogen cyanide													
D Hydrocyanic acid, aqueous solutions *less than 5% HCN*	6.1	NA1613	II	POISON	B12, T18, T26	None	195	243	Forbidden	5 L	D	40, M2
Hydrocyanic acid, aqueous solutions *not more than 20% hydrocyanic acid.*	6.1	UN1613	I	POISON	2, B9, B12, B14, B72.	None	195	244	Forbidden	Forbidden	D	40, M2
Hydrocyanic acid, liquefied, see Hydrogen cyanide, *etc.*													
Hydrocyanic acid (prussic), unstabilized	Forbidden												
Hydrofluoric acid and Sulfuric acid mixtures	8	UN1786	I	CORROSIVE, POISON.	A6, A7, B15, B23, N5, N34, T18, T27	None	201	243	Forbidden	2.5 L	D	40, 95
Hydrofluoric acid, anhydrous, see Hydrogen fluoride, anhydrous.													
Hydrofluoric acid, solution, *more than 60 per cent strength*	8	UN1790	I	CORROSIVE, POISON.	A6, A7, B4, B12, B15, B23, N5, N34, T18, T27.	None	201	243	0.5 L	2.5 L	D	12, 40, 48, 95
Hydrofluoric acid, solution, *not more than 60 per cent strength*	8	UN1790	II	CORROSIVE, POISON.	A6, A7, B12, B15, N5, N34, T18, T27.	None	202	243	1 L	30 L	D	12, 40, 48, 95
Hydrofluoroboric acid, see Fluoboric acid													
Hydrofluorosilicic acid, see Fluorosilicic acid													
Hydrogen and Methane mixtures, compressed	2.1	UN2034		FLAMMABLE GAS.	B13	306	302	302, 314	Forbidden	150 kg	E	40
Hydrogen bromide, anhydrous	2.3	UN1048		POISON GAS, CORROSIVE.	3, B13, B14, B33, B75.	None	304	244	Forbidden	25 kg	D	40
Hydrogen chloride, anhydrous	2.3	UN1050		POISON GAS, CORROSIVE.	3, B13, B14, B33, B75.	None	304	244	Forbidden	Forbidden	D	40
Hydrogen chloride, refrigerated liquid (*cryogenic liquid*)	2.3	UN2186		POISON GAS, CORROSIVE.	3, B6, B43, B86.	None	None	314, 315	Forbidden	Forbidden	B	40
Hydrogen, compressed	2.1	UN1049		FLAMMABLE GAS.		306	302	302, 314	Forbidden	150 kg	E	40, 57
Hydrogen cyanide, anhydrous, stabilized	6.1	UN1051	I	POISON. FLAMMABLE LIQUID.	1, B9, B12, B14, B30, B61, B65, T38, T43, T44.	None	195	245	Forbidden	Forbidden	D	40, M2
Hydrogen cyanide, anhydrous, stabilized, *absorbed in a porous inert material.*	6.1	UN1614	I	POISON	1, B9, B12, B14, B30, B64, T38, T43, T44.	None	195	244	Forbidden	Forbidden	D	25, 40, M2

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Hydrogen fluoride, anhydrous	8	UN1052	I	CORROSIVE, POISON.	B7, B12, B46, B71, T24, T27.	None	163	243	Forbidden	Forbidden	D	40, 95
	Hydrogen iodide, anhydrous	2.2	UN2197		NONFLAMMABLE GAS, CORROSIVE.	B13	306	304	244	Forbidden	Forbidden	D	40
	Hydrogen iodide solution, see Hydriodic acid, solution												
	Hydrogen peroxide and peroxyacetic acid mixtures, *with acids, water and not more than 5 per cent peroxyacetic acid, stabilized.*	5.1	UN3149	II	OXIDIZER, CORROSIVE.	A2, A3, A6, A36, B12, B53, T14.	None	202	243	1 L	5 L	D	25, 66, 75, 106
	Hydrogen peroxide, aqueous solutions *with more than 40 per cent but not more than 60 per cent hydrogen peroxide (stabilized as necessary).*	5.1	UN2014	II	OXIDIZER, CORROSIVE.	12, A3, A6, B12, B53, B80, B81, B85, T14.	None	202	243	Forbidden	Forbidden	D	25, 66, 75, 106
	Hydrogen peroxide, aqueous solutions *with not less than 8 per cent but less than 20 per cent hydrogen peroxide (stabilized as necessary).*	5.1	UN2984	III	OXIDIZER	A1, 17	152	203	241	2.5 L	30 L	B	25, 75, 106
	Hydrogen peroxide, aqueous solutions *with not less than 20 per cent but not more than 40 per cent hydrogen peroxide (stabilized as necessary).*	5.1	UN2014	II	OXIDIZER, CORROSIVE.	A2, A3, A6, B12, B53, T14.	None	202	243	1 L	5 L	D	25, 66, 75, 106
	Hydrogen peroxide, stabilized *or* Hydrogen peroxide aqueous solutions, stabilized *with more than 60 per cent hydrogen peroxide.*	5.1	UN2015	I	OXIDIZER, CORROSIVE.	12, A3, A6, B12, B53, B62, B80, B81, B85, T15.	None	201	243	Forbidden	Forbidden	D	25, 66, 75, 106
	Hydrogen, refrigerated liquid (*cryogenic liquid*)	2.1	UN1966		FLAMMABLE GAS.		None	316	318, 319	Forbidden	Forbidden	D	40
	Hydrogen selenide, anhydrous	2.3	UN2202		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	192	245	Forbidden	Forbidden	D	40
	Hydrogen sulfate, see Sulfuric acid												
	Hydrogen sulfide, liquefied	2.3	UN1053		POISON GAS, FLAMMABLE GAS.	2, B9, B13, B14, B31, B73.	None	304	244	Forbidden	Forbidden	D	40
	Hydroquinone, solid *or* liquid	6.1	UN2662	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Hydrosilicofluoric acid, see Fluorosilicic acid												
	3-(2-Hydroxyethoxy)-4-pyrrolidin-1-ylbenzenediazonium zinc chloride.	4.1	UN3035	II	FLAMMABLE SOLID.		None	224	240	Forbidden	Forbidden	D	2
	Hydroxyl amine iodide	Forbidden											
AW	Hydroxylamine sulfate	8	UN2865	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Hypochlorite solutions *with more than 5 per cent but less than 16 per cent available chlorine.*	8	UN1791	III	CORROSIVE	N34, T7	154	203	241	5 L	60 L	B	26
	Hypochlorite solutions *with 16 per cent or more available chlorine.*	8	UN1791	II	CORROSIVE	A7, B2, B15, N34, T7.	154	202	242	1 L	30 L	B	26
	Hyponitrous acid	Forbidden											
	Igniter fuse, metal clad, see Fuse, igniter, tubular, metal clad												
	Igniters	1.1G	UN0121	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
	Igniters	1.2G	UN0314	II	EXPLOSIVE 1.2G.			62	None	Forbidden	Forbidden	B	
	Igniters	1.3G	UN0315	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	A	
	Igniters	1.4G	UN0325	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
	Igniters	1.4S	UN0454	II	EXPLOSIVE 1.4S			62	None	25 kg	100 kg	A	9E
	3,3'-Iminodipropylamine	8	UN2269	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	

Infectious substances, affecting animals *only*	6.2	UN2900		INFECTIOUS SUBSTANCE.		196	196	None	50 mL or 50 g.	4 L or 4 kg	B	
Infectious substances, affecting humans	6.2	UN2814		INFECTIOUS SUBSTANCE.		196	196	None	50 mL or 50 g.	4 L or 4 kg	B	
Inflammable, see Flammable												
Initiating explosives (dry)	Forbidden											
Ink, *printer's, flammable*	3	UN1210	II	FLAMMABLE LIQUID.	T7, T30	150	173	242	5 L	60 L	B	
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	173	242	60 L	220 L	B, A	
Inositol hexanitrate (dry)	Forbidden											
Insecticide gases *flammable* n.o.s.	2.1	UN1968		FLAMMABLE GAS.	B13	306	304	244	75 kg	150 kg	D	40, M3
Insecticide gases, n.o.s.	2.2	UN1968		NONFLAMMABLE GAS.	B13	306	304	244	75 kg	150 kg	A	105, M3
Insecticide gases, n.o.s.	2.2	UN1968		NONFLAMMABLE GAS.	B13	306	304	244	75 kg	150 kg	D	40, M3
Insecticide gases, toxic, n.o.s.	2.3	UN1967		POISON GAS	3, B13, B14, B33, B75.	None	193, 334	245	Forbidden	Forbidden	D	40, M3
Inulin trinitrate (dry)	Forbidden											
Iodine azide (dry)	Forbidden											
Iodine monochloride	8	UN1792	II	CORROSIVE	B6, N41, T8, T26.	None	202	242	Forbidden	50 kg	D	40, 66, 74, 89, 90
Iodine pentafluoride	5.1	UN2495	I	OXIDIZER, POISON.		None	205	243	Forbidden	2.5 L	D	25, 40, 66, 90
2-Iodobutane	3	UN2390	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
Iodomethylpropanes	3	UN2391	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
Iodopropanes	3	UN2392	III	FLAMMABLE LIQUID.		150	203	241	60 L	220 L	A	
Iodoxy compounds (dry)	Forbidden											
Iridium nitratopentamine iridium nitrate	Forbidden											
Iron chloride, see Ferric chloride												
Iron oxide, spent, *or* Iron sponge, spent *obtained from coal gas purification.*	4.2	UN1376	III	SPONTANEOUSLY COMBUSTIBLE.	B18	None	213	240	Forbidden	Forbidden	E	
Iron pentacarbonyl	6.1	UN1994	I	POISON, FLAMMABLE LIQUID.	1, B9, B14, B30, B72, B77, T38, T43, T44.	None	192	244	Forbidden	Forbidden	D	40
Iron sesquichloride, see Ferric chloride												
Irritating material, see Tear gas substances, *etc.*												
Isobutane *or* Isobutane mixtures	2.1	UN1969		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, M3
Isobutanol *or* Isobutyl alcohol	3	UN1212	III	FLAMMABLE LIQUID.	T1	150	203	241	60 L	220 L	A	
Isobutyl acetate	3	UN1213	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
Isobutyl acrylate	3	UN2527	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
Isobutyl alcohol, *see* Isobutanol												
Isobutyl aldehyde, *see* Isobutyraldehyde												
Isobutylamine	3	UN1214	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
D Isobutyl chloroformate	6.1	NA2742	I	POISON, FLAMMABLE LIQUID, CORROSIVE.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	1 L	30 L	A	12, 13, 22, 25, 40, 48, 100, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Isobutylene	2.1	UN1055		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, M3
	Isobutyl formate	3	UN2393	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Isobutyl isobutyrate	3	UN2528	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
+	Isobutyl isocyanate	3	UN2486	II	FLAMMABLE LIQUID. POISON.	1, B9, B14, B30, B72, T9, T38, T43, T44.	None	226	244	1 L	60 L	D	40
	Isobutyl methacrylate	3	UN2283	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Isobutyl propionate	3	UN2394	II	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	B	
	Isobutyraldehyde *or* isobutyl aldehyde	3	UN2045	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	40
	Isobutyric acid	3	UN2529	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Isobutyric anhydride	3	UN2530	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Isobutyronitrile	3	UN2284	II	FLAMMABLE LIQUID. POISON.	T17	None	202	243	1 L	60 L	E	40
	Isobutyryl chloride	3	UN2395	II	FLAMMABLE LIQUID. CORROSIVE.	T9, T26	None	202	243	1 L	5 L	C	40
	Isocyanates, liquid *or* solid, n.o.s. *or* Isocyanate solutions, n.o.s. *boiling point not less than 300 degrees C.*	6.1	UN2207	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	48, M3
	Isocyanates, n.o.s *or* Isocyanate solutions, n.o.s. (flashpoint less than 23 degrees C).	3	UN2478	II	FLAMMABLE LIQUID. POISON.	5, A3, A7	None	202	243	1 L	60 L	D	40
	Isocyanates, n.o.s. *or* Isocyanate solutions, n.o.s., *flash point more than 61 degrees C and boiling point less than 300 degrees C.*	6.1	UN2206	II	POISON	T15	None	202	243	5 L	60 L	D	25, 40, 48, M3
	Isocyanates, n.o.s. *or* Isocyanate solutions, n.o.s., *flash point not less than 23 degrees C but not more than 61 degrees C and boiling point less than 300 degrees C.*	6.1	UN3080	II	POISON, FLAMMABLE LIQUID.	T15	None	202	243	5 L	60 L	D	25, 40, 48, M3
	Isocyanatobenzotrifluorides	6.1	UN2285	II	POISON	T14	None	202	243	5 L	60 L	B	25, 40, 48
	Isoheptenes	3	UN2287	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	E, B	
	Isohexenes	3	UN2288	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	E	
	Isononanoyl peroxide, see Di-(3,3,5-trimethylhexanoyl) peroxide.												
	Isooctane, see Octanes												
	Isooctenes	3	UN1216	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Isopentane, *see* n-Pentane												
	Isopentanoic acid, see Corrosive liquids, n.o.s.												
	Isopentenes	3	UN2371	I	FLAMMABLE LIQUID.	T20	150	201	243	1 L	30 L	E	
AW	Isophoronediamine	8	UN2289	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	6
+	Isophoronediisocyanate	6.1	UN2290	III	POISON	2, B9, B14, B32, B64, B74, T8, T38, T43, T45.	None	227	244	60 L	220 L	B	40
	Isoprene, inhibited	3	UN1218	I	FLAMMABLE LIQUID.	T20	150	201	243	1 L	30 L	E	

	Isopropanol *or* isopropyl alcohol	3	UN1219	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
	Isopropenyl acetate	3	UN2403	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
	Isopropenylbenzene	3	UN2303	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A		M2
	Isopropyl acetate	3	UN1220	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
	Isopropyl acid phosphate	8	UN1793	III	CORROSIVE	T7	154	213	240	25 kg	100 kg	A		
	Isopropyl alcohol, *see* Isopropanol													
	Isopropylamine	3	UN1221	I	FLAMMABLE LIQUID.	T20	None	201	243	1 L	30 L	E		
	Isopropylbenzene	3	UN1918	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A		M2
	Isopropyl butyrate	3	UN2405	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A		
	Isopropyl chloroacetate	3	UN2947	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
+	Isopropyl chloroformate	3	UN2407	I	FLAMMABLE LIQUID, CORROSIVE, POISON.	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	Forbidden	Forbidden	B		40
	Isopropyl-2-chloropropionate	3	UN2934	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
	Isopropylcumyl hydroperoxide, more than 72 per cent in solution.	Forbidden												
	Isopropyl isobutyrate	3	UN2406	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
+	Isopropyl isocyanate	3	UN2483	II	FLAMMABLE LIQUID, POISON.	1, B9, B14, B30, B72, T18, T26, T38, T43, T44.	None	226	244	Forbidden	30 L	D		40
	Isopropyl mercaptan, see Propanethiols													
	Isopropyl nitrate	3	UN1222	II	FLAMMABLE LIQUID.	T25	150	202	None	5 L	60 L	D		
	Isopropyl peroxydicarbonate, *see* Diisopropyl peroxydicarbonate, *etc.*.													
	Isopropyl phosphoric acid, see Isopropyl acid phosphate													
	Isopropyl propionate	3	UN2409	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
	Isosorbide dinitrate mixture *with not less than 60 per cent lactose, mannose, starch or calcium hydrogen phosphate.*	4.1	UN2907	II	FLAMMABLE SOLID.		None	212	None	15 kg	50 kg	E		
	Isothiocyanic acid	Forbidden												
	Jet fuel, see Fuel aviation, turbine engine													
	Jet perforating guns, charged *oil well, without detonator*	1.1D	UN0124	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B		
D	Jet perforating guns, charged *oil well, without detonator*	1.4D	NA0124	II	EXPLOSIVE 1.4D.	114		62	None	Forbidden	Forbidden	A		24E
	Jet perforators, see Charges, shaped, commercial													
	Jet tappers, without detonator, see Charges, shaped commercial, etc..													
	Jet thrust igniters, for rocket motors or Jato, see Igniters													
	Jet thrust unit (Jato), see Rocket motors													
	Kerosene	3	UN1223	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
	Ketones, liquid, n.o.s.	3	UN1224	I	FLAMMABLE LIQUID.	T8, T31	None	201	243	1 L	30 L	E, B		M3
				II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	E, B		M3
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A		M3
	Krypton, compressed	2.2	UN1056		NONFLAMMABLE GAS.		306	302	None	75 kg	150 kg	A		
	Krypton, refrigerated liquid (*cryogenic liquid*)	2.2	UN1970		NONFLAMMABLE GAS.	B13	320		244	50 kg	500 kg	B		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Lacquer base or lacquer chips, nitrocellulose, dry, see Nitrocellulose, *etc. (UN 2557).*												
	Lacquer base or lacquer chips, plastic, wet with alcohol or solvent, see Nitrocellulose *(UN 2059, UN 2060, UN 2555, UN2556) or* Paint *etc. (UN1263).*												
	Lauroyl peroxide, *see* Dilauroyl peroxide												
	Lead acetate	6.1	UN1616	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
	Lead arsenates	6.1	UN1617	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Lead arsenites	6.1	UN1618	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Lead azide (dry)	Forbidden											
	Lead azide, wetted *with not less than 20 per cent water or mixture of alcohol and water, by mass.*	1.1A	UN0129	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Lead compounds, soluble, n.o.s.	6.1	UN2291	II	POISON		153	213	240	100 kg	200 kg	A	M2
	Lead cyanide	6.1	UN1620	II	POISON		None	212	242	25 kg	100 kg	A	26, M2
	Lead dioxide	5.1	UN1872	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A	34
	Lead dross, see Lead sulphate, *with more than 3% free acid*												
D	Lead mononitroresorcinate	1.1A	NA0473	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Lead nitrate	5.1	UN1469	II	OXIDIZER, POISON.		None	212	242	5 kg	25 kg	A	M2
	Lead nitroresorcinate (dry)	Forbidden											
	Lead perchlorate, solid *or* solution	5.1	UN1470	II	OXIDIZER, POISON.	T8	None	212	242	5 kg	25 kg	A	56, 58, 106
	Lead peroxide, see Lead dioxide												
	Lead phosphite, dibasic	4.1	UN2989	II	FLAMMABLE SOLID.		None	212	240	5 kg	25 kg	B	34
				III	FLAMMABLE SOLID.		151	213	240	15 kg	50 kg	B	34
	Lead picrate (dry)	Forbidden											
	Lead styphnate (dry)	Forbidden											
	Lead styphnate (Lead trinitroresorcinate), wetted *with not less than 20 per cent water or mixture of alcohol and water, by mass.*	1.1A	UN0130	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Lead sulfate *with more than 3 per cent free acid*	8	UN1794	II	CORROSIVE		154	212	240	15 kg	50 kg	A	
D	Lead sulfide	9	NA2291	III	CLASS 9		155	213	240	100 kg	200 kg	A	M2
	Lead trinitroresorcinate, *see* Lead styphnate, *etc.*												
	Life-saving appliances, not self inflating *containing dangerous goods as equipment.*	9	UN3072		None			219	None	No limit	No limit	A	120
	Life-saving appliances, self inflating	9	UN2990		None			219	None	No limit	No limit	A	120
	Lighter replacement cartridges containing liquefied petroleum gases (and similar devices, each not exceeding 65 grams), see Lighters for cigars, cigarettes, *etc. with flammable gas.*												
D	Lighters for cigars, cigarettes, *etc., with lighter fluids*	3	NA1226	II	FLAMMABLE LIQUID.	N72	150	202	None	Forbidden	Forbidden	B	
	Lighters, fuse	1.4S	UN0131	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E
	Lighters *or* Lighter refills (cigarettes) containing flammable gas	2.1	UN1057		FLAMMABLE GAS.	21	None	308	None	1 kg	15 kg	B	40
	Lime, unslaked, see Calcium oxide												
	Liquefied gases, *non-flammable charged with nitrogen, carbon dioxide or air*	2.2	UN1058		NONFLAMMABLE GAS.	B13,	306	304	244	75 kg	150 kg	A	

Liquefied hydrocarbon gas, see Hydrocarbon gases, liquefied, n.o.s., *etc.*.												
Liquefied natural gas, see Methane, *etc. (UN 1972)*												
+ Liquefied petroleum gas *see* Petroleum gases, liquefied												
Lithium	4.3	UN1415	II	DANGEROUS WHEN WET.	22, A7, A19, N34, N45.	None	212	None	Forbidden	50 kg	E	
Lithium acetylide ethylenediamine complex, see Substances which in contact with water emit flammable gases.												
Lithium alkyls	4.2	UN2445	I	SPONTANEOUSLY COMBUSTIBLE.	B11, T28, T40	None	181	244	Forbidden	Forbidden	D	
Lithium aluminum hydride	4.3	UN1410	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
Lithium aluminum hydride, ethereal	4.3	UN1411	I	DANGEROUS WHEN WET, FLAMMABLE LIQUID.	A2, A3, A11, N34.	None	201	244	Forbidden	1 L	D	40
Lithium battery, liquid cathod	9	UN3090	II	CLASS 9		None	185	None	Forbidden	35 kg	A	
Lithium battery, solid cathode	9	UN3090	II	CLASS 9		None	185	None	Forbidden	35 kg	A	
Lithium borohydride	4.3	UN1413	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
Lithium ferrosilicon	4.3	UN2830	II	DANGEROUS WHEN WET.	A19	None	212	241	15 kg	50 kg	E	40, 85, 103
Lithium hydride	4.3	UN1414	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
Lithium hydride, fused solid	4.3	UN2805	II	DANGEROUS WHEN WET.	A8, A19, A20	None	212	241	15 kg	50 kg	E	
Lithium hydroxide, monohydrate	8	UN2680	II	CORROSIVE		154	212	240	15 kg	50 kg	A	
Lithium hydroxide, solution	8	UN2679	II	CORROSIVE	B2, T8	154	202	242	1 L	60 L	A	96
Lithium hypochlorite, dry *or* Lithium hypochlorite mixtures, dry	5.1	UN1471	II	OXIDIZER	A9, N34	152	212	None	5 kg	25 kg	A	13, 48, 56, 58, 69, 105, 116
Lithium in cartridges, see Lithium												
Lithium nitrate	5.1	UN2722	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A	
Lithium nitride	4.3	UN2806	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
Lithium peroxide	5.1	UN1472	II	OXIDIZER	A9, N34	152	212	None	5 kg	25 kg	A	13, 75, 106
Lithium silicon	4.3	UN1417	II	DANGEROUS WHEN WET.	A19, A20	None	212	241	15 kg	50 kg	A	85, 103
LNG, see Methane *etc. (UN 1972)*												
London Purple	6.1	UN1621	II	POISON		None	212	242	25 kg	100 kg	A	M2
LPG, see Petroleum gases, liquefied												
Lye, see Sodium hydroxide, solutions												
Magnesium alkyls	4.2	UN3053	I	SPONTANEOUSLY COMBUSTIBLE.	B11, T28, T29, T42.	None	181	244	Forbidden	Forbidden	D	18
Magnesium aluminum phosphide	4.3	UN1419	I	DANGEROUS WHEN WET, POISON.	A19, N34, N40	None	211	242	Forbidden	15 kg	E	40, 85
+ Magnesium arsenate	6.1	UN1622	II	POISON		None	212	242	25 kg	100 kg	A	M2
Magnesium bisulfite solution, *see* Bisulfites, inorganic aqueous solutions, n.o.s..												
Magnesium bromate	5.1	UN1473	II	OXIDIZER	A1	152	212	240	5 kg	25 kg	A	56, 58, 106
Magnesium chlorate	5.1	UN2723	II	OXIDIZER		152	212	240	5 kg	25 kg	A	56, 58, 106
Magnesium diamide	4.2	UN2004	II	SPONTANEOUSLY COMBUSTIBLE.	A8, A19, A20	None	212	241	15 kg	50 kg	C	
Magnesium diphenyl	4.2	UN2005	I	SPONTANEOUSLY COMBUSTIBLE.		None	187	244	Forbidden	Forbidden	C	
Magnesium dross, wet or hot	Forbidden											

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***) Exceptions	Non-bulk packaging	Bulk packaging	(9) Quantity limitations Passenger aircraft or railcar	Cargo aircraft only	(10) Vessel stowage requirements Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Magnesium fluorosilicate	6.1	UN2853	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	26, M4
	Magnesium granules, coated *particle size not less than 149 microns.*	4.3	UN2950	III	DANGEROUS WHEN WET.	A1, A19	None	213	None	25 kg	100 kg	A	
	Magnesium hydride	4.3	UN2010	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
	Magnesium *or* Magnesium alloys *with more than 50 per cent magnesium in pellets, turnings or ribbons.*	4.1	UN1869	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A	39
	Magnesium nitrate	5.1	UN1474	III	OXIDIZER	A1, T2	152	213	240	25 kg	100 kg	A	
	Magnesium perchlorate	5.1	UN1475	II	OXIDIZER	T6	152	212	240	5 kg	25 kg	A	56, 58, 106
	Magnesium peroxide	5.1	UN1476	II	OXIDIZER		152	212	240	5 kg	25 kg	A	13, 75, 106
	Magnesium phosphide	4.3	UN2011	I	DANGEROUS WHEN WET. POISON.	A19, N40	None	211	None	Forbidden	15 kg	E	40, 65
	Magnesium, powder *or* Magnesium alloys, powder	4.3	UN1418	II	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.	A19, B56	None	212	241	15 kg	50 kg	A	39
	Magnesium scrap, see Magnesium, *etc. (UN 1869)*												
	Magnesium silicide	4.3	UN2624	II	DANGEROUS WHEN WET.	A19, A20	None	212	241	15 kg	50 kg	B	85, 103
	Magnetized material, see section 173.21												
D	Maleic acid	8	NA2215	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Maleic anhydride	8	UN2215	III	CORROSIVE	T7, T38	154	213	240	25 kg	100 kg	A	
	Malononitrile	6.1	UN2647	II	POISON		None	212	240	25 kg	100 kg	A	12
	Maneb *or* Maneb preparations *with not less than 60 per cent maneb.*	4.2	UN2210	III	SPONTANEOUSLY COMBUSTIBLE, DANGEROUS WHEN WET.	A1, A19	None	213	240	25 kg	100 kg	A	34, M2
	Maneb stabilized *or* Maneb preparations, stabilized *against self-heating.*	4.3	UN2968	III	DANGEROUS WHEN WET.	A1, A19	None	213	240	25 kg	100 kg	B	34, M2
	Manganese nitrate	5.1	UN2724	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A	
	Manganese resinate	4.1	UN1330	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A	
	Mannitan tetranitrate	Forbidden											
	Mannitol hexanitrate (dry)	Forbidden											
D	Mannitol hexanitrate (Nitromannite), wetted *with not less than 40 percent water, by mass or mixture of alcohol and water.*	1.1A	NA0133	II	EXPLOSIVE 1.1A.	111		62	None	Forbidden	Forbidden	E	1E, 5E
	Mannitol hexanitrate (Nitromannite), wetted *with not less than 40 per cent water, or mixture of alcohol and water, by mass.*	1.1D	UN0133	II	EXPLOSIVE 1.1D.	111, 117		62	None	Forbidden	Forbidden	B	1E, 5E
	Matches, block, see Matches, 'strike anywhere'												
	Matches, fusee	4.1	UN2254	III	FLAMMABLE SOLID.		188	186	None	Forbidden	Forbidden	A	
	Matches, safety *(book, card or strike on box)*	4.1	UN1944	III	FLAMMABLE SOLID.		186	186	None	25 kg	100 kg	A	
	Matches, strike anywhere	4.1	UN1331	III	FLAMMABLE SOLID.		186	186	None	Forbidden	Forbidden	B	
	Matches, wax, Vesta	4.1	UN1945	III	FLAMMABLE SOLID.		186	186	None	25 kg	100 kg	B	
	Matting acid, see Sulfuric acid												
D	Medicines, *corrosive, liquid,* n.o.s.	8	NA1760	II	CORROSIVE	B2	154	202	242	1 L	30 L	B	40, M4

				III	CORROSIVE		154	203	241	5 L	60 L	A	40, M4
D	Medicines, *corrosive, solid,* n.o.s.	8	NA1759	II	CORROSIVE		154	212	240	15 kg	50 kg	A	M4
				III	CORROSIVE		154	213	240	25 kg	100 kg	A	M4
D	Medicines, *flammable, liquid,* n.o.s.	3	NA1993	I	FLAMMABLE LIQUID.		150	201	243	1 L	30 L	E, B	M3
				II	FLAMMABLE LIQUID.		150	202	242	5 L	60 L	E, B	M3
				III	FLAMMABLE LIQUID.	81	150	203	242	60 L	220 L	A	M3
D	Medicines, *flammable, solid,* n.o.s.	4.1	NA1325	II	FLAMMABLE SOLID.		151	212	240	15 kg	50 kg	B	M3
D	Medicines, *oxidizing substance, solid,* n.o.s.	5.1	NA1479	II	OXIDIZER		152	212	240	5 kg	25 kg	B	56, 58, 69, 106, M4
D	Medicines, *poisonous, liquid,* n.o.s.	6.1	NA2810	I	POISON		153	201	243	1 L	30 L	B	40, M3
				II	POISON		153	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	40, M3
D	Medicines, *poisonous, solid,* n.o.s.	6.1	NA2811	I	POISON		153	211	242	5 kg	50 kg	B	M3
				II	POISON		153	212	242	25 kg	100 kg	B	M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M3
	Memtetrahydrophthalic anhydride, see Corrosive liquids, n.o.s.												
	p-Menthane hydroperoxide, *see* p-Menthyl hydroperoxide, *technically pure.*												
	Mercaptans, liquid, n.o.s. *or* Mercaptan mixtures, liquid, n.o.s.	3	UN1228	II	FLAMMABLE LIQUID, POISON.	T14	None	202	243	Forbidden	60 L	E, B	40, 95, 102, M3
	Mercaptans, liquid n.o.s. *or* Mercaptan mixtures, liquid, n.o.s., *flash point not less than 23 degrees C.*	6.1	UN3071	II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	C	40, 121, M3
	Mercuric arsenate	6.1	UN1623	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercuric chloride	6.1	UN1624	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercuric compounds, see Mercury compounds, *etc.*												
	Mercuric nitrate	6.1	UN1625	II	POISON	N73	None	212	242	25 kg	100 kg	A	M1
+	Mercuric potassium cyanide	6.1	UN1626	I	POISON	N74, N75	None	211	242	5 kg	50 kg	A	26, M1
	Mercuric sulfocyanate, see Mercury thiocyanate												
	Mercurol, see Mercury nucleate												
	Mercurous azide	Forbidden											
	Mercurous compounds, see Mercury compounds, *etc.*												
	Mercurous nitrate	6.1	UN1627	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury	8	UN2809	III	CORROSIVE		164	164	240	35 kg	35 kg	B	40, 97
	Mercury acetate	6.1	UN1629	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury acetylide	Forbidden											
	Mercury ammonium chloride	6.1	UN1630	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury based pesticides, liquid, flammable, toxic, n.o.s. *flash point less than 23deg C.*	3	UN2778	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	40, M1
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	40, M1
	Mercury based pesticides, liquid, toxic, flammable, n.o.s. *flash-point not less than 23 degrees C.*	6.1	UN3011	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T14	153	202	241	60 L	220 L	A	40, M3
	Mercury based pesticides, liquid, toxic, n.o.s.	6.1	UN3012	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(6) Packaging authorizations (§173.***) Exceptions	Non-bulk packaging	Bulk packaging	(9) Quantity limitations Passenger aircraft or railcar	Cargo aircraft only	(10) Vessel stowage requirements Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Mercury based pesticides, solid, toxic, n.o.s.	6.1	UN2777	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Mercury benzoate	6.1	UN1631	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury bromides	6.1	UN1634	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury compounds, liquid, n.o.s.	6.1	UN2024	I	POISON		None	201	243	1 L	30 L	B	40, M1
				II	POISON		None	202	243	5 L	60 L	B	40, M1
				III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	B	40, M1
	Mercury compounds, solid, n.o.s.	6.1	UN2025	I	POISON		None	211	242	5 kg	50 kg	A	M1
				II	POISON		None	212	242	25 kg	100 kg	A	M1
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M1
A	Mercury *contained in manufactured articles*	8	UN2809	I	CORROSIVE		None	164	None	No limit	No limit	B	40
	Mercury cyanide	6.1	UN1636	II	POISON	N74, N75	None	212	242	25 kg	100 kg	A	26, M1
	Mercury fulminate, wetted *with not less than 20 per cent water, or mixture of alcohol and water, by mass.*	1.1A	UN0135	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 6E
	Mercury gluconate	6.1	UN1637	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury iodide	6.1	UN1638	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Mercury iodide aquabasic ammonobasic (Iodide of Millon's base).	Forbidden											
	Mercury iodide, *solution*	6.1	UN1638	II	POISON		None	202	243	5 L	60 L	A	M2
	Mercury nitride	Forbidden											
	Mercury nucleate	6.1	UN1639	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury oleate	6.1	UN1640	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury oxide	6.1	UN1641	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury oxycyanide	Forbidden											
	Mercury oxycyanide, desensitized	6.1	UN1642	II	POISON		None	212	242	25 kg	100 kg	A	26, 91, M1
	Mercury potassium iodide	6.1	UN1643	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury salicylate	6.1	UN1644	II	POISON		None	212	242	25 kg	100 kg	A	M1
+	Mercury sulfates	6.1	UN1645	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mercury thiocyanate	6.1	UN1646	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Mesityl oxide	3	UN1229	III	FLAMMABLE LIQUID.	B1, T1	None	203	242	60 L	220 L	A	
	Metal alkyl halides, n.o.s.	4.2	UN3049	I	SPONTANEOUSLY COMBUSTIBLE.	B9, B11, B14, T28, T29, T40.	None	181	244	Forbidden	Forbidden	D	M3
	Metal alkyl hydrides, n.o.s	4.2	UN3050	I	SPONTANEOUSLY COMBUSTIBLE.	B9, B11, T28, T29, T30.	None	181	244	Forbidden	Forbidden	D	M3
	Metal alkyls, n.o.s.	4.2	UN2003	I	SPONTANEOUSLY COMBUSTIBLE.	B11	None	181	244	Forbidden	Forbidden	D	M3
D	Metal alkyl, solution, n.o.s.	3	NA9195	II	FLAMMABLE LIQUID.		150	202	242	1 L	4 L	B	
	Metal catalyst, dry	4.2	UN2881	I	SPONTANEOUSLY COMBUSTIBLE.	N34	None	187	None	Forbidden	Forbidden	B	

Metal catalyst, wetted *with not less than 40 per cent water or other suitable liquid, by mass, finely divided, activated or spent.*	4.2	UN1378	II	SPONTANEOUSLY COMBUSTIBLE.	A2, A8, N34	None	212	None	Forbidden	50 kg	B	
Metaldehyde	4.1	UN1332	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A	
Metal powders, flammable, n.o.s.	4.1	UN3089	II	FLAMMABLE SOLID.		151	212	240	15 kg	50 kg	B	
			III	FLAMMABLE SOLID.		151	212	140	25 kg	100 kg	B	
Metal salts of methyl nitramine (dry)	Forbidden											
Methacrylaldehyde	3	UN2396	II	FLAMMABLE LIQUID, POISON.	T8	None	202	243	1 L	60 L	E	40
Methacrylic acid, inhibited	8	UN2531	III	CORROSIVE	T8	154	203	241	5 L	60 L	A	8, 12, 48
Methacrylonitrile, inhibited	3	UN3079	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	D	12, 40, 48, M2
Methallyl alcohol	3	UN2614	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
Methane and hydrogen, mixtures, see Hydrogen and methane, mixtures, *etc.*.												
Methane, compressed *or* Natural gas, compressed *(with high methane content).*	2.1	UN1971		FLAMMABLE GAS.	B13	306	302	302	Forbidden	150 kg	E	40
Methane, refrigerated liquid *(cryogenic liquid)* or Natural gas, refrigerated liquid *(cryogenic liquid) (with high methane content).*	2.1	UN1972		FLAMMABLE GAS.		None	316	318, 319	Forbidden	Forbidden	D	40
Methanol, *or* methyl alcohol	3	UN1230	II	FLAMMABLE LIQUID, POISON.	T8	None	202	243	1 L	60 L	B	40
Methazoic acid	Forbidden											
+ Methoxymethyl isocyanate	3	UN2605	I	FLAMMABLE LIQUID, POISON.	1, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	30 L	D	40
4-Methoxy-4-methylpentan-2-one	3	UN2293	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
1-Methoxy-2-propanol	3	UN3092	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	44
Methyl acetate	3	UN1231	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
Methylacetylene and propadiene mixtures, stabilized	2.1	UN1060		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	B	40
Methyl acrylate, inhibited	3	UN1919	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
Methylal	3	UN1234	II	FLAMMABLE LIQUID.	T14	None	202	242	5L	60 L	E	
Methyl alcohol, *see* Methanol												
Methyl allyl chloride	3	UN2554	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
Methylamine, anhydrous	2.3	UN1061		POISON GAS, FLAMMABLE GAS.	3, B13, B14, B33, B75.	None	304	314, 315	Forbidden	150 kg	B	40
Methylamine, aqueous solution	3	UN1235	II	FLAMMABLE LIQUID, CORROSIVE.	B1, T8	150	202	242	5 L	60 L	E	41
Methylamine dinitramine and dry salts thereof	Forbidden											
Methylamine nitroform	Forbidden											
Methylamine perchlorate (dry)	Forbidden											
Methylamyl acetate	3	UN1233	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Methyl amyl ketone, see Amyl methyl ketone												

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	N-Methylaniline	6.1	UN2294	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	
	Methyl benzoate	6.1	UN2938	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A	
	alpha-Methylbenzyl alcohol	6.1	UN2937	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A	
	Methyl bromide	2.3	UN1062		POISON GAS, FLAMMABLE GAS.	3, B13, B14, B33, B75.	None	193	244	Forbidden	25 kg	D	40
	Methyl bromide and chloropicrin mixtures with more than 2 per cent chloropicrin, see Chloropicrin and methyl bromide mixtures.												
	Methyl bromide and chloropicrin mixtures with not more than 2 per cent chloropicrin, see Methyl bromide.												
	Methyl bromide and ethylene dibromide mixtures, liquid	6.1	UN1647	I	POISON	2, B9, B19, B14, B32, B74, N65, T38, T43, T45.	None	227	244	Forbidden	30 L	C	40, M2
	Methyl bromoacetate	6.1	UN2643	II	POISON	T8	None	202	243	5 L	60 L	D	40
	3-Methylbutan-2-one	3	UN2397	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	3-Methyl-1-butene	3	UN2561	I	FLAMMABLE LIQUID.	T20	None	201	243	1 L	30 L	E	
	2-Methyl-1-butene	3	UN2459	I	FLAMMABLE LIQUID.	T14	None	201	243	1 L	30 L	E	
	2-Methyl-2-butene	3	UN2460	II	FLAMMABLE LIQUID.	T14	None	202	242	5 L	60 L	E	
	N-Methylbutylamine	3	UN2945	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
	Methyl-tert-butylether	3	UN2398	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	E	
	Methyl butyrate	3	UN1237	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Methyl chloride	2.1	UN1063		FLAMMABLE GAS.	B13, B14	None	304	314, 315	Forbidden	25 kg	D	40
	Methyl chloride and chloropicrin mixtures, see Chloropicrin and methyl chloride mixtures.												
	Methyl chloride and methylene chloride mixtures	2.1	UN1912		FLAMMABLE GAS.	B13, B36	306	304	244	Forbidden	150 kg	D	40
	Methyl chloroacetate	6.1	UN2295	II	POISON	T11	None	202	243	5 L	60 L	C	
	Methyl chlorocarbonate, see Methyl chloroformate												
	Methyl chloroformate	6.1	UN1238	I	POISON, FLAMMABLE LIQUID, CORROSIVE.	1, A3, A6, A7, B6, B9, B14, B30, B72, N34, T38, T43, T44.	None	226	244	Forbidden	Forbidden	D	21, 40, 100
	Methyl chloroform, see 1,1,1-Trichloroethane												
	Methylchloromethyl ether	6.1	UN1239	I	POISON, FLAMMABLE LIQUID.	1, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	Forbidden	D	40
	Methyl-2-chloropropionate	3	UN2933	III	FLAMMABLE LIQUID.	B1, T7	150	203	242	60 L	220 L	A	
	Methylchlorosilane	2.3	UN2534		POISON GAS, FLAMMABLE GAS.	2, A2, A3, A7, B9, B13, B14, B31, B73, N34.	None	226	244	Forbidden	25 kg	D	40
	Methyl cyanide	3	UN1648	II	FLAMMABLE LIQUID, POISON.	T14	None	202	243	1 L	60 L	B	40

	Methyl cyclohexane	3	UN2296	II	FLAMMABLE LIQUID.	B1, T1	150	202	242	5 L	60 L	B		
	Methyl cyclohexanols, *flash point not more than 60.5 degrees C.*	3	UN2617	III	FLAMMABLE LIQUID.	B1, T2	150	203	242	60 L	220 L	A		
	Methyl cyclohexanone	3	UN2297	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
	Methyl cyclopentane	3	UN2298	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B		
	Methyl dichloroacetate	6.1	UN2299	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A		
D	Methyldichloroarsine	6.1	NA1556	I	POISON	2, B9, B14, B32, B74.	None	192	None	Forbidden	Forbidden	D	40, 95	
	Methyldichlorosilane	4.3	UN1242	I	DANGEROUS WHEN WET, CORROSIVE, FLAMMABLE LIQUID.	A2, A3, A7, B6, B77, N34, T12.	None	201	243	Forbidden	1 L	D	21, 28, 40, 49, 100	
	Methylene chloride, see Dichloromethane													
	Methylene glycol dinitrate	Forbidden												
	Methyl ethyl ether, see Ethyl methyl ether													
	Methyl ethyl ketone, *see* Ethyl methyl ketone													
	Methyl ethyl ketone peroxide, in solution with more than 9 per cent by mass active oxygen.	Forbidden												
	2-Methyl-5-ethylpyridine	6.1	UN2300	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M2	
	Methyl fluoride	2.1	UN2454		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	E	40	
	Methyl formate	3	UN1243	I	FLAMMABLE LIQUID.	T20	150	201	243	1 L	30 L	E		
	2-Methylfuran	3	UN2301	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	E		
	a-Methylglucoside tetranitrate	Forbidden												
	a-Methylglycerol trinitrate	Forbidden												
	5-Methylhexan-2-one	3	UN2302	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
	Methylhydrazine	6.1	UN1244	I	POISON, FLAMMABLE LIQUID, CORROSIVE.	1, B9, B14, B30, B72, B77, N34, T38, T43, T44.	None	227	244	Forbidden	Forbidden	D	21, 49, 100	
+	Methyl iodide	6.1	UN2644	II	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	5 L	60 L	A	12, 40, 48	
	Methyl isobutyl carbinol	3	UN2053	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A		
	Methyl isobutyl ketone	3	UN1245	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
	Methyl isobutyl ketone peroxide, in solution with more than 9 per cent by mass active oxygen.	Forbidden												
	Methyl isocyanate	6.1	UN2480	I	POISON, FLAMMABLE LIQUID.	1, A7, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	Forbidden	D	28, 40	
	Methyl isopropenyl ketone, inhibited	3	UN1246	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B		
+	Methyl isothiocyanate	6.1	UN2477	II	POISON, FLAMMABLE LIQUID.	1, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	60 L	A		
	Methyl isovalerate	3	UN2400	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B		
	Methyl magnesium bromide, in ethyl ether	4.3	UN1928	I	DANGEROUS WHEN WET, FLAMMABLE LIQUID.		None	201	243	Forbidden	1 L	D		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Methyl mercaptan	2.3	UN1064		POISON GAS, FLAMMABLE GAS.	2, B7, B9, B13, B14, B31, B73.	None	304	314, 315	Forbidden	25 kg	D	40, M2
	Methyl mercaptopropionaldehyde, see Thia-4-pentanal												
	Methyl methacrylate monomer, inhibited	3	UN1247	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	40
	Methylmorpholine	3	UN2535	II	FLAMMABLE LIQUID, CORROSIVE.	B6, T8	None	202	243	1 L	5 L	B	40
	Methyl nitramine (dry)	Forbidden											
	Methyl nitrate	Forbidden											
	Methyl nitrite	Forbidden											
	Methyl norbornene dicarboxylic anhydride, see Corrosive liquids, n.o.s.												
+	Methyl orthosilicate	3	UN2606	I	FLAMMABLE LIQUID, POISON.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	30L	E	40
D	Methyl parathion *liquid*	6.1	NA3018	II	POISON	N76	None	202	243	Forbidden	1 L	A	40, M4
D	Methyl parathion *solid*	6.1	NA2783	II	POISON	N77	None	212	242	25 kg	100 kg	A	40, M4
	Methylpentadienes	3	UN2461	II	FLAMMABLE LIQUID.	T7	150	202	241	5 L	60 L	E	
	Methylpentanes, see Hexanes												
	2-Methylpentan-2-ol	3	UN2560	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Methylphenyldichlorosilane	8	UN2437	II	CORROSIVE	T8, T26	154	202	242	1 L	30 L	C	40
D	Methyl phosphonic dichloride	6	NA9206	I	POISON, CORROSIVE.	2, A3, B8, B9, B14, B25, B32, B74, N34, N43, T38, T43, T45.	None	227	244	Forbidden	Forbidden	C	
	Methyl phosphonothioic dichloride, anhydrous, see Corrosive liquid, n.o.s.												
D	Methyl phosphonous dichloride, *pyrophoric liquid*	6.1	NA2845	I	POISON, SPONTANEOUSLY COMBUSTIBLE.	2, B6, B9, B14, B16, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	18, M4
	Methyl picric acid (heavy metal salts of)	Forbidden											
	1-Methylpiperidine	3	UN2399	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Methyl propionate	3	UN1248	II	FLAMMABLE LIQUID.	T2	150	202	242	5 L	60 L	B	
	Methyl propyl ether	3	UN2612	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	E	40
	Methyl propyl ketone	3	UN1249	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Methyl sulfate, see Dimethyl sulfate												
	Methyl sulfide, see Dimethyl sulfide												
	Methyltetrahydrofuran	3	UN2536	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
	Methyl trichloroacetate	6.1	UN2533	III	KEEP AWAY FROM FOOD.	T1	153	203	241	60 L	220 L	A	

Methyltrichlorosilane	3	UN1250	I	FLAMMABLE LIQUID, CORROSIVE.	A7, B6, B77, N34, T12.	None	201	243	Forbidden	2.5 L	B	40
Methyl trimethylol methane trinitrate	Forbidden											
alpha-Methylvaleraldehyde	3	UN2367	II	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	B	
Methyl vinyl ketone	3	UN1251	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
Mine rescue equipment containing carbon dioxide, see Carbon dioxide.												
Mines *with bursting charge*	1.1F	UN0136	I	EXPLOSIVE 1.1F.		63(b)	62	None	Forbidden	Forbidden	E	
Mines *with bursting charge*	1.1D	UN0137	II	EXPLOSIVE 1.1D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
Mines *with bursting charge*	1.2D	UN0138	II	EXPLOSIVE 1.2D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
Mines *with bursting charge*	1.2F	UN0294	II	EXPLOSIVE 1.2F.		63(b)	62	None	Forbidden	Forbidden	E	
Mixed acid, see Nitrating acid, mixtures												
Molybdenum pentachloride	8	UN2508	III	CORROSIVE	T8, T26	154	213	240	25 kg	100 kg	C	40
Monochloroacetone (unstabilized)	Forbidden											
Monochloroethylene, see Vinyl chloride												
Monoethanolamine, see Ethanolamine												
Monoethylamine, see Ethylamine												
Morpholine	3	UN2054	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
Morpholine, aqueous, mixture, see Corrosive liquid, n.o.s.												
Motorcycles, see Vehicles, self-propelled												
+ Motor fuel anti-knock mixtures	6.1	UN1649	I	POISON, FLAMMABLE LIQUID.	14, B9, B12, B43, B90, T26, T39.	None	201	244	Forbidden	30 L	E	40, M2
Motor spirit, *see* Gasoline												
Motor vehicle, see Vehicles, self-propelled												
Muriatic acid, see Hydrochloric acid solution												
Musk xylene, *see* 5-tert-Butyl2,4,6-trinitro-m-xylene												
Naphtha	3	UN2553	II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	B	M2
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	M2
Naphthalene, crude *or* refined	4.1	UN1334	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A	M2
Naphthalene diozonide	Forbidden											
Naphthalene, molten	4.1	UN2304	III	FLAMMABLE SOLID.	A1, T8, T38	151	213	241	25 kg	100 kg	C	M2
Naphtha, *petroleum*	3	UN1255	I	FLAMMABLE LIQUID.	T8	150	201	243	1 L	30 L	E, B	
			II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E, B	
Naphtha, *solvent*	3	UN1256	II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	B	
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
alpha-Naphthylamine	6.1	UN2077	III	KEEP AWAY FROM FOOD.	T7	153	213	240	100 kg	200 kg	A	
beta-Naphthylamine	6.1	UN1650	II	POISON	T12, T26	None	212	242	25 kg	100 kg	A	
Naphthyl amineperchlorate	Forbidden											
Naphthylthiourea	6.1	UN1651	II	POISON		None	212	242	25 kg	100 kg	A	
Naphthylurea	6.1	UN1652	II	POISON		None	212	242	25 kg	100 kg	A	
Natural gases (with high methane content); see Methane, *etc. (UN 1971, UN 1972).*												
Natural gasoline	3	UN1257	I	FLAMMABLE LIQUID.	T8	150	201	243	1L	30L	E	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	
	Nechexane, see Hexanes												
	Neon, compressed	2.2	UN1065		NONFLAMMABLE GAS.	B13	306	302	302	75 kg	150 kg	A	
	Neon, refrigerated liquid (*cryogenic liquid*)	2.2	UN1913		NONFLAMMABLE GAS.	B13	320	320	244	50 kg	500 kg	B	
	New explosive or explosive device, see sections 173.51 and 173.56.												
	Nickel carbonyl	6.1	UN1259	I	POISON, FLAMMABLE LIQUID.	1, B9, B14, B30, B72, T38, T43, T45.	None	198	None	Forbidden	Forbidden	D	18, 40, M1
	Nickel cyanide	6.1	UN1653	II	POISON	N74, N75	None	212	242	25 kg	100 kg	A	26, M1
	Nickel nitrate	5.1	UN2725	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A	
	Nickel nitrite	5.1	UN2726	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A	56, 58
	Nickel picrate	Forbidden											
	Nicotine	6.1	UN1654	II	POISON		None	202	243	5 L	60 L	A	
	Nicotine compounds, liquid, n.o.s. *or* Nicotine preparations, liquid, n.o.s.	6.1	UN3144	I	POISON	A4, B38, B40, T42.	None	201	243	1 L	30 L	B	40
				II	POISON	T14	None	202	243	5 L	60 L	B	40
				III	KEEP AWAY FROM FOOD.	A34, T7	153	203	241	60 L	220 L	B	40
	Nicotine compounds, solid, n.o.s. *or* Nicotine preparations, solid, n.o.s.	6.1	UN1655	I	POISON		None	211	242	5 kg	50 kg	B	
				II	POISON		None	212	242	25 kg	100 kg	A	
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Nicotine hydrochloride *or* Nicotine hydrochloride solution	6.1	UN1656	II	POISON		None	202	243	5 L	60 L	A	
	Nicotine salicylate	6.1	UN1657	II	POISON		None	212	242	25 kg	100 kg	A	
	Nicotine sulfate, *solid*	6.1	UN1658	II	POISON		None	212	242	25 kg	100 kg	A	
	Nicotine sulfate, *solution*	6.1	UN1658	II	POISON	T14	None	202	243	5 L	60 L	A	
	Nicotine tartrate	6.1	UN1659	II	POISON		None	212	242	25 kg	100 kg	A	
	Nitrated paper (unstable)	Forbidden											
	Nitrates, inorganic, n.o.s.	5.1	UN1477	II	OXIDIZER		152	212	240	5 kg	25 kg	A	46, M3
	Nitrates of diazonium compounds	Forbidden											
	Nitrating acid mixtures spent *with not more than 50 per cent nitric acid.*	8	UN1826	II	CORROSIVE	B2, T12, T27	None	158	242	Forbidden	30 L	D	40
	Nitrating acid mixtures, spent *with 50 per cent or more nitric acid.*	8	UN1826	I	CORROSIVE, OXIDIZER.	T12, T27	None	158	243	Forbidden	2.5 L	D	40, 66, 89
	Nitrating acid mixtures *with not more than 50 per cent nitric acid.*	8	UN1796	II	CORROSIVE	B2, T12, T27	None	158	242	Forbidden	30 L	D	40
	Nitrating acid mixtures *with 50 per cent or more nitric acid*	8	UN1796	I	CORROSIVE, OXIDIZER.	T12, T27	None	158	243	Forbidden	2.5 L	D	40, 66, 89
	Nitric acid *other than red fuming with more than 70 percent nitric acid.*	8	UN2031	I	CORROSIVE	B12, B53	None	158	243	Forbidden	2.5 L	D	110, 111
	Nitric acid *other than red fuming, with not more than 70 percent nitric acid.*	8	UN2031	II	CORROSIVE	B2, B12, B53, T9, T27.	None	158	242	Forbidden	30 L	D	110, 111
+	Nitric acid, red fuming	8	UN2032	I	CORROSIVE, OXIDIZER, POISON.	2, B9, B32, B53, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	40, 66, 74, 89, 90, 95
	Nitric ether, see Ethyl nitrate												
	Nitric oxide	2.3	UN1660		POISON GAS	2, B7, B9, B12, B13, B31, B37, B46, B50, B60.	None	337	245	Forbidden	Forbidden	D	40

Nitric oxide and dinitrogen tetroxide mixtures (Nitric oxide and nitrogen dioxide mixtures)	2.3	UN1975		POISON GAS, OXIDIZER.	2, B7, B9, B12, B13, B14, B31, B45, B46, B73.	None	337	245	Forbidden	Forbidden	D	40
Nitrites inorganic, n.o.s	5.1	UN2627	II	OXIDIZER	A33	152	212	None	5 kg	25 kg	A	46, 56, 58, M3
N-Nitroaniline	Forbidden											
Nitroanilines (*o-; m-; p-*)	6.1	UN1661	II	POISON	T14	None	212	242	25 kg	100 kg	A	
Nitroanisole	6.1	UN2730	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
Nitrobenzene	6.1	UN1662	II	POISON	T14	None	202	243	5 L	60 L	A	40
m-Nitrobenzene diazonium perchlorate	Forbidden											
Nitrobenzenesulfonic acid	8	UN2305	II	CORROSIVE		154	212	240	1 L	30 L	A	
Nitrobenzol, see Nitrobenzene												
5-Nitrobenzotriazol	1.1D	UN0385	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
Nitrobenzotrifluorides	6.1	UN2306	II	POISON	T8	None	202	243	5 L	60 L	A	40, M2
Nitrobromobenzenes *liquid*	6.1	UN2732	III	KEEP AWAY FROM FOOD.	T8, T38	153	203	241	60 L	220 L	A	48
Nitrobromobenzenes *solid*	6.1	UN2732	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	48
Nitrocellulose, *dry or wetted with less than 25 per cent water (or alcohol), by mass.*	1.1D	UN0340	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	4E, 27E
Nitrocellulose, plasticized *with not less than 18 per cent plasticizing substance, by mass.*	1.3C	UN0343	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
Nitrocellulose, solution, flammable *with not more than 12.6 per cent nitrogen, by mass, and not more than 55 per cent nitrocellulose.*	3	UN2059	II	FLAMMABLE LIQUID.	A32, T9	150	202	242	5 L	60 L	B, A	
Nitrocellulose, *unmodified or plasticized with less than 18 per cent plasticizing substance, by mass.*	1.1D	UN0341	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	4E, 27E
Nitrocellulose, wetted *with not less than 25 per cent alcohol, by mass.*	1.3C	UN0342	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
Nitrocellulose with alcohol *not less than 25 per cent alcohol by mass, and not more than 12.6 per cent nitrogen, by dry mass.*	4.1	UN2556	I	FLAMMABLE SOLID.		151	212	None	1 kg	15 kg	D	28
Nitrocellulose with plasticizing *not less than 18 per cent, plasticizing substance, by mass, and not more than 12.6 per cent nitrogen, by dry mass.*	4.1	UN2557	I	FLAMMABLE SOLID		151	212	None	1 kg	15 kg	D	28
Nitrocellulose with water *not less than 25 per cent water, by mass.*	4.1	UN2555	I	FLAMMABLE SOLID.		151	212	None	15 kg	50 kg	E	28
Nitrochlorobenzene, see Chloronitrobenzenes												
3-Nitro-4-chlorobenzotrifluoride	6.1	UN2307	II	POISON	T8	None	202	243	5 L	60 L	A	40, M2
Nitrocresols	6.1	UN2446	III	KEEP AWAY FROM FOODS.		153	213	240	100 kg	200 kg	A	M2
6-Nitro-4-diazotoluene-3-sulfonic acid (dry)	Forbidden											
Nitroethane	3	UN2842	III	FLAMMABLE LIQUID.	T8	150	203	242	60 L	220 L	A	
Nitroethylene polymer	Forbidden											
Nitroethyl nitrate	Forbidden											
Nitrogen compressed	2.2	UN1066		NONFLAMMABLE GAS.		306	302	314, 315	75 kg	150 kg	A	
Nitrogen dioxide, liquefied	2.3	UN1067		POISON GAS, OXIDIZER.	1, B7, B9, B12, B14, B45, B46, B61, B68, B67.	None	336	245	Forbidden	Forbidden	D	40, 43
Nitrogen fertilizer solution, see Fertilizer ammoniating solution etc.												
Nitrogen, mixtures with rare gases, see Rare gases and nitrogen mixtures.												
Nitrogen peroxide, see Nitrogen dioxide, liquefied												
Nitrogen, refrigerated liquid (*cryogenic liquid*)	2.2	UN1977		NONFLAMMABLE GAS.		320	316	318	50 kg	500 kg	A	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Nitrogen tetroxide and nitric oxide mixtures, see Nitric oxide and nitrogen tetroxide mixtures.												
	Nitrogen tetroxide, see Nitrogen dioxide, liquefied												
	Nitrogen trichloride	Forbidden											
	Nitrogen trifluoride	2.3	UN2451		POISON GAS, OXIDIZER.	3, B64	None	302	None	Forbidden	25 kg	D	40
	Nitrogen triiodide	Forbidden											
	Nitrogen triiodide monoamine	Forbidden											
	Nitrogen trioxide	2.3	UN2421		POISON GAS, OXIDIZER.	1, B9, B13, B14, B30, B72.	None	338	245	Forbidden	Forbidden	D	40
	Nitroglycerin, desensitized *with not less than 40 per cent non-volatile water insoluble phlegmatizer, by mass.*	1.1D	UN0143	II	EXPLOSIVE 1.1D, POISON.			62	None	Forbidden	Forbidden	B	1E, 4E, 21E
	Nitroglycerin, liquid, not desensitized	Forbidden											
	Nitroglycerin, solution in alcohol, *with more than 1% but not more than 5% nitroglycerin.*	3	UN3064	II	FLAMMABLE LIQUID.	N9	None	202	None	Forbidden	5 L	E	
D	Nitroglycerin, solution in alcohol, *with more than 5 percent but not more than 10 percent nitroglycerin.*	1.1D	NA0144	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 4E, 21E
	Nitroglycerin solution in alcohol *with not more than 1 per cent nitroglycerin.*	3	UN1204	II	FLAMMABLE LIQUID.	N34, T25	None	202	None	5 L	60 L	B	
	Nitroguanidine nitrate	Forbidden											
	Nitroguanidine (Picrite), *dry or wetted with less than 20 per cent water, by mass.*	1.1D	UN0282	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Nitroguanidine; (picrite) wetted *with not less than 20 per cent water, by mass.*	4.1	UN1336	I	FLAMMABLE SOLID.	A8, A19, A20, N41.	None	211	None	1 kg	15 kg	E	28
	1-Nitrohydantoin	Forbidden											
	Nitrohydrochloric acid	8	UN1798	I	CORROSIVE	A3, B4, N41, T18, T27.	None	201	242	Forbidden	2.5 L	D	40, 68, 74, 89, 90
	Nitro isobutane triol trinitrate	Forbidden											
	Nitromannite (dry)	Forbidden											
	Nitromannite, wetted, *see* Mannitol hexanitrate, *etc.*												
	Nitromethane	3	UN1261	II	FLAMMABLE LIQUID.	T25	150	202	None	Forbidden	60 L	A	
	N-Nitro-N-methylglycolamide nitrate	Forbidden											
	2-Nitro-2-methylpropanol nitrate	Forbidden											
	Nitromuriatic acid, see Nitrohydrochloric acid												
	Nitronaphthalene	4.1	UN2538	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A	
	Nitrophenols (*o-; m-; p-*)	6.1	UN1663	III	KEEP AWAY FROM FOOD.	T8, T38	153	213	240	100 kg	200 kg	A	
	m-Nitrophenyldinitro methane	Forbidden											
	Nitropropanes	3	UN2608	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	p-Nitrosodimethylaniline	4.2	UN1369	II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20, N34	None	212	241	15 kg	50 kg	D	34

D	Nitrosoguanidine	1.1A	NA0473	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	E	2E, 5E
	Nitrostarch, *dry or wetted with less than 20 per cent water, by mass.*	1.1D	UN0146	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Nitrostarch, wetted *with not less than 20 per cent water, by mass.*	4.1	UN1337	I	FLAMMABLE SOLID	A8, A19, A20, N41.	None	211	None	1 kg	15 kg	D	28
	Nitrosugars (dry)	Forbidden											
	Nitrosyl chloride	2.3	UN1069		POISON GAS, CORROSIVE.	3, B13, B14, B33.	None	304	244	Forbidden	Forbidden	D	40
	Nitrosylsulfuric acid	8	UN2308	II	CORROSIVE	A3, A6, A7, B2, N34, T9, T27.	154	202	242	1 L	30 L	D	40, 56, 74, 89, 90
	Nitrotoluenes, *liquid o-; m-; p-*	6.1	UN1664	II	POISON	T14	None	202	243	5 L	60 L	A	
	Nitrotoluenes, *solid m-, or p-*	6.1	UN1664	II	POISON	T14	None	212	242	25 kg	100 kg	A	
	Nitrotoluidines (mono)	6.1	UN2660	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Nitrotriazolone; (NTO)	1.1D	UN0490	II	EXPLOSIVE 1.1D.			62		Forbidden	Forbidden	B	1E, 5E, 25E
	Nitro urea	1.1D	UN0147	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Nitrous oxide and carbon dioxide mixtures, see Carbon dioxide and nitrous oxide mixtures.												
	Nitrous oxide, compressed	2.2	UN1070		NONFLAMMABLE GAS.		None	304	314, 315	75 kg	150 kg	A	40
	Nitrous oxide, refrigerated liquid (*cryogenic liquid*)	2.2	UN2201		NONFLAMMABLE GAS.	B6, B14	None	316	314, 315	75 kg	150 kg	B	40
	Nitroxylenes, (o-; m-; p-)	6.1	UN1665	II	POISON	T14	None	202	243	5 L	60 L	A	M2
	Nitroxylol, see Nitroxylenes												
	Nonanes	3	UN1920	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Nonflammable gas, n.o.s., see Compressed or Liquefied gases, *etc. (UN 1955, UN 1956).*												
	Nonliquefied gases, see Compressed gases, *etc.*												
	Nonliquefied hydrocarbon gas, see Hydrocarbon gases, compressed, n.o.s.,												
	Nonyltrichlorosilane	8	UN1799	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	40
	2,5 Norbornadiene (Dicycloheptadiene)	3	UN2251	II	FLAMMABLE LIQUID.		150	202	241	5 L	60 L	D	
	Nordhausen acid, see Sulfuric acid, fuming												
	Octadecyltrichlorosilane	8	UN1800	II	CORROSIVE	A7, B2, B6 N34, T8.	None	202	242	Forbidden	30 L	C	40
	Octadiene	3	UN2309	II	FLAMMABLE LIQUID.	B1, T1	150	202	242	5 L	60 L	B	
	1,7-Octadine-3,5-diyne-1,8-dimethoxy-9-octadecynoic acid	Forbidden											
	Octafluorobut-2-ene	2.2	UN2422		NONFLAMMABLE GAS.	B13	None	304	244	75 kg	150 kg	A	
	Octafluorocyclobutane	2.2	UN1976		NONFLAMMABLE GAS.	B13	None	304	244	75 kg	150 kg	A	
	Octafluoropropane	2.2	UN2424		NONFLAMMABLE GAS.	B13	None	304	244	75 kg	150 kg	A	
	Octanes	3	UN1262	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	n-Octanoyl peroxide. *see* Di-n-octanoyl peroxide, *technically pure.*												
	Octogen, *see* Cyclotetramethylene tetranitramine, etc.												
	Octolite (Octol), *dry or wetted with less than 15 per cent water, by mass.*	1.1D	UN0266	II	EXPLOSIVE 1.1D.			62		Forbidden	Forbidden	B	1E, 5E
	Octol, *see* Octolite, *etc.*												
	Octyl aldehydes, *flammable*	3	UN1191	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
+	tert-Octylmercaptan	6.1	UN3023	II	POISON, FLAMMABLE LIQUID	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	60 L	B	40

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Octyltrichlorosilane	8	UN1801	II	CORROSIVE	A7, B2, B6, N34, T8, T25.	None	202	242	Forbidden	30 L	C	40
	Oil gas	2.1	UN1071		FLAMMABLE GAS.	B13	None	304	244	Forbidden	150 kg	D	40
	Oleum, see Sulfuric acid, fuming												
	Organic peroxide type A, liquid or solid	Forbidden											
	Organic peroxide type B, liquid	5.2	UN3101	II	ORGANIC PEROXIDE EXPLOSIVE.	53	None	225	None	Forbidden	Forbidden	D	12, 40
	Organic peroxide type B, liquid, temperature controlled	5.2	UN3111	II	ORGANIC PEROXIDE EXPLOSIVE.	53	None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type B, solid	5.2	UN3102	II	ORGANIC PEROXIDE EXPLOSIVE.	53	None	225	None	Forbidden	Forbidden	D	12, 40
	Organic peroxide type B, solid, temperature controlled	5.2	UN3112	II	ORGANIC PEROXIDE EXPLOSIVE.	53	None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type C, liquid	5.2	UN3103	II	ORGANIC PEROXIDE.		152	225	None	5 L	10 L	D	12, 40
	Organic peroxide type C, liquid, temperature controlled	5.2	UN3113	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type C, solid	5.2	UN3104	II	ORGANIC PEROXIDE.		152	225	None	5 kg	10 kg	D	12, 40
	Organic peroxide type C, solid, temperature controlled	5.2	UN3114	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type D, liquid	5.2	UN3105	II	ORGANIC PEROXIDE.		152	225	None	5 L	10 L	D	12, 40
	Organic peroxide type D, liquid, temperature controlled	5.2	UN3115	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type D, solid	5.2	UN3106	II	ORGANIC PEROXIDE.		152	225	None	5 kg	10 kg	D	12, 40
	Organic peroxide type D, solid, temperature controlled	5.2	UN3116	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type E, liquid	5.2	UN3107	II	ORGANIC PEROXIDE.		152	225	None	10 L	25 L	D	12, 40
	Organic peroxide type E, liquid, temperature controlled	5.2	UN3117	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type E, solid	5.2	UN3108	II	ORGANIC PEROXIDE.		152	225	None	10 kg	25 kg	D	12, 40
	Organic peroxide type E, solid, temperature controlled	5.2	UN3118	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type F, liquid	5.2	UN3109	II	ORGANIC PEROXIDE.		152	225	225	10 L	25 L	D	12, 40
	Organic peroxide type F, liquid, temperature controlled	5.2	UN3119	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
	Organic peroxide type F, solid	5.2	UN3110	II	ORGANIC PEROXIDE.		152	225	None	10 kg	25 kg	D	12, 40
	Organic peroxide type F, solid, temperature controlled	5.2	UN3120	II	ORGANIC PEROXIDE.		None	225	None	Forbidden	Forbidden	D	2, 40
D	Organic phosphate, Organic phosphate compound, *or* Organic phosphorus compound; mixed with compressed gas.	2.3	NA1955		POISON GAS	3	None	304	None	Forbidden	Forbidden	D	40, M3
	Organochlorine pesticides liquid, flammable, toxic, n.o.s. *flash point less than 23 degrees C.*	3	UN2762	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	M3

			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B		M3
Organochlorine pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN2995	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B		40, M3
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B		40, M3
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, T14	153	203	242	60 L	220 L	A		40, M3
Organochlorine pesticides, liquid, toxic, n.o.s.	6.1	UN2996	I	POISON	T42	None	201	243	1 L	30 L	B		40, M3
			II	POISON	T14	None	202	242	5 L	60 L	B		40, M3
			III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A		40, M3
Organochlorine pesticides, solid toxic n.o.s.	6.1	UN2761	I	POISON		None	211	242	5 kg	50 kg	A		40, M3
			II	POISON		None	212	242	25 kg	100 kg	A		40, M3
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		40, M3
Organophosphorus pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2784	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B		M3
			II	FLAMMABLE LIQUID. POISON		None	202	243	1 L	60 L	B		M3
Organophosphorus pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3017	I	POISON. FLAMMABLE LIQUID.	N76, T42	None	201	243	1 L	30 L	B		40, M3
			II	POISON, FLAMMABLE LIQUID.	N76, T14	None	202	243	5 L	60 L	B		40, M3
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, N76, T14	153	203	242	60 L	220 L	A		40, M3
Organophosphorus pesticides, liquid, toxic, n.o.s.	6.1	UN3018	I	POISON	N76, T42	None	201	243	1 L	30 L	B		40, M3
			II	POISON	N76, T14	None	202	243	5 L	60 L	B		40, M3
			III	KEEP AWAY FROM FOOD.	N76, T14	153	203	241	60 L	220 L	A		40, M3
Organophosphorus pesticides, solid, toxic, n.o.s.	6.1	UN2783	I	POISON	N77	None	211	242	5 kg	50 kg	A		40, M3
			II	POISON	N77	None	212	242	25 kg	100 kg	A		40, M3
			III	KEEP AWAY FROM FOOD.	N77	153	213	240	100 kg	200 kg	A		40, M3
Organotin compounds, liquid, n.o.s.	6.1	UN2788	I	POISON	A3, N33, N34	None	201	243	1 L	30 L	B		40, M1
			II	POISON	A3, N16, N33, N34.	None	202	243	5 L	60 L	A		40, M1
			III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A		40, M1
Organotin compounds, solid, n.o.s.	6.1	UN3146	I	POISON	A5	None	211	242	5 kg	50 kg	B		40, M1
			II	POISON		None	212	242	25 kg	100 kg	A		40, M1
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		40, M1
Organotin pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23deg C.*	3	UN2787	I	FLAMMABLE LIQUID, POISON		None	201	243	Forbidden	30 L	B		M1
			II	FLAMMABLE LIQUID. POISON.		None	202	243	1 L	60 L	B		M1
Organotin pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3019	I	POISON, FLAMMABLE LIQUID.		None	201	243	1 L	30 L	B		40, M3
			II	POISON. FLAMMABLE LIQUID.		None	202	243	5 L	60 L	B		40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***) Exceptions	Non-bulk packaging	Bulk packaging	(9) Quantity limitations Passenger aircraft or railcar	Cargo aircraft only	(10) Vessel stowage requirements Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.		153	203	241	60 L	220 L	A	40, M3
	Organotin pesticides, liquid, toxic, n.o.s.	6.1	UN3020	I	POISON		None	201	243	1 L	30 L	B	40, M3
				II	POISON		None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	40, M3
	Organotin pesticides, solid, toxic, n.o.s.	6.1	UN2786	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Orthonitroaniline, see Nitroanilines *etc.*												
	Osmium tetroxide	6.1	UN2471	I	POISON	A8, N33, N34	None	211	242	5 kg	50 kg	B	40, M1
AD	Other regulated substances, liquid, n.o.s.	9	NA3082	III	CLASS 9		155	203	241	No limit	No limit	A	
AD	Other regulated substances, solid, n.o.s.	9	NA3077	III	CLASS 9		155	213	240	No limit	No limit	A	
	Oxalates, *water soluble*	6.1	UN2449	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Oxidizing substances, liquid, corrosive, n.o.s.	5.1	UN3098	I	OXIDIZER, CORROSIVE.		None	201	244	Forbidden	2.5 L	B	34, 56, 58, 69, 106, M3
				II	OXIDIZER, CORROSIVE.		None	202	243	1 L	5 L	D	34, 56, 58, 69, 106, M3
				III	OXIDIZER, CORROSIVE.		152	203	242	2.5 L	30 L	B	34, 56, 58, 69, 106, M3
	Oxidizing substances, liquid, n.o.s.	5.1	UN3139	II	OXIDIZER	A2	152	202	242	1 L	5 L	B	56, 58, 69, 106, M3
	Oxidizing substances, liquid, poisonous, n.o.s.	5.1	UN3099	I	OXIDIZER, POISON.		None	201	244	Forbidden	2.5 L	D	56, 58, 95, 106, M3
				II	OXIDIZER, POISON.		None	202	243	1 L	5 L	B	56, 58, 95, 106, M3
				III	OXIDIZER, KEEP AWAY FROM FOOD.		152	203	242	2.5L	30L	B	56, 58, 95, 106, M3
	Oxidizing substance, solid, self heating, n.o.s.	5.1	UN3100		OXIDIZER, SPONTANEOUSLY COMBUSTIBLE.		None	214	214	Forbidden	Forbidden		
	Oxidizing substances, solid, corrosive, n.o.s.	5.1	UN3085	I	OXIDIZER, CORROSIVE.		None	211	242	1 kg	15 kg	D	13, 34, 56, 58, 69, 106, M3
				II	OXIDIZER, CORROSIVE.	B10	None	212	240	5 kg	25 kg	B	13, 34, 56, 58, 69, 106, M3
				III	OXIDIZER, CORROSIVE.	B10	152	213	240	25 kg	100 kg	B	13, 34, 56, 58, 69, 106, M3
	Oxidizing substances, solid, flammable, n.o.s.	5.1	UN3137		OXIDIZER, FLAMMABLE SOLID.		None	214	214	Forbidden	Forbidden		
	Oxidizing substances, solid, n.o.s.	5.1	UN1479	I	OXIDIZER		152	211	240	1 kg	15 kg	B	56, 58, 69, 106, M3
				II	OXIDIZER		152	212	240	5 kg	25 kg	D	56, 58, 69, 106, M3
				III	OXIDIZER		152	213	240	25 kg	100 kg	B	56, 58, 69, 106, M3

	Oxidizing substances, solid poisonous, n.o.s.	5.1	UN3087	I	OXIDIZER, POISON.		None	211	242	1 kg	15 kg	D	56, 58, 69, 95, 106, M3
				II	OXIDIZER, POISON.	B10	None	212	240	5 kg	25 kg	B	56, 58, 69, 95, 106, M3
				III	OXIDIZER, KEEP AWAY FROM FOOD.	B10	152	213	240	25 kg	100 kg	B	56, 58, 69, 95, 106, M3
	Oxidizing substances, solid, which in contact with water emit flammable gases, n.o.s.,	5.1	UN3121		OXIDIZER, DANGEROUS WHEN WET.		None	214	214	Forbidden	Forbidden		
	Oxygen and carbon dioxide mixtures, see Carbon dioxide and oxygen mixtures.												
	Oxygen, compressed	2.2	UN1072		NONFLAMMABLE GAS, OXIDIZER.		306	302	314, 315	75 kg	150 kg	A	
	Oxygen difluoride	2.3	UN2190		POISON GAS, OXIDIZER.	1, B9, B14, B30, B72.	None	304	245	Forbidden	Forbidden	D	13, 40
	Oxygen, mixtures with rare gases, see Rare gases and oxygen mixtures.												
	Oxygen, refrigerated liquid (*cryogenic liquid*)	2.2	UN1073		NONFLAMMABLE GAS, OXIDIZER.		320	316	318	Forbidden	Forbidden	D	
	Paint driers, see Driers, paint or varnish, *etc.*												
	Paint (including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler, and liquid lacquer base) *or* Paint related material (including paint thinning or reducing compound).	3	UN1263	II	FLAMMABLE LIQUID.	B52, T7, T30	150	173	242	5 L	60 L	E, B	M4
				III	FLAMMABLE LIQUID.	B52, T7, T30	150	173	241	60 L	220 L	E,B,A	M4
	Paint *or* Paint related material	8	UN3066	II	CORROSIVE	B2, N71, T7	154	202	242	1 L	30 L	A	
				III	CORROSIVE	B52, N71, T7	154	203	241	5 L	60 L	A	
	Paper, unsaturated oil treated *incompletely dried (including carbon paper).*	4.2	UN1379	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	Forbidden	Forbidden	A	
	Paraformaldehyde	4.1	UN2213	III	NONE	A1	151	213	240	25 kg	100 kg	A	
	Paraldehyde	3	UN1264	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Paranitroaniline, solid, see Nitroanilines *etc.*												
D	Parathion	6.1	NA2783	I	POISON		None	201	243	Forbidden	1 L	A	40, M1
				II	POISON		None	202	243	Forbidden	5 L	A	40, M1
D	Parathion and compressed gas mixture	2.3	NA1967		POISON GAS	3, B13, B14, B33, B75.	None	334	244	Forbidden	Forbidden	E	40, M3
	Paris green, solid, see Copper acetoarsenite												
D	PCB, *see* Polychlorinated biphenyls												
	Pelargonyl peroxide, *see* Di-n-nonanoyl peroxide, *technically pure.*												
+	Pentaborane	4.2	UN1380	I	SPONTANEOUSLY COMBUSTIBLE, POISON.	1, B9, B14, B30, B72, T38, T43, T44.	None	205	246	Forbidden	Forbidden	D	
	Pentachloroethane	6.1	UN1669	II	POISON		None	202	243	5 L	60 L	A	40, M2
	Pentaerythrite tetranitrate (dry)	Forbidden											
D	Pentaerythrite tetranitrate (Pentaerythritol tetranitrate; PETN) wetted *with not less than 25 per cent water, by mass, or* Pentaerythrite tetranitrate (Pentaerythritol tetranitrate ; PETN) desensitized *with not less than 15 per cent phlegmatizer by mass.*	1.1A	NA0150	II	EXPLOSIVE 1.1A.	111, 117		62	None	Forbidden	Forbidden	B	1E, 5E
	Pentaerythrite tetranitrate; Pentaerythritol tetranitrate (PETN) *with not less than 7 per cent wax by mass.*	1.1D	UN0411	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Pentaerythritol tetranitrate, *see* Pentaerythrite tetranitrate, *etc.*												
	Pentamethylheptane	3	UN2286	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Pentan-2,4-Dione	3	UN2310	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	n-Pentanes *or* isopentane	3	UN1265	I	FLAMMABLE LIQUID.	T20	150	201	243	1 L	30 L	E	
	Pentanitroaniline (dry)	Forbidden											
	1-Pentol	8	UN2705	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	B	38
	Pentolite, *dry or wetted with less than 15 per cent water, by mass.*	1.1D	UN0151	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Perchlorates, inorganic, n.o.s.	5.1	UN1481	II	OXIDIZER		152	212	240	5 kg	25 kg	A	46, 56
	Perchloric acid, more than 72 per cent acid by mass	Forbidden											
	Perchloric acid *more than 50 per cent but not more than 72 per cent acid, by mass.*	5.1	UN1873	I	OXIDIZER, CORROSIVE.	A2, A3, N41, T9, T27.	None	201	243	Forbidden	2.5 L	D	66
	Perchloric acid *not more than 50 per cent acid by mass*	8	UN1802	II	CORROSIVE, OXIDIZER.	N41, T9	None	202	243	Forbidden	30 L	C	66, 89
	Perchloroethylene, see Tetrachloroethylene												
	Perchloromethylmercaptan	6.1	UN1670	I	POISON	2, A3, A7, B9, B14, B25, B32, B74, N34, T38, T43, T45.	None	227	244	Forbidden	30 L	D	40, M2
	Perchloryl fluoride	2.3	UN3083		POISON GAS, OXIDIZER.	3, B12, B13, B14, B33, B75.	None	302	244	Forbidden	Forbidden	D	40, 43, 95
	Percussion caps, see Primers, cap type												
	Perfluoromethylvinyl ether	2.1	UN3153		FLAMMABLE GAS.	B13	306	302, 304, 305	244	Forbidden	150 kg	E	40
	Perfluoro-2-butene, see Octafluorobut-2-ene												
	Perfluoroethylvinyl ether	2.1	UN3154		FLAMMABLE GAS.	B13	306	302, 304, 305	244	Forbidden	150 kg	E	40
	Perfumery products *with flammable solvents*	3	UN1266	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	15 L	60 L	B	M3
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	B, A	M3
	Permanganates, inorganic, n.o.s. (*except ammonium permanganate, the transport of which should be prohibited except with special authorization granted by the competent authorities*).	5.1	UN1482	II	OXIDIZER	A30	152	212	240	5 kg	25 kg	D	56, 58, 69, 106, 107, M3
	Peroxides, inoganic, n.o.s.	5.1	UN1483	II	OXIDIZER	A7, A20, N34	None	212	240	5 kg	25 kg	A	13, 75, 106, M3
	Peroxyacetic acid, more than 43 per cent and with more than 6 per cent hydrogen peroxide.	Forbidden											
	Pesticides, liquid, flammable, toxic, n.o.s. (flashpoint less than 23 degrees C).	3	UN3021	I	FLAMMABLE LIQUID, POISON.	B5	None	201	243	Forbidden	30 L	B	M3
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	M3
	Pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN2903	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3

			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T14	153	203	242	60 L	220 L	A	40, M3
Pesticides, liquid, toxic, n.o.s.	6.1	UN2902	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
			III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
Pesticides, solid, toxic, n.o.s.	6.1	UN2588	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
			II	POISON		None	212	242	25 kg	100 kg	A	40, M3
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
PETN, *see* Pentaerythrite tetranitrate												
PETN/TNT, *see* Pentolite, *etc.*												
Petroleum crude oil	3	UN1267	I	FLAMMABLE LIQUID.	T8, T31	None	201	243	1 L	30 L	E, B	
			II	FLAMMABLE LIQUID.	T6, T31	150	202	242	5 L	60 L	E, B	
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
Petroleum distillates, n.o.s.	3	UN1268	I	FLAMMABLE LIQUID.	T42	150	201	243	1 L	30 L	E, B	M3
			II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	E, B	M3
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	M3
Petroleum ether, see Petroleum spirit												
Petroleum gases, liquefied *see also* Liquefied petroleum gas	2.1	UN1075		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, M3
Petroleum naphtha, see Naphtha, *petroleum*												
Petroleum oil	3	UN1270	I	FLAMMABLE LIQUID.	T8, T31	None	201	243	1 L	30 L	E, B	
			II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	E, B	
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A, B	
Petroleum spirit	3	UN1271	I	FLAMMABLE LIQUID.	T8	150	201	243	1 L	30 L	E, B	
			II	FLAMMABLE LIQUID.	B1, T8	150	202	242	5 L	60 L	E, B	
Petrol, *see* Gasoline												
Phenacyl bromide	6.1	UN2645	II	POISON		None	212	242	25 kg	100 kg	B	40, 48
Phenetidines	6.1	UN2311	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	
Phenol, molten	6.1	UN2312	II	POISON	B14, T8, T38	None	202	243	Forbidden	Forbidden	B	40
+ Phenol, solid	6.1	UN1671	II	POISON	N78, T14	None	212	240	25 kg	100 kg	A	
Phenol solutions	6.1	UN2821	II	POISON	T14	None	202	243	5 L	60 L	A	
Phenolsulfonic acid, liquid	8	UN1803	II	CORROSIVE	B2, N41, T8	154	202	242	1 L	30 L	C	14
Phenoxy pesticides, liquid, flammable, toxic n.o.s., *flash point less than 23 degrees C.*	3	UN2766	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	M3
			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	M3
Phenoxy pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN2999	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T14	153	203	242	60 L	220 L	A	40, M3
Phenoxy pesticides, liquid, toxic, n.o.s.	6.1	UN3000	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
	Phenoxy pesticides, solid, toxic, n.o.s.	6.1	UN2765	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Phenylacetonitrile, liquid	6.1	UN2470	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	26
	Phenylacetyl chloride	8	UN2577	II	CORROSIVE	B2, T8, T26	154	202	242	1 L	30 L	C	40
	Phenylcarbylamine chloride	6.1	UN1672	I	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	40
	Phenylchloroformate	6.1	UN2746	II	POISON, CORROSIVE.	T12	None	202	243	1 L	30 L	A	12, 13, 25, 40, 48
	m-Phenylene diaminediperchlorate (dry)	Forbidden											
	Phenylenediamines (*o-; m-; p-;*)	6.1	UN1673	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	108
	Phenylhydrazine	6.1	UN2572	II	POISON		None	202	243	5 L	60 L	A	40
	Phenyl isocyanate	6.1	UN2487	I	POISON	2, A3, B9, B14, B32, B74, B77, N33, N34, T38, T43, T45.	None	227	244	5 L	60 L	D	40
	Phenyl mercaptan	6.1	UN2337	I	POISON, FLAMMABLE LIQUID.	2, B9, B14, B32, B74, B77, T38, T43, T45.	None	227	244	5 L	60 L	B	26, 40
	Phenylmercuric acetate	6.1	UN1674	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Phenylmercuric compounds, n.o.s.	6.1	UN2026	I	POISON		None	211	242	5 kg	50 kg	A	M1
				II	POISON		None	212	242	25 kg	100 kg	A	M1
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M1
	Phenylmercuric hydroxide	6.1	UN1894	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Phenylmercuric nitrate	6.1	UN1895	II	POISON		None	212	242	25 kg	100 kg	A	M1
	Phenyl phosphorus dichloride	8	UN2798	II	CORROSIVE	B2, B15, T8, T26.	154	202	242	Forbidden	30 L	B	40
	Phenyl phosphorus thiodichloride	8	UN2799	II	CORROSIVE	B2, B15, T8, T26.	154	202	242	Forbidden	30 L	B	40
	Phenyltrichlorosilane	8	*UN1804*	II	*CORROSIVE*	A7, B6, N34, T8.	*None*	202	242	*Forbidden*	30L	C	40
	Phenyl urea pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2768	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	
	Phenyl urea pesticides, liquid, toxic, flammable, n.o.s., *flash point not less than 23 degrees C*	6.1	UN3001	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, T14	153	203	242	60 L	220 L	A	40, M3
	Phenyl urea pesticides, liquid, toxic, n.o.s.	6.1	UN3002	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON	T14	None	202	243	5 L	60 L	B	40, M3

			III	KEEP AWAY FROM FOOD	T14	153	203	241	60 L	220 L	A	40, M3
Phenyl urea pesticides, solid, toxic, n.o.s.	6.1	UN2767	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
			II	POISON		None	212	242	25 kg	100 kg	A	40, M3
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
Phosgene	2.3	UN1076		POISON GAS, CORROSIVE.	1, B7, B9, B14, B30, B46, B60 B72	None	192	245	Forbidden	Forbidden	D	40
9-Phosphabicyclononanes (cyclooctadiene phosphines)	4.2	UN2940	II	SPONTANEOUSLY COMBUSTIBLE.	A19	None	212	241	15 kg	50 kg	A	
Phosphine	2.3	UN2199		POISON GAS, FLAMMABLE GAS.	1, B7, B9, B14, B30, B72.	None	192	245	Forbidden	Forbidden	D	40
Phosphoric acid	8	UN1805	III	CORROSIVE	A7, N34, T7	154	203	241	5 L	60 L	A	
Phosphoric acid triethyleneimine, see Tri-(1-aziridyl) phosphine oxide, solution.												
Phosphoric anhydride see Phosphorus pentoxide												
Phosphorous acid, ortho	8	UN2834	III	CORROSIVE	T7	154	213	240	25 kg	100 kg	A	48
Phosphorus, amorphous	4.1	UN1338	III	FLAMMABLE SOLID.	A1, A19, B12, B26.	None	213	243	25 kg	100 kg	A	74
Phosphorus bromide, see Phosphorus tribromide												
Phosphorus chloride, see Phosphorus trichloride												
Phosphorus heptasulfide, *free from yellow or white phosphorus.*	4.1	UN1339	II	FLAMMABLE SOLID.	A20, N34	None	212	240	15 kg	50 kg	B	74
Phosphorus oxybromide	8	UN1939	II	CORROSIVE	B8, N41, N43	None	212	240	Forbidden	50 kg	C	12, 40, 48
Phosphorus oxybromide, molten	8	UN2576	II	CORROSIVE	B2, B8, N41, N43, T8, T27, T38.	None	202	242	Forbidden	Forbidden	C	40
Phosphorus oxychloride	8	UN1810	II	CORROSIVE, POISON.	2, A7, B9, B9, B14, B32, B74, B77, N34, T38 T43, T45.	None	227	244	Forbidden	30 L	C	8, 40
Phosphorus pentabromide	8	UN2691	II	CORROSIVE	A7, N34	154	202	240	Forbidden	50 kg	B	12, 40, 48
Phosphorus pentachloride	8	UN1806	II	CORROSIVE	A7, N34	None	202	240	Forbidden	50 kg	C	40
Phosphorus pentafluoride	2.3	UN2198		POISON GAS	1, B9, B13, B14, B33, B72.	None	302	245	Forbidden	Forbidden	D	40
Phosphorus pentasulfide, *free from yellow or white phosphorus.*	4.3	UN1340	II	DANGEROUS WHEN WET.	A20, B59, N34	None	212	241	15 kg	50 kg	B	74
Phosphorus pentoxide	8	UN1807	II	CORROSIVE	A7, N34	154	212	240	15 kg	50 kg	A	10
Phosphorus sesquisulfide, *free from yellow or white phosphorus.*	4.1	UN1341	II	FLAMMABLE SOLID.	A20, N34	None	212	240	15 kg	50 kg	B	74
Phosphorus tribromide	8	UN1808	II	CORROSIVE	A3, A6, A7, B2, B25, N34, N43, T6.	None	202	242	Forbidden	30 L	C	8, 40
Phosphorus trichloride	8	UN1809	II	CORROSIVE, POISON	2, A3, A7, B8, B9, B14, B32, B74, B77, N34, T38, T43, T45.	None	227	244	Forbidden	30L	C	8, 40
Phosphorus trioxide	8	UN2578	III	CORROSIVE		154	213	241	25 kg	100 kg	A	12, 48
Phosphorus trisulfide, *free from yellow or white phosphorus*	4.1	UN1343	II	FLAMMABLE SOLID.	A20, N34	None	212	240	15 kg	50 kg	B	74
Phosphorus white, molten	4.2	UN2447	I	SPONTANEOUSLY COMBUSTIBLE, POISON.	A3, A19, B12 B26, N34, T15, T26, T29.	None	188	243	Forbidden	Forbidden	D	M1
Phosphorus (white or red) and a chlorate, mixtures of	Forbidden											
Phosphorus, white or yellow dry or under water or in solution	4.2	UN1381	I	SPONTANEOUSLY COMBUSTIBLE, POISON	A3, A19, B12, B26, N34, T15, T26 T33	None	188	243	Forbidden	Forbidden	E	M1
Phosphoryl chloride see Phosphorus oxychloride												

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Phthalic anhydride *with more than .05 per cent maleic anhydride.*	8	UN2214	III	CORROSIVE	T7, T38	154	213	240	25 kg	100 kg	A	
	Phthalimide derivative pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2774	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	M3
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	M3
	Phthalimide derivative pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3007	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T14	153	203	242	60 L	220 L	A	40, M3
	Phthalimide derivative pesticides, liquid, toxic, n.o.s.	6.1	UN3006	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
	Phthalimide derivative pesticides, solid, toxic, n.o.s.	6.1	UN2773	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Picolines	3	UN2313	III	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	A	40, M2
	Picric acid, *see* Trinitrophenol, *etc.*												
D	Picric acid, wet, with not less than 10% water	4.1	NA1344	I	FLAMMABLE SOLID.	A19, A20, N41	None	211	None	Forbidden	Forbidden	D	
	Picrite, *see* Nitroguanidine, *etc.*												
	Picryl chloride, *see* Trinitrochlorobenzene												
	Pinane hydroperoxide, *see* Pinanyl hydroperoxide, *technically pure.*												
	alpha-Pinene	3	UN2368	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Pine oil	3	UN1272	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Piperazine	8	UN2579	III	CORROSIVE	T7	154	213	240	25 kg	100 kg	A	12, 48
	Piperidine	3	UN2401	II	FLAMMABLE LIQUID.	T2	150	202	242	5 L	60 L	B	
	Pivaloyl chloride, see Trimethyl acetyl chloride												
	Plastic moulding material *in dough, sheet or extruded rope form.*	9		III	CLASS 9		155	213	None	100 kg	200 kg	A	
	Plastics, nitrocellulose based, spontaneously combustible, n.o.s.	4.2	UN2006	III	SPONTANEOUSLY COMBUSTIBLE.		None	213	None	Forbidden	Forbidden	C	M3
	Plastic solvent, n.o.s., see Flammable liquids, n.o.s.												
	Poisonous gases, n.o.s., see Compressed *or* liquefied gases, flammable *or* toxic, n.o.s.												
	Poisonous liquids, corrosive, n.o.s.	6.1	UN2927	I	POISON, CORROSIVE.	B38, T42	None	201	243	0.5 L	2.5 L	B	40, M3
				II	POISON, CORROSIVE.		None	202	243	1 L	30 L	B	40, M3

Poisonous liquids, corrosive, n.o.s., *inhalation hazard, Packing Group I, Zone A.*	6.1	UN2927	I	POISON. CORROSIVE	1, B9, B14, B30, B72, T38, T43, T44.	None	226	245	Forbidden	Forbidden	D	20, 40, 95
Poisonous liquids, corrosive, n.o.s., *inhalation hazard, Packing Group I, Zone B.*	6.1	UN2927	I	POISON. CORROSIVE.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	20, 40, 95
Poisonous liquids, flammable, n.o.s.	6.1	UN2929	I	POISON, FLAMMABLE LIQUID.	B38, B40, T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON FLAMMABLE LIQUID.	T15	None	202	243	5 L	60 L	B	40, M3
Poisonous liquids, flammable, n.o.s., *inhalation hazard, Packing Group I, Zone A.*	6.1	UN2929	I	POISON. FLAMMABLE LIQUID.	1, B9, B14, B30, B72, T38, T43, T44.	None	226	245	Forbidden	Forbidden	D	20, 40, 95
Poisonous liquids, flammable, n.o.s., *inhalation hazard, Packing Group I, Zone B.*	6.1	UN2929	I	POISON FLAMMABLE LIQUID.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	20, 40, 95
Poisonous liquids, n.o.s.	6.1	UN2810	I	POISON	B38, B40, T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
			III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	40, M3
Poisonous liquids, n.o.s. *inhalation hazard, Packing Group I, Zone A.*	6.1	UN2810	I	POISON	1, B9, B14, B30, B72, T38, T43, T44.	None	226	245	Forbidden	Forbidden	D	20, 40, 95
Poisonous liquids, n.o.s. *inhalation hazard, Packing Group I, Zone B.*	6.1	UN2810	I	POISON	2, B9, B14, B32, B74, T38, T43, T45.	None	227	244	Forbidden	Forbidden	D	20, 40, 95
Poisonous liquids, oxidizing, n.o.s.	6.1	UN3122	I	POISON. OXIDIZER.	A4	None	201	243	Forbidden	2.5 L	C	89, M3
			II	POISON, OXIDIZER		None	202	243	1 L	5 L	C	89, M3
Poisonous liquids, oxidizing, n.o.s.	6.1	UN3122	I	POISON, OXIDIZER.	2, B9, B14, B32, T38, T43, T45.	None	227	244	Forbidden	Forbidden	C	89, M3
Poisonous liquids which in contact with water emit flammable gases, n.o.s.	6.1	UN3123	I	POISON. DANGEROUS WHEN WET.	A4	None	201	243	Forbidden	1 L	E	M2
			II	POISON. DANGEROUS WHEN WET.		None	202	243	1 L	5 L	E	M2
Poisonous solids, corrosive, n.o.s.	6.1	UN2928	I	POISON CORROSIVE		None	211	242	1 kg	25 kg	B	40, M3
			II	POISON. CORROSIVE		None	212	242	15 kg	50 kg	B	40, M3
Poisonous solids flammable, n.o.s.	6.1	UN2930	I	POISON. FLAMMABLE SOLID		None	211	242	1 kg	15 kg	B	M3
			II	POISON. FLAMMABLE SOLID.		None	212	242	15 kg	50 kg	B	M3
Poisonous solids, n.o.s.	6.1	UN2811	I	POISON		None	211	242	5 kg	50 kg	B	M3
			II	POISON		None	212	242	25 kg	100 kg	B	M3
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M3
Poisonous solids, oxidizing, n.o.s.	6.1	UN3086	I	POISON, OXIDIZER.		None	211	242	1 kg	15 kg	C	89, M3
			II	POISON. OXIDIZER.		None	212	242	15 kg	50 kg	C	89, M3
Poisonous solids, self heating, n.o.s.	6.1	UN3124	I	POISON. SPONTANEOUSLY COMBUSTIBLE.	A5	None	211	241	5 kg	15 kg	C	M2

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***) Exceptions	Non-bulk packaging	Bulk packaging	(9) Quantity limitations Passenger aircraft or rail car	Cargo aircraft only	(10) Vessel stowage requirements Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				II	POISON, SPONTANEOUSLY COMBUSTIBLE.		None	212	242	15 kg	50 kg	C	M2
	Poisonous, solids, which in contact with water emit flammable gases, n.o.s.	6.1	UN3125	I	POISON, DANGEROUS WHEN WET.	A5	None	211	241	5 kg	15 kg	E	M2
				II	POISON, DANGEROUS WHEN WET.		None	212	242	15 kg	50 kg	E	M2
	Poisonous liquids, oxidizing, n.o.s. *Inhalation hazard, packing group I, Zone A.*	6.1	UN3122	I	POISON, OXIDIZER.	1, B9, B14, B30, B72, T38, T43, T44.	None	226	244	Forbidden	2.5 L	C	B9, M3
	Polyalkylamines, n.o.s., *see* Alkylamines, *etc.*												
AW	Polychlorinated biphenyls	9	UN2315	II	CLASS 9	9	155	202	240	100 L	220 L	A	34, M1
D	Polyester resin kits	5.2	NA2255	II	ORGANIC PEROXIDE.		None	225	246	5 kg	5 kg	D	
	Polyhalogenated biphenyls, liquid *or* Polyhalogenated terphenyls liquid.	9	UN3151	II	CLASS 9	A37	155	204	241	100 L	220 L	A	34, M1
	Polyhalogenated biphenyls, solid *or* Polyhalogentated terphenyls, solid.	9	UN3152	II	CLASS 9	A37	155	204	241	100 kg	200 kg	A	34, M1
	Polystyrene beads, expandable, *evolving flammable vapor*	9	UN2211	III	None		221	221	240	100 kg	200 kg	A	85, 87
	Potassium	4.3	UN2257	II	DANGEROUS WHEN WET.	A19, A20, B27, N6, N34, T15, T26.	None	212	244	Forbidden	50 kg	D	
	Potassium arsenate	6.1	UN1677	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Potassium arsenite	6.1	UN1678	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Potassium bifluoride, *solid*	8	UN1811	II	CORROSIVE, POISON.	N3, N34, T8	154	212	242	15 kg	50 kg	A	25, 26, 40, 95
	Potassium bifluoride, *solution*	8	UN1811	II	CORROSIVE, POISON.	N3, N34, T8	154	202	242	1 L	30 L	A	26, 40, 95
	Potassium bifluoride solution, see Corrosive liquid, n.o.s.												
	Potassium bisulfite solution, *see* Bisulfites, inoganic, aqueous solutions, n.o.s.												
	Potassium borohydride	4.3	UN1870	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E	
	Potassium bromate	5.1	UN1484	II	OXIDIZER		152	212	240	5 kg	25 kg	A	56, 58, 106
	Potassium carbonyl	Forbidden											
	Potassium chlorate	5.1	UN1485	II	OXIDIZER	A9, N34	152	212	240	5 kg	25 kg	A	56, 58, 106
	Potassium chlorate mixed with mineral oil, see Explosive, blasting, type C.												
	Potassium chlorate, solution	5.1	UN2427	II	OXIDIZER	A2, T6	152	202	241	1 L	5 L	B	56, 58, 106
	Potassium cuprocyanide	6.1	UN1679	II	POISON		None	212	242	25 kg	100 kg	A	26, M1
	Potassium cyanide	6.1	UN1680	I	POISON	B69, B77, N74, N75, T8, T26.	None	211	242	5 kg	50 kg	B	52, M2
	Potassium dichloro isocyanurate or Potassium dichloro-s-triazinetrione, see Dichloroisocyanuric acid, dry or Dichloroisocyanuric acid salts *etc.*												
	Potassium dithionite *or* potassium hydrosulfite	4.2	UN1929	II	SPONTANEOUSLY COMBUSTIBLE.	A8, A19, A20	None	212	241	15 kg	50 kg	E	13
	Potassium fluoride	6.1	UN1812	III	KEEP AWAY FROM FOOD.	T8	153	213	240	100 kg	200 kg	A	26
	Potassium fluoroacetate	6.1	UN2628	I	POISON		None	211	242	5 kg	50 kg	E	

Potassium fluorosilicate	6.1	UN2655	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	26, M4
Potassium hydrate, see Potassium hydroxide, solid												
Potassium hydrogen fluoride. see Potassium bifluoride												
Potassium hydrogen fluoride solution. see Corrosive liquid, n.o.s.												
Potassium hydrogen sulfate	8	UN2509	II	CORROSIVE	A7, N34	154	212	240	15 kg	50 kg	A	
Potassium hydrosulfite, *see* Potassium dithionite												
Potassium hydroxide, liquid, see Potassium hydroxide solution												
Potassium hydroxide, solid	8	UN1813	II	CORROSIVE		154	212	240	15 kg	50 kg	A	
Potassium hydroxide, solution	8	UN1814	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A	
Potassium hypochlorite, solution, see Hypochlorite solutions, *etc.*,												
Potassium, metal alloys	4.3	UN1420	I	DANGEROUS WHEN WET.	A19, A20, B27	None	212	244	Forbidden	50 kg	D	
Potassium metal, liquid alloy, see Alkali metal alloys, liquid												
Potassium metavanadate	6.1	UN2864	II	POISON		None	212	242	25 kg	100 kg	A	
Potassium monoxide	8	UN2033	II	CORROSIVE		154	212	240	15 kg	50 kg	A	
Potassium nitrate	5.1	UN1486	III	OXIDIZER	A1, A29	152	212	240	25 kg	100 kg	A	
Potassium nitrate and sodium nitrite mixtures	5.1	UN1487	II	OXIDIZER	B12, B78	152	212	240	5 kg	25 kg	A	56, 58
Potassium nitrite	5.1	UN1488	II	OXIDIZER		152	212	240	5 kg	25 kg	A	56, 58
Potassium perchlorate, solid *or* solution	5.1	UN1489	II	OXIDIZER	T8	152	212	240	5 kg	25 kg	A	56, 58, 106
Potassium permanganate	5.1	UN1490	II	OXIDIZER	B12	152	212	240	5 kg	25 kg	D	56, 58, 69, 106, 107
Potassium peroxide	5.1	UN1491	I	OXIDIZER	A20, N34	None	211	None	Forbidden	15 kg	B	13, 75, 106
Potassium persulfate	5.1	UN1492	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
Potassium phosphide	4.3	UN2012	I	DANGEROUS WHEN WET, POISON.	A19, N40	None	211	None	Forbidden	15 kg	E	40, 85
Potassium salts of aromatic nitro-derivatives, *explosive*	1.3C	UN0158	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
Potassium selenate, *see* Selenates *or* Selenites												
Potassium selenite, *see* Selenates *or* Selenites												
Potassium sodium alloys	4.3	UN1422	I	DANGEROUS WHEN WET.	A19, B27, N34, N40, T15, T26.	None	211	244	Forbidden	15 kg	D	
Potassium sulfide, anhydrous *or* Potassium sulfide *with less than 30 per cent water of crystallization.*	4.2	UN1382	II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20, B16, N34.	None	212	241	15 kg	50 kg	A	
Potassium sulfide, hydrated *with not less than 30 per cent water of crystallization.*	8	UN1847	II	CORROSIVE		154	212	240	15 kg	50 kg	A	26
Potassium superoxide	5.1	UN2466	I	OXIDIZER	A20	None	211	None	Forbidden	15 kg	B	13, 75, 106
Powder cake, (powder paste) wetted *with not less than 17 percent alcohol by mass.*	1.1C	UN0433	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	1E, 5E
Powder cake (Powder paste) wetted *with not less than 25 per cent water, by mass.*	1.3C	UN0159	II	EXPLOSIVE 1.3C			62	None	Forbidden	Forbidden	B	1E, 5E
Powder paste, *see* Powder cake, *etc.*												
Powder, smokeless	1.1C	UN0160	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	10E, 28E
Powder, smokeless	1.3C	UN0161	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	10E, 26E
Power device, explosive, see Cartridges, power device												
Primers, cap type	1.4S	UN0044	II	None			62	None	25 kg	100 kg	A	9E
Primers, cap type	1.1B	UN0377	II	EXPLOSIVE 1.1B.			62	None	Forbidden	Forbidden	B	2E, 6E
Primers, cap type	1.4B	UN0378	II	EXPLOSIVE 1.4B.			62	None	Forbidden	75 kg	B	
Primers, small arms, see Primers, cap type												
Primers, tubular	1.3G	UN0319	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	
Primers, tubular	1.4G	UN0320	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
Primers, tubular	1.4S	UN0376	II	None			62	None	25 kg	100 kg	A	9E
Projectiles, illuminating, see Ammunition, illuminating, *etc.*												
Projectiles, *inert with tracer*	1.4S	UN0345	II	EXPLOSIVE 1.4S.		63(b)	62	None	25 kg	100 kg	A	3E, 7E, 9E

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Projectiles, *inert, with tracer*	1.3G	UN0424	II	EXPLOSIVE 1.3G.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Projectiles, *inert, with tracer*	1.4G	UN0425	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	A	3E, 7E, 24E
	Projectiles, *with burster or expelling charge*	1.2D	UN0346	II	EXPLOSIVE 1.2D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Projectiles, *with burster or expelling charge*	1.4D	UN0347	II	EXPLOSIVE 1.4D.		63(b)	62	None	Forbidden	75 kg	A	3E, 7E, 24E
	Projectiles, *with burster or expelling charge*	1.2F	UN0426	II	EXPLOSIVE 1.2F.		63(b)	62	None	Forbidden	Forbidden	E	
	Projectiles, *with burster or expelling charge*	1.4F	UN0427	II	EXPLOSIVE 1.4F.		63(b)	62	None	Forbidden	Forbidden	E	
	Projectiles, *with burster or expelling charge*	1.2G	UN0434	II	EXPLOSIVE 1.2G.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Projectiles, *with burster or expelling charge*	1.4G	UN0435	II	EXPLOSIVE 1.4G.		63(b)	62	None	Forbidden	75 kg	A	3E, 7E, 24E
	Projectiles, *with bursting charge*	1.1F	UN0167	II	EXPLOSIVE 1.1F.		63(b)	62	None	Forbidden	Forbidden	E	
	Projectiles, *with bursting charge*	1.1D	UN0168	II	EXPLOSIVE 1.1D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Projectiles, *with bursting charge*	1.2D	UN0169	II	EXPLOSIVE 1.2D.		63(b)	62	None	Forbidden	Forbidden	B	3E, 7E
	Projectiles, *with bursting charge*	1.2F	UN0324	II	EXPLOSIVE 1.2F.		63(b)	62	None	Forbidden	Forbidden	E	
	Projectiles, *with bursting charge*	1.4D	UN0344	II	EXPLOSIVE 1.4D.		63(b)	62	None	Forbidden	75 kg	A	3E, 7E, 24E
	Propadiene, inhibited	2.1	UN2200		FLAMMABLE GAS.	B13	None	304	244	Forbidden	150 kg	B	40
	Propadiene mixed with methyl acetylene, see Methyl acetylene and propadiene mixtures, stabilized.												
	Propane *see also* Petroleum gases, liquefied	2.1	UN1978		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, M3
	Propanethiols	3	UN2402	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	E	95, 102
	n-Propanol *or* propyl alcohol normal	3	UN1274	II	FLAMMABLE LIQUID.	B1, T1	150	202	242	5 L	60 L	B	
D	Propargyl alcohol	3	NA1986	II	FLAMMABLE LIQUID, POISON.		None	202	243	Forbidden	1 L	E, B	40, M3
D	Propellant explosive, liquid	1.1C	NA0474	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	1E, 5E
D	Propellant explosive, liquid	1.3C	NA0477	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
D	Propellant explosive, solid	1.1C	NA0273	II	EXPLOSIVE 1.1C.			62	None	Forbidden	Forbidden	B	
D	Propellant explosive, solid	1.3C	NA0274	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	
	Propionaldehyde	3	UN1275	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	E	
	Propionic acid	8	UN1848	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	22, 48
	Propionic anhydride	8	UN2496	III	CORROSIVE	T2	154	203	241	5 L	60 L	A	8
	Propionitrile	3	UN2404	II	FLAMMABLE LIQUID, POISON.	B14	None	201	243	Forbidden	60 L	E	40
	Propionyl chloride	8	UN1815	II	FLAMMABLE LIQUID, CORROSIVE.	T8, T26	None	202	243	1 L	5 L	B	40

Propionyl peroxide, see Dipropionyl peroxide, etc.												
n-Propyl acetate	3	UN1276	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
Propyl alcohol, *see* Propanol												
Propylamine	3	UN1277	II	FLAMMABLE LIQUID, CORROSIVE.	N34, T14	None	202	242	5 L	60 L	E	40
n-Propyl benzene	3	UN2364	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
Propyl chloride	3	UN1278	II	FLAMMABLE LIQUID.	N34, T14	None	202	242	Forbidden	60 L	E	M2
n-Propyl chloroformate	6.1	UN2740	I	POISON, FLAMMABLE LIQUID, CORROSIVE.	2, A3, A6, A7, B6, B9, B14, B32, B74, B77, N34, T38, T43, T45.	None	227	244	Forbidden	2.5 L	B	21, 40, 48, 100
Propylene *see also* Petroleum gases, liquefied	2.1	UN1077	I	FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	E	40, M3
Propylene chlorohydrin	6.1	UN2611	II	POISON	T9	None	202	243	5 L	60 L	A	12, 40, 48
1,2-Propylenediamine	8	UN2258	III	CORROSIVE	A3, A6, N34, T6.	None	202	243	1 L	30 L	A	12, 20, 40, 48
Propylene dichloride	3	UN1279	II	FLAMMABLE LIQUID.	N36, T1	150	202	242	5 L	60 L	B	
Propyleneimine, inhibited	3	UN1921	I	FLAMMABLE LIQUID.	A3, N34, T25	None	201	243	1 L	30 L	B	40
Propylene oxide	3	UN1280	I	FLAMMABLE LIQUID.	A3, N34, T20, T29.	None	201	243	1 L	30 L	E	40
Propylene tetramer	3	UN2850	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
Propyl formates	3	UN1281	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
n-Propyl isocyanate	3	UN2482	I	FLAMMABLE LIQUID, POISON.	1, A7, B9, B14, B30, B72, T18, T26, T38, T43, T44.	None	226	244	Forbidden	30 L	D	40
Propyl mercaptan, see Propanethiols												
n-Propyl nitrate	3	UN1865	II	FLAMMABLE LIQUID.	T25	150	202	None	5 L	60 L	D	
Propyltrichlorosilane	8	UN1816	II	CORROSIVE	A7, B2, B6, N34, T8, T26.	None	202	242	Forbidden	30 L	C	12, 21, 40, 48
Prussic acid, see Hydrogen cyanide												
Pyridine	3	UN1282	II	FLAMMABLE LIQUID, POISON.	T8	None	202	243	1 L	60 L	B	21, 100
Pyridine perchlorate	Forbidden											
Pyrophoric liquids, n.o.s.	4.2	UN2845	I	SPONTANEOUSLY COMBUSTIBLE.	B11	None	181	244	Forbidden	Forbidden	D	18, M3
Pyrophoric metals, n.o.s., *or* Pyrophoric alloys, n.o.s.	4.2	UN1383	I	SPONTANEOUSLY COMBUSTIBLE.	B11	None	187	242	Forbidden	Forbidden	D	M3
Pyrophoric solids, n.o.s.	4.2	UN2846	I	SPONTANEOUSLY COMBUSTIBLE.		None	187	242	Forbidden	Forbidden	D	M3
Pyrosulfuryl chloride	8	UN1817	II	CORROSIVE	B2, T9, T27	154	202	242	1 L	30 L	C	8, 40
Pyroxylin solution or solvent, see Nitrocellulose												
Pyrrolidine	3	UN1922	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	40
Quebrachitol pentanitrate	Forbidden											
Quicklime, see Calcium oxide												

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Quinoline	6.1	UN2656	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	A	12, 48
	R 12B1, see Chlorodifluorobromomethane												
	R 12, see Dichlorodifluoromethane												
	R 13B1, see Bromotrifluoromethane												
	R 13, see Chlorotrifluoromethane												
	R 14, see Tetrafluoromethane												
	R 21, see Dichlorofluoromethane												
	R 22, see Chlorodifluoromethane												
	R 114, see Dichlorotetrafluoroethane												
	R 115, see Chloropentafluoroethane												
	R 116, see Hexafluoroethane												
	R 124, see Chlorotetrafluoroethane												
	R 133a, see Chlorotrifluoroethane												
	R 152a, see Difluoroethane												
	R 500, see Dichlorodifluoromethane and difluoroethane, *etc.*												
	R 502, see Chlorodifluoromethane and chloropentafluoroethane mixture, *etc.*												
	R 503, see Chlorotrifluoromethane and trifluoromethane, *etc.*												
	Radioactive material, excepted package-articles manufactured from natural *or* depleted uranium *or* natural thorium.	7	UN2910		None		421-1, 424	421-1, 424	421-1, 424			A	
	Radioactive material, excepted package-empty packaging	7	UN2910		EMPTY		427	427	427			A	
	Radioactive material, excepted package-instruments *or* articles	7	UN2910		None		421-1, 422	421-1, 422	421-1, 422			A	
	Radioactive material, excepted package-limited quantity of material.	7	UN2910		None		421, 421-1	421, 421-1	421, 421-1			A	
	Radioactive material, fissile, n.o.s.	7	UN2918		RADIOACTIVE.		453	417	417			A	40, 95
	Radioactive material, low specific activity *LSA*, n.o.s.	7	UN2912		RADIOACTIVE.		421, 422, 424	425	425			A	
	Radioactive material, n.o.s.	7	UN2982		RADIOACTIVE.		421, 422, 424	415, 416	415, 416			A	40, 95
	Radioactive material, special form, n.o.s.	7	UN2974		RADIOACTIVE.		421, 422	415, 416	415, 416			A	
	Railway torpedo, see Signals, railway track, explosive												
	Rare gases and nitrogen mixtures	2.2	UN1981		NONFLAMMABLE GAS.		306	302	None	75 kg	150 kg	A	
	Rare gases and oxygen mixtures	2.2	UN1980		NONFLAMMABLE GAS.		306	302	None	75 kg	150 kg	A	
	Rare gases, mixtures	2.2	UN1979		NONFLAMMABLE GAS.		306	302	None	75 kg	150 kg	A	
	RC 318, see Octafluorocyclobutane												
	RDX, see Cyclotrimethylene trinitramine, etc.												
	Receptacles, small, containing gas *nonflammable, without release device not refillable.*	2.2	UN2037		NONFLAMMABLE GAS.		306	304	None	1 kg	15 kg	B	40
	Receptacles, small containing gas *poison, without release device, not refillable.*	2.3	UN2037		POISON GAS.		306	304	None	1 kg	15 kg	B	40
	Receptacles, small containing gas *without release device, not refillable.*	2.1	UN2037		FLAMMABLE GAS.		306	304	None	1 kg	15 kg	B	40
	Red phosphorus, see Phosphorus, amorphous												
	Refrigerant gases, n.o.s. (*cryogenic liquids*)	2.2	UN1078		NONFLAMMABLE GAS.	B51	306	304	314, 315	75 kg	150 kg	A	
	Refrigerant gases *poison* n.o.s. (*cryogenic liquids*)	2.3	UN1078		POISON GAS.	B51	306	304	314, 315	75kg	150kg	A	

D	Refrigerant gas, n.o.s. (*cryogenic liquids*)*or* Dispersant gas, n.o.s. (*cryogenic liquids*).	2.1	NA1954		FLAMMABLE GAS.	B51	306	304	314, 315	Forbidden	150 kg	C	40	
D	Refrigerating machine	3	NA1993	III	FLAMMABLE LIQUID.		174	174	None	10 L	10 L	A	M3	
D	Refrigerating machines, *containing flammable, non-poisonous, liquefied gas.*	2.1	NA1954		FLAMMABLE GAS.		306	306	306	Forbidden	Forbidden	C	40	
	Refrigerating machines, *containing non-flammable, non-poisonous, liquefied gas.*	2.2	UN2857		NONFLAMMABLE GAS.		306, 307	306	306, 307	Forbidden	Forbidden	A		
	Release devices, explosive	1.4S	UN0173	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	24E	
	Resin solution, *flammable*	3	UN1866	II	FLAMMABLE LIQUID.	B52, T7, T30	150	202	242	5 L	60 L	B	M4	
				III	FLAMMABLE LIQUID.	B1, B52, T1, T30.	150	203	242	60 L	220 L	B, A	M4	
	Resorcinol	6.1	UN2876	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		
	Rifle grenade, see Grenades, *hand or rifle, etc.*													
	Rifle powder, see Powder, smokeless (*UN 0160*)													
	Rivets, explosive	1.4S	UN0174	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	9E	
	Road asphalt or tar liquid, see Tars, liquid, *etc.*													
	Rocket motors	1.3C	UN0186	II	EXPLOSIVE 1.3C.	109	63(d)	62	None	Forbidden	220 kg	B	9E	
	Rocket motors	1.1C	UN0280	II	EXPLOSIVE 1.1C.	109	63(d)	62	None	Forbidden	Forbidden	B		
	Rocket motors	1.2C	UN0281	II	EXPLOSIVE 1.2C.	109	63(d)	62	None	Forbidden	Forbidden	B		
	Rocket motors, liquid fueled	1.2J	UN0395	II	EXPLOSIVE 1.2J.	109	63(d), 63(e)	62	None	Forbidden	Forbidden	E	7E, 16E, 23E	
	Rocket motors, liquid fuelled	1.3J	UN0396	II	EXPLOSIVE 1.3J.	109	63(d), 63(e)	62	None	Forbidden	Forbidden	E	7E, 16E, 23E	
	Rocket motors with hypergolic liquids *with or without an expelling charge.*	1.3L	UN0250	II	EXPLOSIVE 1.3L.	109	63(d)	62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E	
	Rocket motors with hypergolic liquids *with or without an expelling charge.*	1.2L	UN0322	II	EXPLOSIVE 1.2L.	109	63(d)	62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E	
	Rockets, line throwing	1.4G	UN0453	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	B		
	Rockets, line-throwing	1.2G	UN0238	II	EXPLOSIVE 1.2G.			62	None	Forbidden	Forbidden	B		
	Rockets, line-throwing	1.3G	UN0240	II	EXPLOSIVE 1.3G.			62	None	Forbidden	75 kg	B		
	Rockets, liquid fueled *with bursting charge*	1.2J	UN0398	II	EXPLOSIVE 1.2J.			62	None	Forbidden	Forbidden	E	7E, 16E, 23E	
	Rockets, liquid-fuelled *with bursting charge*	1.1J	UN0397	II	EXPLOSIVE 1.1J.			62	None	Forbidden	Forbidden	E	7E, 16E, 23E	
	Rockets, *with bursting charge*	1.1F	UN0180	II	EXPLOSIVE 1.1F.			62	None	Forbidden	Forbidden	E		
	Rockets, *with bursting charge*	1.1E	UN0181	II	EXPLOSIVE 1.1E.			62	None	Forbidden	Forbidden	B		
	Rockets, *with bursting charge*	1.2E	UN0182	II	EXPLOSIVE 1.2E.			62	None	Forbidden	Forbidden	B		
	Rockets, *with bursting charge*	1.2F	UN0295	II	EXPLOSIVE 1.2F.			62	None	Forbidden	Forbidden	E		
	Rockets, *with expelling charge*	1.2C	UN0436	II	EXPLOSIVE 1.2C.			62	None	Forbidden	Forbidden	B		
	Rockets, *with expelling charge*	1.3C	UN0437	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B		
	Rockets, *with expelling charge*	1.4C	UN0438	II	EXPLOSIVE 1.4C.			62	None	Forbidden	75 kg	A	24E	
	Rockets, *with inert head*	1.3C	UN0183	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B		
	Rosin oil	3	UN1286	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B		
				III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	B, A		

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Rubber solution	3	UN1287	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	M4
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	B, A	M4
	Rubidium	4.3	UN1423	I	DANGEROUS WHEN WET.	22, A7, A19. N34, N40, N45.	None	211	242	Forbidden	15 kg	D	
	Rubidium hydroxide	8	UN2678	II	CORROSIVE	T8	154	212	240	15 kg	50 kg	A	
	Rubidium hydroxide solution	8	UN2677	II	CORROSIVE	B2	154	202	242	1 L	30 L	A	
	Safety fuse, see Fuse, safety												
	Safety squibs, see Squibs, etc.												
	Samples, explosive, *other than initiating explosives*		UN0190			113		62	None	Forbidden	Forbidden	E	12E
	Sand acid, see Fluorosilicic acid												
	Seed cake, *containing vegetable oil solvent extractions and expelled seeds, containing not more than 10% of oil and when the amount of moisture is higher than 11%, not more than 20% of oil and moisture combined.*	4.2	UN1386	III	None	N7	None	213	241	Forbidden	Forbidden	A	13
I	Seed cake *with more than 1.5 percent oil and not more than 11 percent moisture.*	4.2	UN1386	III	None	N7	None	213	241	Forbidden	Forbidden	E	13
I	Seed cake *with not more than 1.5 percent oil and not more than 11 percent moisture.*	4.2	UN2217	III	None	N7	None	213	241	Forbidden	Forbidden	A	13
	Selenates *or* Selenites	6.1	UN2630	I	POISON		None	211	242	5 kg	50 kg	E	M4
	Selenic acid	8	UN1905	I	CORROSIVE	N34	None	211	240	Forbidden	25 kg	A	M2
	Selenites, *see* Selenates *or* Selenites												
	Selenium disulfide	6.1	UN2657	II	POISON		None	212	242	25 kg	100 kg	A	
	Selenium hexafluoride	2.3	UN2194		POISON GAS	1, B9, B14, B30, B72.	None	302	245	Forbidden	Forbidden	D	40
	Selenium nitride	Forbidden											
D	Selenium oxide	6.1	NA2811	I	POISON		None	211	242	5 kg	50 kg	B	M4
	Selenium oxychloride	8	UN2879	I	CORROSIVE. POISON.	A3, A6, A7, N34, T12, T27.	None	201	243	0.5 L	2.5 L	E	40, 95
	Selenium powder	6.1	UN2658	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Self heating substances, solid, corrosive, n.o.s.	4.2	UN3126	II	SPONTANEOUSLY COMBUSTIBLE, CORROSIVE.		None	212	242	15 kg	50 kg	C	M3
				III	SPONTANEOUSLY COMBUSTIBLE, CORROSIVE.		None	213	242	25 kg	100 kg	C	M3
	Self-heating substances, solid, n.o.s.	4.2	UN3088	II	SPONTANEOUSLY COMBUSTIBLE.		None	212	241	15 kg	50 kg	C	M3
				III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	25 kg	100 kg	C	M3
	Self heating substances, solid, oxidizing, n.o.s.	4.2	UN3127		SPONTANEOUSLY COMBUSTIBLE, OXIDIZER.		None	214	214	Forbidden	Forbidden		

Self heating substances, solid, poisonous, n.o.s.	4.2	UN3128	II	SPONTANEOUSLY COMBUSTIBLE, POISON.		None	212	242	15 kg	50 kg	C	M3
			III	SPONTANEOUSLY COMBUSTIBLE, KEEP AWAY FROM FOOD.		None	213	242	25 kg	100 kg	C	M3
Self-propelled vehicle, see Vehicles, self-propelled												
Self-reactive substances (*aliphatic azocompounds, aromatic sulphohydrazides, N-nitroso compounds, diazonium salts*) Sample, n.o.s.	4.1	UN3031	II	FLAMMABLE SOLID.		None	214	None	Forbidden	Forbidden	D	M3
Self-reactive substances (*aliphatic azocompounds, aromatic sulphohydrazides, N-nitroso compounds, diazonium salts*), Trial quantities, n.o.s.	4.1	UN3032	II	FLAMMABLE SOLID.		None	214	None	Forbidden	Forbidden	D	M3
Shale oil	3	UN1288	I	FLAMMABLE LIQUID.	T7	None	201	243	1 L	30 L	B	
			II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
Shaped charges, commercial, see Charges, shaped, commercial.												
Shaped charges (commercial) containing more than 8 ounces of explosives.	Forbidden											
Signal devices, hand	1.4G	UN0191	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
Signal devices, hand	1.4S	UN0373	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	92
Signals, distress, *ship*	1.1G	UN0194	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
Signals, distress, *ship*	1.3G	UN0195	II	EXPLOSIVE 1.3G.			62	None	Forbidden	75 kg	B	
Signals, highway, see Signal devices, hand; Fireworks, type D												
Signals, railway track, explosive	1.1G	UN0192	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
Signals, railway track, explosive	1.4S	UN0193	II	EXPLOSIVE 1.4S.			62	None	25 kg	100 kg	A	92
Signals, ship distress, wateractivated, see Contrivances, water-activated, *etc.*.												
Signals, smoke	1.1G	UN0196	II	EXPLOSIVE 1.1G.			62	None	Forbidden	Forbidden	B	
Signals, smoke	1.2G	UN0313	II	EXPLOSIVE 1.2G.			62	None	Forbidden	Forbidden	B	
Signals, smoke	1.4G	UN0197	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
Signals, smoke	1.3G	UN0487	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	1E, 7E, 25E
Silane	2.1	UN2203		FLAMMABLE GAS.		None	302	None	Forbidden	Forbidden	E	40, 57, 104
Silicofluoric acid, see Fluorosilicic acid												
Silicon chloride, see Silicon tetrachloride												
Silicon powder, amorphous	4.1	UN1346	III	FLAMMABLE SOLID.	A1	None	213	240	25 kg	100 kg	A	
Silicon tetrachloride	8	UN1818	II	CORROSIVE	A3, A6, B2, B6, N41, T18, T26, T29.	154	202	242	1 L	30 L	C	6, 40
Silicon tetrafluoride	2.3	UN1859		POISON GAS, CORROSIVE.	4, B64	None	302	None	Forbidden	25 kg	D	40
Silver acetylide (dry)	Forbidden											
Silver arsenite	6.1	UN1683	II	POISON		None	212	242	25 kg	100 kg	A	M1
Silver azide (dry)	Forbidden											

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							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Silver chlorite (dry)	Forbidden											
	Silver cyanide	6.1	UN1684	II	POISON		None	212	242	25 kg	100 kg	A	26, 40, M2
	Silver fulminate (dry)	Forbidden											
	Silver nitrate	5.1	UN1493	II	OXIDIZER		152	212	240	5 kg	25 kg	A	
	Silver oxalate (dry)	Forbidden											
	Silver picrate (dry)	Forbidden											
	Silver picrate, wetted *with not less than 30 per cent water, by mass.*	4.1	UN1347	I	FLAMMABLE SOLID.		None	211	None	Forbidden	Forbidden	D	28, 36
	Sludge, acid	8	UN1906	II	CORROSIVE	A3, A7, B2, N34, T9, T27.	None	202	242	Forbidden	30 L	C	14
D	Smokeless powder for small arms (*100 pounds or less*)	4.1	NA1325	I	FLAMMABLE SOLID.		None	171	None	Forbidden	Forbidden	A	
	Soda lime *with more than 4 per cent sodium hydroxide*	8	UN1907	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Sodium	4.3	UN1428	II	DANGEROUS WHEN WET.	A7, A8, A19, A20, B9, B68, N34, T15, T29.	None	212	244	Forbidden	50 kg	D	
	Sodium aluminate, solid	8	UN2812	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Sodium aluminate, solution	8	UN1819	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A	
	Sodium aluminum hydride	4.3	UN2835	II	DANGEROUS WHEN WET.	A8, A19, A20	None	212	242	Forbidden	50 kg	E	
	Sodium ammonium vanadate	6.1	UN2863	II	POISON		None	212	242	25 kg	100 kg	A	
	Sodium arsanilate	6.1	UN2473	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	M2
	Sodium arsenate	6.1	UN1685	II	POISON		None	212	240	25 kg	100 kg	A	M2
	Sodium arsenite, aqueous solutions	6.1	UN1686	II	POISON	T15	None	202	243	5 L	60 L	A	M2
				III	KEEP AWAY FROM FOOD.	T15	153	203	241	60 L	220 L	A	M2
	Sodium arsenite, solid	6.1	UN2027	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Sodium azide	6.1	UN1687	II	POISON	B28	None	212	242	25 kg	100 kg	A	36, 52, 91
	Sodium bifluoride, see Sodium hydrogen fluoride												
	Sodium bisulfate, solid or solution, see Sodium hydrogen sulfate, solid *or* solution.												
	Sodium bisulfite, solid or solution see Sodium hydrogen sulfite, solid *or* solution.												
	Sodium borohydride	4.3	UN1426	I	DANGEROUS WHEN WET.	N40	None	211	242	Forbidden	15 kg	E	
	Sodium bromate	5.1	UN1494	II	OXIDIZER		152	212	240	5 kg	25 kg	A	56, 58, 106
	Sodium cacodylate	6.1	UN1688	II	POISON		None	212	242	25 kg	100 kg	A	26, M2
	Sodium chlorate	5.1	UN1495	II	OXIDIZER	A9, N34, T8	152	212	240	5 kg	25 kg	A	56, 58, 106
	Sodium chlorate mixed with dinitrotoluene, see Explosive blasting, type C.												
	Sodium chlorate, solution	5.1	UN2428	II	OXIDIZER	A2, B6, T8	152	202	241	1 L	5 L	B	56, 58, 106
	Sodium chlorite	5.1	UN1496	II	OXIDIZER	A9, N34, T8	None	212	240	5 kg	25 kg	A	56, 58, 106
	Sodium chlorite solution *with more than 5 per cent available chlorine.*	8	UN1908	II	CORROSIVE	A3, A6, A7, B2, N34.	154	202	242	1 L	30 L	B	26
	Sodium chloroacetate	6.1	UN2659	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	
	Sodium cuprocyanide, solid	6.1	UN2316	I	POISON		None	211	242	5 kg	50 kg	A	26, M1
	Sodium cuprocyanide, solution	6.1	UN2317	I	POISON	T8, T26	None	201	243	1 L	30 L	B	26, 40, M1
	Sodium cyanide	6.1	UN1689	I	POISON	B69, B77, N74, N75, T18. T26.	None	211	242	5 kg	50 kg	B	52, M2
	Sodium 2-diazo-1-naphthol-4-sulphonate	4.1	UN3040	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	C	61

Sodium 2-diazo-1-naphthol-5-sulphonate	4.1	UN3041	II	FLAMMABLE SOLID.		None	224	None	15 kg	50 kg	C		61
Sodium dichloroisocyanurate or Sodium dichloro-s-triazinetrione, see Dichloroisocyanuric acid *etc.*.													
Sodium dinitro-o-cresolate, *dry or wetted with less than 15 per cent water, by mass.*	1.3C	UN0234	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B		1E, 5E, M2
Sodium dinitro-ortho-cresolate, wetted *with not less than 15 per cent water, by mass.*	4.1	UN1348	I	FLAMMABLE SOLID, POISON.	A8, A19, A20, N41.	None	211	None	1 kg	15 kg	E		28, 36, M2
Sodium dithionite *or* sodium hydrosulfite	4.2	UN1384	II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20	None	212	241	15 kg	50 kg	E		13
Sodium fluoride	6.1	UN1690	III	KEEP AWAY FROM FOOD.	T8	153	213	240	100 kg	200 kg	A		26
Sodium fluoroacetate	6.1	UN2629	I	POISON		None	211	242	5 kg	50 kg	E		
Sodium fluorosilicate	6.1	UN2674	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A		26, M4
Sodium hydrate, see Sodium hydroxide													
Sodium hydride	4.3	UN1427	I	DANGEROUS WHEN WET.	A19, N40	None	211	242	Forbidden	15 kg	E		
Sodium hydrogen fluoride	8	UN2439	II	CORROSIVE	N3, N34	154	212	240	15 kg	50 kg	A		12, 25, 26, 40, 48
Sodium hydrogen fluoride, *solution*	8	UN2439	II	CORROSIVE	N3, N34	154	202	242	1 L	30 L	A		12, 25, 26, 40
Sodium hydrogen sulfate, solid	8	UN1821	III	CORROSIVE		154	213	240	25 kg	100 kg	A		
Sodium hydrogen sulfate, solution	8	UN2837	II	CORROSIVE	A7, B2, N34, T8, T26.	154	202	242	1 L	30 L	A		
D Sodium hydrosulfide, solution	8	NA2922	II	CORROSIVE, POISON.	B2	154	202	242	1 L	30 L	B		40, 85, M4
Sodium hydrosulfide, *with less than 25 per cent water of crystallization.*	4.2	UN2318	II	SPONTANEOUSLY COMBUSTIBLE.	A7, A19, A20	None	212	241	15 kg	50 kg	A		
Sodium hydrosulfide *with not less than 25 per cent water of crystallization.*	8	UN2949	II	CORROSIVE	A7	154	212	240	15 kg	50 kg	A		26
Sodium hydrosulfite, *see* Sodium dithionite													
Sodium hydroxide, solid	8	UN1823	II	CORROSIVE		154	212	240	15 kg	50 kg	A		
Sodium hydroxide solution	8	UN1824	II	CORROSIVE	B2, N34, T8	154	202	242	1 L	30 L	A		
Sodium hypochlorite, solution, see Hypochlorite solutions													
Sodium metal, liquid alloy, see Alkali metal alloys, liquid													
Sodium methylate	4.2	UN1431	II	SPONTANEOUSLY COMBUSTIBLE, CORROSIVE.	A19	None	211	242	15kg	50 kg	B		
Sodium methylate solutions *in alcohol*	3	UN1289	II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	B		
			III	FLAMMABLE LIQUID.	B1, T7, T30	150	202	242	60 L	220 L	A		
Sodium monoxide	8	UN1825	II	CORROSIVE		154	212	240	15 kg	50 kg	A		
Sodium nitrate	5.1	UN1498	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A		
Sodium nitrate and potassium nitrate mixtures	5.1	UN1499	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A		
Sodium nitrite	5.1	UN1500	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A		56, 58
Sodium pentachlorophenate	6.1	UN2567	II	POISON		None	212	242	25 kg	100 kg	A		M1
Sodium percarbonate	5.1	UN2467	III	OXIDIZER	27, A1, A29	152	213	240	25 kg	100 kg	A		13
Sodium perchlorate	5.1	UN1502	II	OXIDIZER	T8	152	212	240	5 kg	25 kg	A		56, 58, 106
Sodium permanganate	5.1	UN1503	II	OXIDIZER		152	212	240	5 kg	25 kg	D		56, 58, 69, 106, 107
Sodium peroxide	5.1	UN1504	I	OXIDIZER	A20, N34	None	211	None	Forbidden	15 kg	B		13, 75, 106
Sodium persulfate	5.1	UN1505	III	OXIDIZER	A1	152	213	240	25 kg	100 kg	A		
Sodium phenolate, solid	8	UN2497	III	CORROSIVE		154	213	240	25 kg	100 kg	A		
Sodium phosphide	4.3	UN1432	I	DANGEROUS WHEN WET, POISON.	A19, N40	None	211	None	Forbidden	15 kg	E		40, 85

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(6) Packaging authorizations (§173.***) Exceptions	(6) Packaging authorizations (§173.***) Non-bulk packaging	(6) Packaging authorizations (§173.***) Bulk packaging	(8) Quantity limitations Passenger aircraft or railcar	(8) Quantity limitations Cargo aircraft only	(10) Vessel stowage requirements Vessel stowage	(10) Vessel stowage requirements Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Sodium picramate, *dry or wetted with less than 20 per cent water, by mass.*	1.3C	UN0235	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Sodium picramate, wetted *with not less than 20 per cent water, by mass.*	4.1	UN1349	I	FLAMMABLE SOLID.	A8, A19, N41	None	211	None	Forbidden	15 kg	E	28, 36
	Sodium picryl peroxide	Forbidden											
	Sodium potassium alloys, see Potassium sodium alloys												
	Sodium salts of aromatic nitro-derivatives, n.o.s. *explosive*	1.3C	UN0203	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E
	Sodium selenate, see Selenates *or* Selenites												
D	Sodium selenite	6.1	NA2630	II	POISON		None	212	242	25 kg	100 kg	E	M4
	Sodium sulfide, anhydrous *or* Sodium sulfide *with less than 30 per cent water of crystallization.*	4.2	UN1385	II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20, N34	None	212	241	15 kg	50 kg	A	
	Sodium sulfide, hydrated *with at least 30 per cent water*	8	UN1849	II	CORROSIVE	T8	154	212	240	15 kg	50 kg	A	26
	Sodium superoxide	5.1	UN2547	I	OXIDIZER	A20, N34	None	211	None	Forbidden	15 kg	E	13, 75, 106
	Sodium tetranitride	Forbidden											
	Sounding devices, explosive	1.2F	UN0204	II	EXPLOSIVE 1.2F.			62	None	Forbidden	Forbidden	E	
	Sounding devices, explosive	1.1F	UN0296	II	EXPLOSIVE 1.1F.			62	None	Forbidden	Forbidden	E	
	Sounding devices, explosive	1.1D	UN0374	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	
	Sounding devices, explosive	1.2D	UN0375	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	
	Spirits of salt, see Hydrochloric acid												
	Stannic chloride, anhydrous	8	UN1827	II	CORROSIVE	B2, T8, T26	154	202	242	1 L	30 L	C	8
	Stannic chloride, pentahydrate	8	UN2440	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	Stannic phosphide	4.3	UN1433	I	DANGEROUS WHEN WET, POISON.	A19, N40	None	211	242	Forbidden	15 kg	E	40, 85
	Steel swarf, *see* Ferrous metal borings, *etc.*												
	Stibine	2.3	UN2676		POISON GAS, FLAMMABLE GAS.	1, B9, B14, B30, B72.	None	304	245	Forbidden	Forbidden	D	40
	Storage batteries, wet, see Batteries, *wet etc.*												
	Strontium arsenite	6.1	UN1691	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Strontium chlorate, solid *or* solution	5.1	UN1506	II	OXIDIZER	A1, A9, N34, T8.	152	212	240	5 kg	25 kg	A	56, 58, 106
	Strontium nitrate	5.1	UN1507	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	
	Strontium perchlorate	5.1	UN1508	II	OXIDIZER	T8	152	212	240	5 kg	25 kg	A	56, 58, 106
	Strontium peroxide	5.1	UN1509	II	OXIDIZER		152	212	240	5 kg	25 kg	A	13, 75, 106
	Strontium phosphide	4.3	UN2013	I	DANGEROUS WHEN WET, POISON.	A19, N40	None	211	None	Forbidden	15 kg	E	40, 85
	Strychnine *or* Strychnine salts	6.1	UN1692	I	POISON		None	211	242	5 kg	50 kg	A	40, M2
	Styphnic acid, *see* Trinitroresorcinol, *etc.*												
	Styrene monomer, inhibited	3	UN2055	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	M2
	Substances, explosive, n.o.s.	1.1L	UN0357	II	EXPLOSIVE 1.1L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E
	Substances, explosive, n.o.s.	1.2L	UN0358	II	EXPLOSIVE 1.2L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E
	Substances, explosive, n.o.s.	1.3L	UN0359	I	EXPLOSIVE 1.3L.	101		62	None	Forbidden	Forbidden	E	2E, 8E, 11E, 17E

Substances, explosive, n.o.s.	1.1A	UN0473	II	EXPLOSIVE 1.1A.	101, 111		62	None	Forbidden	Forbidden	E	2E, 6E
Substances, explosive, n.o.s.	1.1C	UN0474	II	EXPLOSIVE 1.1C.	101		62	None	Forbidden	Forbidden	B	1E, 5E
Substances, explosive, n.o.s.	1.1D	UN0475	II	EXPLOSIVE 1.1D.	101		62	None	Forbidden	Forbidden	B	1E, 5E
Substances, explosive, n.o.s.	1.1G	UN0476	II	EXPLOSIVE 1.1G.	101		62	None	Forbidden	Forbidden	B	1E, 8E
Substances, explosive, n.o.s.	1.3C	UN0477	II	EXPLOSIVE 1.3C.	101		62	None	Forbidden	Forbidden	B	1E, 5E
Substances, explosive, n.o.s.	1.3G	UN0478	II	EXPLOSIVE 1.3G.	101		62	None	Forbidden	Forbidden	E	1E, 8E
Substances, explosive, very insensitive;(substances, EVI), n.o.s.	1.5D	UN0482	II	EXPLOSIVE 1.5D.	101		62	None	Forbidden	Forbidden	B	1E, 5E
Substances which in contact with water emit flammable gases, liquid, corrosive, n.o.s.	4.3	UN3129	I	DANGEROUS WHEN WET, CORROSIVE.		None	201	243	Forbidden	1 L	E	M3
			II	DANGEROUS WHEN WET, CORROSIVE.		None	202	243	1 L	5 L	E	M3
			III	DANGEROUS WHEN WET, CORROSIVE.		None	203	242	5 L	60 L	E	M3
Substances which in contact with water emit flammable gases, liquid n.o.s.	4.3	UN3148	I	DANGEROUS WHEN WET.		None	201	244	Forbidden	1 L	E	40, M3
			II	DANGEROUS WHEN WET.		None	202	243	1 L	5 L	E	40, M3
			III	DANGEROUS WHEN WET.		None	203	243	5 L	60 L	E	40, M3
Substances which in contact with water emit flammable gases, liquid, poisonous, n.o.s.	4.3	UN3130	I	DANGEROUS WHEN WET, POISON.	A4	None	201	243	Forbidden	1 L	E	M3
			II	DANGEROUS WHEN WET, POISON.		None	202	243	1 L	5 L	E	M3
			III	DANGEROUS WHEN WET, KEEP AWAY FROM FOOD.		None	203	242	5 L	60 L	E	M3
Substances which in contact with water emit flammable gases, solid, corrosive, n.o.s.	4.3	UN3131	I	DANGEROUS WHEN WET, CORROSIVE.	N40	None	211	241	Forbidden	15 kg	E	M3
			II	DANGEROUS WHEN WET, CORROSIVE.		None	212	242	15 kg	50 kg	E	M3
			III	DANGEROUS WHEN WET, CORROSIVE.		None	213	242	25 kg	100 kg	E	M3
Substances which in contact with water emit flammable gases, solid, flammable n.o.s.	4.3	UN3132	I	DANGEROUS WHEN WET, FLAMMABLE SOLID.	N40	None	211	241	Forbidden	15 kg	E	M3
			II	DANGEROUS WHEN WET, FLAMMABLE SOLID.		None	212	242	15 kg	50 kg	E	M3
			III	DANGEROUS WHEN WET, FLAMMABLE SOLID.	A34	None	213	242	25 kg	100 kg	E	M3
Substances which in contact with water emit flammable gases, solid n.o.s.	4.3	UN2813	I	DANGEROUS WHEN WET.	N40	None	211	242	Forbidden	15kg	E	40, M3
			II	DANGEROUS WHEN WET.		None	212	242	15kg	50kg	E	40, M3
			III	DANGEROUS WHEN WET.		None	213	242	25kg	100kg	E	40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Substances which in contact with water emit flammable gases, solid, oxidizing, n.o.s..	4.3	UN3133		DANGEROUS WHEN WET, OXIDIZER.		None	214	214	Forbidden	Forbidden		
	Substances which in contact with water, emit flammable gases, solid, poisonous, n.o.s..	4.3	UN3134	I	DANGEROUS WHEN WET, POISON.	A5, N40	None	211	241	Forbidden	15kg	E	M3
				II	DANGEROUS WHEN WET, POISON.		None	212	242	15kg	50kg	E	M3
				III	DANGEROUS WHEN WET, KEEP AWAY FROM FOOD.		None	213	242	25kg	100kg	E	M3
	Substances which in contact with water emit flammable gases, solid, self-heating, n.o.s..	4.3	UN3135	I	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.	N40	None	211	241	Forbidden	15 kg	E	M3
				II	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.		None	212	242	15 kg	50 kg	E	M3
				III	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.		None	213	242	25 kg	100 kg	E	M3
	Substituted nitrophenol pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23 degrees C.*	3	UN2780	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	M3
				II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	M3
	Substituted nitrophenol pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN3013	I	POIBON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	B1, T14	153	203	242	60 L	220 L	A	40, M3
	Substituted nitrophenol pesticides, liquid, toxic, n.o.s.	6.1	UN3014	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
				II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
				III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
	Substituted nitrophenol pesticides, solid, toxic, n.o.s.	6.1	UN2779	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
				II	POISON		None	212	242	25 kg	100 kg	A	40, M3
				III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
	Succinic acid peroxide, *see* Disuccinic acid peroxide												

	Sucrose octanitrate (dry)	Forbidden												
	Sulfamic acid	8	UN2967	III	CORROSIVE		None	154	213	240	25 kg	100 kg	A	
I	Sulfur	4.1	UN1350	III	FLAMMABLE SOLID.	A1		151	213	240	25 kg	100 kg	A	19, 74
D	Sulfur	9	NA1350	III	CLASS 9	A1		151	213	240	25 kg	100 kg	A	19, 74
	Sulfur and chlorate, loose mixtures of	Forbidden												
+	Sulfur chlorides	8	UN1828	I	CORROSIVE, POISON.	2, A7, A10, B6, B9, B14, B32, B74, B77, T38, T43, T45.		None	227	244	Forbidden	2.5 L	C	8, 40
	Sulfur dichloride, see Sulfur chlorides													
	Sulfur dioxide, liquefied	2.3	UN1079		POISON GAS	2, B13, B14		None	304	314, 315	Forbidden	25 kg	D	40
	Sulfur dioxide solution, see Sulfurous acid													
	Sulfuretted hydrogen, see Hydrogen sulfide, liquefied													
	Sulfur hexafluoride	2.2	UN1080		NONFLAMMABLE GAS.	B13		306	304	314	75 kg	150 kg	A	
	Sulfuric acid	8	UN1830	II	CORROSIVE	A3, A7, B2, N34, T9, T27.		None	202	242	1 L	30 L	C	14
+	Sulfuric acid, fuming	8	UN1831	I	CORROSIVE, POISON.	2, A3, A6, A7, B9, B14, B32, B74, B77, N34, T38, T43, T45.		None	227	244	Forbidden	2.5 L	C	14, 40
	Sulfuric acid, spent	8	UN1832	II	CORROSIVE	A3, A7, B2, B83, B84, N34, T9, T27.		None	202	242	Forbidden	30 L	C	14
	Sulfuric and hydrofluoric acid mixtures, *see* Hydrofluoric and sulfuric acid mixtures.													
	Sulfuric anhydride, see Sulfur trioxide, inhibited													
I	Sulfur, molten	4.1	UN2448	III	FLAMMABLE SOLID.	T9, T38		None	213	241	Forbidden	Forbidden	C	61
D	Sulfur, molten	9	NA2448	III	CLASS 9	T9, T38		None	213	241	Forbidden	Forbidden	C	61
	Sulfurous acid	8	UN1833	II	CORROSIVE	B2, T8		154	202	242	1 L	30 L	B	40
	Sulfur tetrafluoride	2.3	UN2418		POISON GAS	1, B9, B14, B30, B72.		None	302	245	Forbidden	25 kg	D	40
+	Sulfur trioxide, inhibited	8	UN1829	I	CORROSIVE, POISON.	2, A7, B9, B12, B14, B29, B32, B74, B77, N34, T38, T43, T45.		None	227	244	Forbidden	25 kg	A	10, 40
D	Sulfur trioxide, uninhibited	6.1	NA1829	I	POISON, CORROSIVE.	2, A7, B9, B12, B14, B32, B38, B49, B74, N34, T38, T43, T45.		None	227	244	Forbidden	25 kg	A	10, 40
	Sulfuryl chloride	8	UN1834	I	CORROSIVE	A3, A6, A7, B4, B6, N34, T18, T27.		None	201	242	0.5 L	2.5 L	C	8, 40
	Sulfuryl fluoride	2.3	UN2191		POISON GAS	4, B13, B34		None	304	314, 315	Forbidden	25 kg	D	40
	Tars, liquid *including road asphalt and oils, bitumen and cut backs.*	3	UN1999	II	FLAMMABLE LIQUID.	T7, T30		150	202	242	5 L	60 L	B	M4
				III	FLAMMABLE LIQUID.	T7, T30		150	203	242	60 L	220 L	B, A	M4
	Tear gas candles	6.1	UN1700	II	POISON, FLAMMABLE SOLID.			None	340	None	Forbidden	50 kg	D	40
	Tear gas cartridges, see Ammunition, tear-producing, *etc.*													
D	Tear gas devices *with more than 2 per cent tear gas substances, by mass.*	6.1	NA1693	I	POISON			None	340	None	Forbidden	Forbidden	D	40, 95
				II	POISON			None	340	None	Forbidden	Forbidden	D	40, 95
	Tear gas devices, with not more than 2 per cent tear gas substances, by mass; see Aerosols, *etc.*													
	Tear gas grenades, see Tear gas candles													
	Tear gas substances, n.o.s., liquid *or* solid	6.1	UN1693	I	POISON			None	340	None	Forbidden	Forbidden	D	40, M3
				II	POISON			None	340	None	Forbidden	5 L	D	40, M3

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or rail car	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Tellurium hexafluoride	2.3	UN2195		POISON GAS	1, B9, B14, B30, B72.	None	302	245	Forbidden	Forbidden	D	40
	Terpene hydrocarbons, n.o.s.	3	UN2319	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	M3
	Terpinolene	3	UN2541	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	
	Tetraazido benzene quinone	Forbidden											
	Tetrabromoethane	6.1	UN2504	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M2
	Tetrachloroethane	6.1	UN1702	II	POISON	N36, T11	None	202	243	5 L	60 L	A	40, M2
	Tetrachloroethylene	6.1	UN1897	III	KEEP AWAY FROM FOOD.	N36	153	203	241	60 L	220 L	A	40, M2
	Tetraethylammonium perchlorate (dry)	Forbidden											
	Tetraethyl dithiopyrophosphate	6.1	UN1704	II	POISON	49	None	212	242	25 kg	100 kg	D	40, M2
	Tetraethyl dithiopyrophosphate and gases in solution *or* Tetraethyl dithiopyrophosphate and gases mixtures *LC50 less than or equal to 200 ppm.*	2.3	UN1703		POISON GAS	1, B13, B14, B33, B75.	None	334	245	Forbidden	Forbidden	D	40, 85, 95
	Tetraethyl dithiopyrophosphate and gases in solution *or* tetraethyl dithiopyrophphate and gas mixtures *LC50 over 200 but not greater than 5000 ppm.*	2.3	UN1703		POISON GAS	6, B13, B14, B35.	None	334	244	Forbidden	Forbidden	D	40
	Tetraethylenepentamine	8	UN2320	III	CORROSIVE	T2	154	203	241	5 L	60 L	A	8
D	Tetraethyl lead, liquid	6.1	NA1649	I	POISON, FLAMMABLE LIQUID.		None	201	None	Forbidden	Forbidden	E	40, M2
	Tetraethyl pyrophosphate and compressed gas mixtures *LC50 less than or equal to 200 ppm.*	2.3	UN1705		POISON GAS	1, B13, B14, B33, B75.	None	334	245	Forbidden	Forbidden	D	40, 85, 95
	Tetraethyl pyrophosphate and compressed gas mixtures) *LC50 over 200 ppm but not greater than 5000 ppm.*	2.3	UN1705		POISON GAS	6, B13, B14. B35.	None	334	244	Forbidden	Forbidden	D	40
D	Tetraethyl pyrophosphate, (*liquid*)	6.1	NA3018	I	POISON		None	201	243	Forbidden	1 L	A	40, M4
D	Tetraethyl pyrophosphate (*solid*)	6.1	NA2783	I	POISON	N77	None	211	242	Forbidden	50 kg	A	40, M4
	Tetraethyl silicate	3	UN1292	III	FLAMMABLE LIQUID.	T1	150	203	241	60 L	220 L	A	
	Tetrafluoroethylene, inhibited	2.1	UN1081		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	E	40
	Tetrafluoromethane	2.2	UN1982		NONFLAMMABLE GAS.		None	302	None	75 kg	150 kg	A	
	1,2,3,6-Tetrahydrobenzaldehyde	3	UN2498	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Tetrahydrofuran	3	UN2056	II	FLAMMABLE LIQUID.	T8	None	202	242	5 L	60 L	E, B	
	Tetrahydrofurfurylamine	3	UN2943	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Tetrahydrophthalic anhydrides *with more than 0.05 percent of maleic anhydride.*	8	UN2698	III	CORROSIVE		154	213	240	25 kg	100 kg	A	
	1,2,3,6-Tetrahydropyridine	3	UN2410	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
	Tetrahydrothiophene	3	UN2412	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
	Tetralin hydroperoxide, *see* Tetrahydronaphthyl hydroperoxide												
	Tetramethylammonium hydroxide	8	UN1835	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	A	
	Tetramethylene diperoxide dicarbamide	Forbidden											
	Tetramethylsilane	3	UN2749	I	FLAMMABLE LIQUID.	T21, T26	None	201	243	Forbidden	30 L	D	

	Tetranitroaniline	1.1D	UN0207	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Tetranitro diglycerin	Forbidden											
+	Tetranitromethane	5.1	UN1510	I	OXIDIZER, POISON.	2, B9, B14, B32, B74, T38, T43, T45.	None	227	None	Forbidden	Forbidden	D	40, 66, 106
	2,3,4,6-Tetranitrophenol	Forbidden											
	2,3,4,6-Tetranitrophenyl methyl nitramine	Forbidden											
	2,3,4,6-Tetranitrophenylnitramine	Forbidden											
	Tetranitroresorcinol (dry)	Forbidden											
	2,3,5,6-Tetranitroso-1,4-dinitrobenzene	Forbidden											
	2,3,5,6-Tetranitroso nitrobenzene (dry)	Forbidden											
	Tetrapropylorthotitanate	3	UN2413	III	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	A	
	Tetrazene, *see* Guanyl nitrosaminoguanyltetrazene												
	Tetrazine (dry)	Forbidden											
	Tetrazolyl azide (dry)	Forbidden											
	Tetryl, *see* Trinitrophenylmethyl nitramine												
	Thallium chlorate	5.1	UN2573	II	OXIDIZER, POISON.		None	212	242	5 kg	25 kg	A	66, 5B, 106, M2
	Thallium compounds, n.o.s.	6.1	UN1707	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Thallium nitrate	6.1	UN2727	II	POISON, OXIDIZER.		None	212	242	5 kg	25 kg	A	69, M2
D	Thallium sulfate, solid	6.1	NA1707	II	POISON		None	211	242	5 kg	50 kg	A	M2
	Thia-4-pentanal	6.1	UN2785	III	KEEP AWAY FROM FOOD.	6	153	203	241	60 L	220 L	D	25, 49
	Thioacetic acid	3	UN2436	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Thiocarbonylchloride, see Thiophosgene												
	Thioglycol	6.1	UN2966	II	POISON	T8	None	202	243	5 L	60 L	A	
	Thioglycolic acid	8	UN1940	II	CORROSIVE	A7, B2, N34	154	202	242	1 L	30 L	A	
	Thiolactic acid	6.1	UN2936	II	POISON	T8	None	212	242	25 kg	100 kg	A	
+	Thionyl chloride	8	UN1836	I	CORROSIVE, POISON.	2, A3, A6, A10, B9, B14, B32, B74, N34, T38, T43, T45.	None	227	244	Forbidden	2.5 L	C	6, 40
	Thiophene	3	UN2414	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	40
+	Thiophosgene	6.1	UN2474	II	POISON	2, A7, B9, B14, B32, B74, N33, N34, T38, T43, T45.	None	227	244	Forbidden	60 L	B	26, 40
	Thiophosphoryl chloride	8	UN1837	II	CORROSIVE	A3, A7, B2, B8, B25, N34, T12.	None	202	242	Forbidden	30 L	C	6, 40
	Thorium metal, pyrophoric	7	UN2975		RADIOACTIVE, SPONTANEOUSLY COMBUSTIBLE.		None	416	None	Forbidden	Forbidden	A	
	Thorium nitrate, solid	7	UN2976		RADIOACTIVE, OXIDIZER.		None	419	None	Forbidden	15 kg	A	
	Tin chloride, fuming, see Stannic chloride, anhydrous												
	Tinctures, medicinal	3	UN1293	II	FLAMMABLE LIQUID.	T8, T31	150	202	242	5 L	60 L	B	M4

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	241	60 L	220 L	A	M4
	Tinning flux, see Zinc chloride												
	Tin perchloride or Tin tetrachloride, see Stannic chloride, anhydrous.												
	Titanium hydride	4.1	UN1871	II	FLAMMABLE SOLID.	A19, A20, N34	None	212	241	15 kg	50 kg	E	
	Titanium powder, dry	4.2	UN2546	I	SPONTANEOUSLY COMBUSTIBLE.		None	211	242	Forbidden	Forbidden	D	
				II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20, N5, N34.	None	212	241	15 kg	50 kg	D	
				III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	25 kg	100 kg	D	
	Titanium powder, wetted *with not less than 25 per cent water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns.*	4.1	UN1352	II	FLAMMABLE SOLID.	A19, A20, N34	None	212	240	15 kg	50 kg	E	
	Titanium sponge granules *or* Titanium sponge powders	4.1	UN2878	III	FLAMMABLE SOLID.	A1	None	213	240	25 kg	100 kg	D	
D	Titanium sulfate solution	8	NA1760	II	CORROSIVE	B2, B15	None	213	242	1 L	30 L	B	40, M4
+	Titanium tetrachloride	8	UN1838	II	CORROSIVE, POISON.	2, A3, A6, B7, B9, B14, B32, B41, B74, N41, T38, T43, T45.	None	227	244	Forbidden	30 L	C	8, 40
	Titanium trichloride mixtures	8	UN2869	II	CORROSIVE	A7, N34	154	212	240	15 kg	50 kg	A	40
	Titanium trichloride, pyrophoric *or* Titanium trichloride mixtures, pyrophoric	4.2	UN2441	I	SPONTANEOUSLY COMBUSTIBLE, CORROSIVE.	A7, A8, A19, A20, N34.	None	181	244	Forbidden	Forbidden	D	40
	TNT mixed with aluminum. see Tritonal												
	TNT. *see* Trinitrotoluene, *etc.*												
	Toe puffs, *nitrocellulose base*	4.1	UN1353	III	FLAMMABLE SOLID.	A1	None	213	240	25 kg	100 kg	D	
	Toluene	3	UN1294	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Toluene diisocyanate	6.1	UN2078	II	POISON	T14	None	202	243	5 L	60 L	B	25, 40
	Toluene sulfonic acid, *see* Alkyl, Aryl *or* Toluene sulfonic acid *etc.*.												
	Toluidines *liquid*	6.1	UN1708	II	POISON	T14	None	202	243	5 L	60 L	A	
	Toluidines *solid*	6.1	UN1708	II	POISON		None	212	241	25 kg	100 kg	A	
	2,4-Toluylenediamine	6.1	UN1709	III	KEEP AWAY FROM FOOD.	T7	153	213	240	100 kg	200 kg	A	
	Torpedoes, liquid fuelled, *with inert head*	1.3J	UN0450	II	EXPLOSIVE 1.3J.		63(b)	62	None	Forbidden	Forbidden	E	7E, 16E, 23E
	Torpedoes, liquid fuelled, *with or without bursting charge*	1.1J	UN0449	II	EXPLOSIVE 1.1J.		63(b)	62	None	Forbidden	Forbidden	E	7E, 16E, 23E
	Torpedoes *with bursting charge*	1.1E	UN0329	II	EXPLOSIVE 1.1E.		63(b)	62	None	Forbidden	Forbidden	B	
	Torpedoes *with bursting charge*	1.1F	UN0330	II	EXPLOSIVE 1.1F.		63(b)	62	None	Forbidden	Forbidden	B	

Torpedoes *with bursting charge*	1.1D	UN0451	II	EXPLOSIVE 1.1D.		63(b)	62	None	Forbidden	Forbidden	B	
Tracers for ammunition	1.3G	UN0212	II	EXPLOSIVE 1.3G.			62	None	Forbidden	Forbidden	B	
Tracers for ammunition	1.4G	UN0306	II	EXPLOSIVE 1.4G.			62	None	Forbidden	75 kg	A	24E
Tractors, see Vehicles, self propelled												
Triallylamine	3	UN2610	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A	40
Triallyl borate	6.1	UN2609	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	13
Triazine pesticides, liquid, flammable, toxic, n.o.s., *flash point less than 23deg C.*	3	UN2764	I	FLAMMABLE LIQUID, POISON.		None	201	243	Forbidden	30 L	B	
			II	FLAMMABLE LIQUID, POISON.		None	202	243	1 L	60 L	B	
Triazine pesticides, liquid, toxic, flammable, n.o.s. *flashpoint not less than 23 degrees C.*	6.1	UN2997	I	POISON, FLAMMABLE LIQUID.	T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	B	40, M3
			III	KEEP AWAY FROM FOOD, FLAMMABLE LIQUID.	T14	153	203	242	60 L	220 L	A	40, M3
Triazine pesticides, liquid, toxic, n.o.s.	6.1	UN2998	I	POISON	T42	None	201	243	1 L	30 L	B	40, M3
			II	POISON	T14	None	202	243	5 L	60 L	B	40, M3
			III	KEEP AWAY FROM FOOD.	T14	153	203	241	60 L	220 L	A	40, M3
Triazine pesticides, solid, toxic, n.o.s.	6.1	UN2763	I	POISON		None	211	242	5 kg	50 kg	A	40, M3
			II	POISON		None	212	242	25 kg	100 kg	A	40, M3
			III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	40, M3
Tributylamine	8	UN2542	III	CORROSIVE	T1	None	203	241	5 L	60 L	A	
Trichloroacetic acid	8	UN1839	II	CORROSIVE	A7, N34	154	212	240	15 kg	50 kg	A	
Trichloroacetic acid, solution	8	UN2564	II	CORROSIVE	A3, A8, A7, B2, N34, T8.	154	202	242	1 L	30 L	B	8
+ Trichloroacetyl chloride	8	UN2442	II	CORROSIVE, POISON.	1, A3, A7, B9, B14, B30, B72, N34, T38, T43, T44.	None	226	244	Forbidden	Forbidden	D	40
Trichlorobenzenes, liquid	6.1	UN2321	III	KEEP AWAY FROM FOOD.	T7	153	203	241	60 L	220 L	A	M2
Trichlorobutene	6.1	UN2322	II	POISON	T8	None	202	243	5 L	60 L	A	25, 40, 48, M2
1,1,1-Trichloroethane	6.1	UN2831	III	KEEP AWAY FROM FOOD.	N36, T7	153	203	241	60 L	220 L	A	40, M2
Trichloroethylene	6.1	UN1710	III	KEEP AWAY FROM FOOD.	N36, T1	153	203	241	60 L	220 L	A	40, M2
Trichloroisocyanuric acid, dry	5.1	UN2468	II	OXIDIZER		152	212	240	5 kg	25 kg	A	13
Trichloromethyl perchlorate	Forbidden											
Trichlorosilane	4.3	UN1295	I	DANGEROUS WHEN WET, FLAMMABLE LIQUID, CORROSIVE.	A7, N34, T24, T26.	None	201	244	Forbidden	Forbidden	D	21, 28, 40, 49, 100
D (mono-(Trichloro) tetra-(monopotassium dichloro)-penta-s-triazinetrione, dry (*containing over 39% available chlorine*).	5.1	NA2468	II	OXIDIZER		152	212	240	5 kg	25 kg	A	13
Trichloro-s-triazinetrione dry, containing over 39% available chlorine, see Trichloroisocyanuric acid, dry.												
Tricresyl phosphate *with more than 3 per cent ortho isomer*	6.1	UN2574	II	POISON	A3, N33, N34, T8.	None	202	243	5 L	60 L	A	M1

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Triethylamine	3	UN1296	II	FLAMMABLE LIQUID.	T9	150	202	242	5 L	60 L	B	40
	Triethylenetetramine	8	UN2259	II	CORROSIVE	B2, T8	154	202	242	1 L	30 L	B	40
	Triethyl phosphite	3	UN2323	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Trifluoroacetic acid	8	UN2699	I	CORROSIVE	A3, A6, A7, B4, N3, N34, T18, T27.	None	201	242	0.5 L	2.5 L	B	12, 40, 48
	Trifluoroacetylchloride	2.2	UN3057		NONFLAMMABLE GAS, CORROSIVE.	B13	None	304	244	Forbidden	25kg	D	40
	Trifluorochloroethylene, inhibited	2.1	UN1082		FLAMMABLE GAS.		306	304	314, 316	Forbidden	150 kg	B	40
	Trifluoroethane, compressed	2.1	UN2035		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	B	40
	Trifluoromethane	2.2	UN1984		NONFLAMMABLE GAS.		306	304	314, 315	75 kg	150 kg	A	
D	Trifluoromethane and chlorotrifluoromethane mixture (*constant boiling mixture*) (*R-503*). *See* Refrigerant gas, n.o.s.												
	Trifluoromethane, refrigerated, liquid (*cryogenic liquids*)	2.2	UN3136		NONFLAMMABLE GAS.		306	None	314, 315	50 kg	500 kg	A	
	3-Trifluoromethylaniline	6.1	UN2948	II	POISON	T14	None	202	243	5 L	60 L	A	40
	2-Trifluoromethylaniline	6.1	UN2942	III	KEEP AWAY FROM FOOD.		153	203	241	60 L	220 L	A	
	Trifluoromine trinitrate	Forbidden											
	Triisobutylene	3	UN2324	III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	
	Triisocyanatoisocyanurate of isophoronediisocyanate, solution, *70 per cent, by mass*	3	UN2906	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Triisopropyl borate	3	UN2616	III	FLAMMABLE LIQUID.	B1, T8, T31	150	202	242	60 L	220 L	A	
D	Trimethoxysilane	6.1	NA9269	I	POISON. FLAMMABLE LIQUID.	2, B9, B14, B32, B74, T38, T43, T45.	None	201	244	Forbidden	Forbidden	E	40, M4
+	Trimethylacetyl chloride	8	UN2438	II	CORROSIVE, FLAMMABLE LIQUID. POISON	2, A3, A6, A7, B2, B6, B9, B14, B32, B74, N34, T8, T26, T38, T43, T45.	None	227	244	1 L	30 L	D	12, 21, 25, 40, 48
	Trimethylamine, anhydrous	2.1	UN1083		FLAMMABLE GAS.		306	304	314, 315	Forbidden	150 kg	B	40
	Trimethylamine, aqueous solutions *not more than 50 per cent trimethylamine by mass.*	3	UN1297	I	FLAMMABLE LIQUID.	T42	150	202	242	5 L	60 L	D	40, 41
				II	FLAMMABLE LIQUID.	B1, T14	150	203	242	60 L	220 L	B	40, 41
	1,3,5-Trimethylbenzene	3	UN2325	III	FLAMMABLE LIQUID.	B14	None	201	243	60 L	220 L	A	
	Trimethyl borate	3	UN2416	II	FLAMMABLE LIQUID.	T14	150	202	242	5 L	60 L	B	
	Trimethylchlorosilane	3	UN1298	I	FLAMMABLE LIQUID, CORROSIVE.	A3, A7, B77, N34, T12.	None	201	243	Forbidden	2.5 L	E	40
	Trimethylcyclohexylamine	8	UN2326	III	CORROSIVE	T2	154	203	241	5 L	60 L	A	8
	Trimethylene glycol diperchlorate	Forbidden											
	Trimethylhexamethylenediamines	8	UN2327	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	8

Trimethylhexamethylenediisocyanate	6.1	UN2328	III	KEEP AWAY FROM FOOD.	T8	153	203	241	60 L	220 L	B		
Trimethylol nitromethane trinitrate	Forbidden												
Trimethyl phosphite	3	UN2329	III	FLAMMABLE LIQUID.	T1	150	203	242	60 L	220 L	A		
1,3,5-Trimethyl-2,4,6-trinitrobenzene	Forbidden												
Trinitroacetic acid	Forbidden												
Trinitroacetonitrile	Forbidden												
Trinitroamine cobalt	Forbidden												
Trinitroaniline *or* Picramide	1.1D	UN0153	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E	
Trinitroanisole	1.1D	UN0213	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E	
Trinitrobenzene, *dry or wetted with less than 30 per cent water, by mass.*	1.1D	UN0214	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E	
Trinitrobenzenesulfonic acid	1.1D	UN0386	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	E	1E, 5E, 19E	
Trinitrobenzene, wetted *with not less than 30 per cent water, by mass.*	4.1	UN1354	I	FLAMMABLE SOLID.	A2, A8, A19, N41.	None	211	None	0.5 kg	0.5 kg	E	28, 36	
Trinitrobenzoic acid, *dry or wetted with less than 30 per cent water, by mass.*	1.1D	UN0215	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
Trinitrobenzoic acid, wetted *with not less than 30 per cent water, by mass.*	4.1	UN1355	I	FLAMMABLE SOLID.	A2, A8, A19, N41.	None	211	None	0.5 kg	0.5 kg	E	28, 36	
Trinitrochlorobenzene; (Picryl chloride)	1.1D	UN0155	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
Trinitro-meta-cresol	1.1D	UN0216	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
2,4,6-Trinitro-1,3-diazobenzene	Forbidden												
Trinitroethanol	Forbidden												
Trinitroethylnitrate	Forbidden												
Trinitrofluorenone	1.1D	UN0387	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E	
Trinitromethane	Forbidden												
1,3,5-Trinitronaphthalene	Forbidden												
Trinitronaphthalene	1.1D	UN0217	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E	
Trinitrophenetole	1.1D	UN0218	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E	
Trinitrophenol (Picric acid), *dry or wetted with less than 30 per cent water, by mass.*	1.1D	UN0154	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
Trinitrophenol, wetted *with not less than 30 per cent water, by mass.*	4.1	UN1344	I	FLAMMABLE SOLID.	A8, A19, N41	None	211	None	1 kg	15 kg	E	28, 36, 48	
2,4,6-Trinitrophenyl guanidine (dry).	Forbidden												
Trinitrophenylmethylnitramine (Tetryl)	1.1D	UN0208	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
2,4,6-Trinitrophenyl nitramine	Forbidden												
2,4,6-Trinitrophenyl trimethylol methyl nitramine trinitrate (dry)	Forbidden												
Trinitroresorcinol (Styphnic acid), *dry or wetted with less than 20 per cent water, or mixture of alcohol and water, by mass.*	1.1D	UN0219	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
Trinitroresorcinol (Styphnic acid), wetted *with not less than 20 per cent water, or mixture of alcohol and water by mass*	1.1D	UN0394	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E	
2,4,6-Trinitroso-3-methyl nitraminoanisole	Forbidden												

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Trinitrotetramine cobalt nitrate	Forbidden											
	Trinitrotoluene (TNT) and Trinitrobenzene mixtures *or* Trinitrotoluene (TNT) and Hexanitrostilbene mixtures.	1.1D	UN0388	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E, 19E
	Trinitrotoluene (TNT), *dry or wetted with less than 30 per cent water, by mass.*	1.1D	UN0209	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Trinitrotoluene (TNT) mixtures containing Trinitrobenzene and Hexanitrostilbene.	1.1D	UN0389	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Trinitrotoluene, wetted *with not less than 30 per cent water, by mass.*	4.1	UN1356	I	FLAMMABLE SOLID.	A2, A8, A19, N41.	None	211	None	0.5 kg	0.5 kg	E	28, 36
	2,4,6-Trinitro-1,3,5-triazido benzene (dry)	Forbidden											
	Tri-(b-nitroxyethyl) ammonium nitrate	Forbidden											
	Tripropylamine	3	UN2260	III	FLAMMABLE LIQUID, CORROSIVE.	T8	None	202	243	1 L	5 L	A	40
	Tripropylene	3	UN2057	II	FLAMMABLE LIQUID.		150	202	242	5 L	60 L	B	
				III	FLAMMABLE LIQUID.		150	203	242	60 L	220 L	A	
	Tris-(1-aziridinyl)phosphine oxide, solution	6.1	UN2501	II	POISON	T8	None	202	243	5 L	60 L	A	
	Tris, bis-difluoroamino diethoxy propane (TVOPA)	Forbidden											
	Tritonal	1.1D	UN0390	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Tungsten hexafluoride	2.3	UN2196		POISON GAS	3, B9, B14, B33, B75.	None	338	244	Forbidden	Forbidden	D	40
	Turpentine	3	UN1299	III	FLAMMABLE LIQUID.	B1	150	203	242	60 L	220 L	A	M2
I	Turpentine substitute	3	UN1300	I	FLAMMABLE LIQUID.	T1	None	201	243	1 L	30 L	B	M4
				II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	M4
				III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	M4
	Undecane	3	UN2330	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Uranium hexafluoride, fissile (*containing more than 1% U-235*)	7	UN2977		RADIOACTIVE, CORROSIVE.		453	417	417			A	
	Uranium hexafluoride, *fissile excepted or non-fissile*	7	UN2978		RADIOACTIVE, CORROSIVE.		421	425	425				
	Uranium metal, pyrophoric	7	UN2979		RADIOACTIVE, SPONTANEOUSLY COMBUSTIBLE.		None	418	None			A	
	Uranyl nitrate hexahydrate solution	7	UN2980		RADIOACTIVE, CORROSIVE.		421, 425	415, 416, 417	415, 416, 417			A	
	Uranyl nitrate, solid	7	UN2981		RADIOACTIVE, OXIDIZER.		None	419	None	Forbidden	15 kg	A	
	Urea hydrogen peroxide	5.1	UN1511	III	OXIDIZER	A1, A7, A29	152	213	240	25 kg	100 kg	A	13

	Urea nitrate, *dry or wetted with less than 20 per cent water, by mass.*	1.1D	UN0220	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	1E, 5E
	Urea nitrate, wetted *with not less than 20 per cent water, by mass.*	4.1	UN1357	I	FLAMMABLE SOLID.	A8, A19, N41	None	211	None	1 kg	15 kg	A	28
	Urea peroxide, see Urea hydrogen peroxide												
	Valeraldehyde	3	UN2058	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
	Valeric acid, see Corrosive liquids, n.o.s.												
	Valeryl chloride	8	UN2502	II	CORROSIVE	A3, A6, A7, B2, N34, T8.	154	202	242	1 L	30 L	C	23, 40
	Vanadium oxytrichloride	8	UN2443	II	CORROSIVE	A3, A6, A7, B2, B16, N34, T8, T26.	154	202	242	Forbidden	30 L	C	40
	Vanadium pentoxide, *nonfused form*	6.1	UN2862	II	POISON		None	212	242	25 kg	100 kg	A	
	Vanadium tetrachloride	8	UN2444	I	CORROSIVE	A3, A6, A7, B4, N34, T8, T26.	None	201	242	Forbidden	2.5 L	C	8, 40
AW	Vanadium trichloride	8	UN2475	III	CORROSIVE		154	213	240	25 kg	100 kg	A	40
	Vanadium trioxide, *nonfused form*	6.1	UN2860	III	POISON		None	212	242	25 kg	100 kg	A	
	Vanadyl sulfate	6.1	UN2931	II	POISON		None	212	242	25 kg	100 kg	A	
D	Vehicles, self-propelled *including internal combustion engines or other apparatus containing an internal combustion engine or electric storage battery(see also* Wheel chair, electric).	9	None	III	CLASS 9		220	220	None	No limit	No limit	A	
	Very signal cartridge, see Cartridges, signal												
	Vinyl acetate, inhibited	3	UN1301	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Vinyl bromide, inhibited	2.1	UN1085		FLAMMABLE GAS.	B13	306	304	244	Forbidden	150 kg	B	40
	Vinyl butyrate, inhibited	3	UN2838	II	FLAMMABLE LIQUID.	T7	150	202	242	5 L	60 L	B	
	Vinyl chloride, inhibited	2.1	UN1086		FLAMMABLE GAS.	B44	306	304	314, 315	Forbidden	150 kg	B	40
	Vinyl chloroacetate	6.1	UN2589	II	POISON, FLAMMABLE LIQUID.	T14	None	202	243	5 L	60 L	A	
	Vinyl ethyl ether, inhibited	3	UN1302	II	FLAMMABLE LIQUID.	A3, T14	None	201	243	1 L	30 L	E	
	Vinyl fluoride, inhibited	2.1	UN1860		FLAMMABLE GAS.	B43	306	304	314, 315	Forbidden	150 kg	E	40
	Vinylidene chloride, inhibited	3	UN1303	II	FLAMMABLE LIQUID.	T23, T29	150	201	243	1 L	30 L	E	40, M2
	Vinyl isobutyl ether, inhibited	3	UN1304	II	FLAMMABLE LIQUID.	T8	150	202	242	5 L	60 L	B	
	Vinyl methyl ether, inhibited	2.1	UN1087		FLAMMABLE GAS.	B44	306	304	314, 315	Forbidden	150 kg	B	40
	Vinyl nitrate polymer	Forbidden											
	Vinylpyridenes, inhibited	6.1	UN3073	II	POISON, FLAMMABLE LIQUID.	T8	None	212	243	5 L	60 L	B	40
	Vinyl toluene, inhibited *mixed isomers*	3	UN2618	III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	M2
	Vinyltrichlorosilane	3	UN1305	I	FLAMMABLE LIQUID, CORROSIVE.	A2, A7, B6, N34, T14, T26.	None	201	243	Forbidden	2.5 L	B	40
	Warheads, rocket *with burster or expelling charge*	1.4D	UN0370	II	EXPLOSIVE 1.4D.			62	None	Forbidden	75 kg	A	3E, 7E, 24E
	Warheads, rocket *with burster or expelling charge*	1.4F	UN0371	II	EXPLOSIVE 1.4F.			62	None	Forbidden	Forbidden	E	
	Warheads, rocket *with bursting charge*	1.1D	UN0286	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	3E, 7E
	Warheads, rocket *with bursting charge*	1.2D	UN0287	II	EXPLOSIVE 1.2D.			62	None	Forbidden	Forbidden	B	3E, 7E
	Warheads, rocket *with bursting charge*	1.1F	UN0369	II	EXPLOSIVE 1.1F.			62	None	Forbidden	Forbidden	E	
	Warheads, torpedo *with bursting charge*	1.1D	UN0221	II	EXPLOSIVE 1.1D.			62	None	Forbidden	Forbidden	B	3E, 7E

Symbols	Hazardous materials descriptions and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§173.***)			(9) Quantity limitations		(10) Vessel stowage requirements	
							Exceptions	Non-bulk packaging	Bulk packaging	Passenger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Water reactive substances, n.o.s., see Substances which in contact with water, *etc.*.												
AD	Wheel chair, electric (*spillable or non-spillable type batteries*)	9	None	III	CLASS 9		222	222	None	No limit	No limit	A	
	White acid, see Hydrofluoric acid mixtures												
	White asbestos, (chrysotile, actinolite, anthophyllite, tremolite)	9	UN2590	III	None		155	216	240	200 kg	200 kg	A	34, 40
	Wood preservatives, liquid	3	UN1306	II	FLAMMABLE LIQUID.	T7, T30	150	202	242	5 L	60 L	B	40, M4
				III	FLAMMABLE LIQUID.	B1, T7, T30	150	203	242	60 L	220 L	A	40, M4
	Xenon	2.2	UN2036		NONFLAMMABLE GAS.		306	302	None	75 kg	150 kg	A	
	Xenon, refrigerated liquid (*cryogenic liquids*)	2.2	UN2591		NONFLAMMABLE GAS.		320	316	318	50 kg	500 kg	B	
	Xylenes	3	UN1307	II	FLAMMABLE LIQUID.	T1	150	202	242	5 L	60 L	B	
				III	FLAMMABLE LIQUID.	B1, T1	150	203	242	60 L	220 L	A	
	Xylenols	6.1	UN2261	II	POISON	T8	None	212	243	25 kg	100 kg	A	M2
	Xylidines, solid *or* solution	6.1	UN1711	II	POISON	T14	None	202	243	5 L	60 L	A	
	Xylyl bromide	6.1	UN1701	II	POISON	A3, A6, A7, B14, B30, N33.	None	226	244	Forbidden	60 L	D	40
	p-Xylyl diazide	Forbidden											
	Zinc ammonium nitrite	5.1	UN1512	II	OXIDIZER		None	212	240	5 kg	25 kg	E	
	Zinc arsenate *or* Zinc arsenite *or* Zinc arsenate and Zinc arsenite mixtures.	6.1	UN1712	II	POISON		None	212	242	25 kg	100 kg	A	M2
	Zinc ashes	4.3	UN1435	III	DANGEROUS WHEN WET.	A1, A19	None	213	241	25 kg	100 kg	A	
	Zinc bisulfite solution *see* Bisulfites, inorganic aqueous solutions, n.o.s..												
	Zinc bromate	5.1	UN2469	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A	56, 58, 106
	Zinc chlorate	5.1	UN1513	II	OXIDIZER	A9, N34	152	212	240	5 kg	25 kg	A	56, 58, 106
	Zinc chloride, anhydrous	8	UN2331	III	CORROSIVE		None	213	240	25 kg	100 kg	A	M2
	Zinc chloride, solution	8	UN1840	III	CORROSIVE	T7	154	203	241	5 L	60 L	A	M2
	Zinc cyanide	6.1	UN1713	I	POISON		None	211	242	5 kg	50 kg	A	26, M1
	Zinc dithionite *or* Zinc hydrosulfite	9	UN1931	III	None		155	204	240	100 kg	200 kg	A	13, 49, 102
	Zinc ethyl, see Diethylzinc												
	Zinc fluorosilicate	6.1	UN2855	III	KEEP AWAY FROM FOOD.		153	213	240	100 kg	200 kg	A	26, M4
	Zinc hydrosulfite, *see* Zinc dithionite												
	Zinc munate solution, see Zinc chloride, solution												
	Zinc nitrate	5.1	UN1514	II	OXIDIZER		152	212	240	5 kg	25 kg	A	
	Zinc permanganate	5.1	UN1515	II	OXIDIZER		152	212	240	5 kg	25 kg	D	56, 58, 69, 106, 107
	Zinc peroxide	5.1	UN1516	II	OXIDIZER		152	212	240	5 kg	25 kg	A	13, 75, 106
	Zinc phosphide	4.3	UN1714	I	DANGEROUS WHEN WET, POISON.	A19, N40	None	211	None	Forbidden	15 kg	E	40, 65, M2
	Zinc powder *or* Zinc dust	4.3	UN1436	I	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.	A19, N40	None	211	242	Forbidden	15kg	A	

			II	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.	A19	None	212	242	15 kg	50 kg	A		
			III	DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE.		None	213	242	25kg	100kg	A		
Zinc resinate	4.1	UN2714	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A		
Zinc selenate, *see* Selenates *or* Selenites													
Zinc selenite, *see* Selenates *or* Selenites													
Zinc silicofluoride, see Zinc fluorosilicate													
Zirconium, dry, *coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns).*	4.1	UN2858	III	FLAMMABLE SOLID.	A1	151	213	240	25 kg	100 kg	A		
Zirconium, dry, *finished sheets, strip or coiled wire*	4.2	UN2009	III	SPONTANEOUSLY COMBUSTIBLE.	A1, A19	None	213	240	25 kg	100 kg	D		
Zirconium hydride	4.1	UN1437	II	FLAMMABLE SOLID.	A19, A20, N34	None	212	240	15 kg	50 kg	E		
Zirconium nitrate	5.1	UN2728	III	OXIDIZER	A1, A29	152	213	240	25 kg	100 kg	A		
Zirconium picramate, *dry or wetted with less than 20 per cent water, by mass.*	1.3C	UN0236	II	EXPLOSIVE 1.3C.			62	None	Forbidden	Forbidden	B	1E, 5E	
Zirconium picramate, wetted *with not less than 20 per cent water, by mass.*	4.1	UN1517	I	FLAMMABLE SOLID.	N41	None	211	None	1 kg	15 kg	D	28, 36	
Zirconium powder, dry	4.2	UN2008	I	SPONTANEOUSLY COMBUSTIBLE.		None	211	242	Forbidden	Forbidden	D		
			II	SPONTANEOUSLY COMBUSTIBLE.	A19, A20, N5, N34.	None	212	241	15 kg	50 kg	D		
			III	SPONTANEOUSLY COMBUSTIBLE.		None	213	241	25kg	100kg	D		
Zirconium powder, wetted *with not less than 25 per cent water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns.*	4.1	UN1358	II	FLAMMABLE SOLID.	A19, A20, N34	None	212	241	15 kg	50 kg	E		
Zirconium scrap	4.2	UN1932	III	SPONTANEOUSLY COMBUSTIBLE.	N34	None	213	240	Forbidden	Forbidden	D		
D Zirconium sulfate	8	NA9163	III	CORROSIVE	N34	None	213	240	50 kg	No limit	A		
Zirconium suspended in a liquid	3	UN1308	II	FLAMMABLE LIQUID.		None	202	242	Forbidden	60 L	D,B		
Zirconium tetrachloride	8	UN2503	III	CORROSIVE		154	213	240	25 kg	100 kg	A		

17. Section 172.102 is revised to read as follows:

§ 172.102 Special provisions.

(a) *General.* When Column 7 of the § 172.101 Table refers to a special provision for a hazardous material, the meaning and requirements of that provision are as set forth in this section. When a special provision specifies packagings or packaging requirements, they are in addition to the standard requirements for all packagings prescribed in § 173.24 of this subchapter and any other applicable packaging requirements in subparts A and B of part 173 of this subchapter.

(b) *Description of codes for special provisions.* Special provisions may contain packaging provisions, prohibitions, exceptions from requirements for particular quantities or forms of materials and requirements or prohibitions applicable to specific modes of transportation, as follows:

(1) A code consisting only of numbers (for example, "11") is multi-modal in application and may apply to bulk and non-bulk packagings.

(2) A code containing the letter "A" refers to a special provision which applies only to transportation by aircraft.

(3) A code containing the letter "B" refers to a special provision which applies only to bulk packaging requirements. Unless otherwise provided in this subchapter, these special provisions do not apply to IM portable tanks.

(4) A code containing the letter "H" refers to a special provision which applies only to transportation by highway.

(5) A code containing the letter "N" refers to a special provision which applies only to non-bulk packaging requirements.

(6) A code containing the letter "R" refers to a special provision which applies only to transportation by rail.

(7) A code containing the letter "T" refers to a special provision which applies only to transportation in IM portable tanks.

(8) A code containing the letter "W" refers to a special provision which applies only to transportation by water.

(c) *Tables of special provisions.* The following tables list, and set forth the requirements of, the special provisions referred to in Column 7 of the § 172.101 Table.

(1) *Numeric provisions.* These provisions are multi-modal and apply to bulk and non-bulk packagings:

Code/Special Provisions

1 This material is poisonous by inhalation, meets the criteria in § 173.133(a)(2) of this subchapter for Division 2.3, Hazard Zone A or Division 6.1 Packaging Group I, Hazard Zone A and must be described as an inhalation hazard under the provisions of this subchapter.

2 This material is poisonous by inhalation, meets the criteria in § 173.133(a)(2) of this subchapter for Division 2.3, Hazard Zone B or Division 6.1 Packaging Group I, Hazard Zone B, and must be described as an inhalation hazard under the provisions of this subchapter.

3 This material is poisonous by inhalation, meets the criteria in § 173.133(a)(2) of this subchapter for Division 2.3, Hazard Zone C and must be described as an inhalation hazard under the provisions of this subchapter.

4 This material is poisonous by inhalation, meets the criteria in § 173.133(a)(2) of this subchapter for Division 2.3, Hazard Zone D and must be described as an inhalation hazard under the provisions of this subchapter.

5 If this material meets the defining criteria in § 173.133(a)(2) of this subchapter for Division 2.3, Hazard Zone A, Hazard Zone B, Hazard Zone C, or Hazard Zone D or Division 6.1, Packaging Group I, Hazard Zone A or Hazard Zone B, an appropriate Division 2.3 or Division 6.1 generic proper shipping name must be used to describe this material.

6 This material is poisonous-by-inhalation and must be described as an inhalation hazard under the provisions of this subchapter.

8 A hazardous substance that is not a hazardous waste may be shipped under the shipping description "Other regulated substance, liquid *or* solid", as appropriate.

9 Packaging for certain PCBs for disposal and storage is prescribed by EPA in 40 CFR 761.60 and 761.65.

11 The hazardous material must be packaged as either a liquid or a solid, as appropriate, depending on its physical form at 55 °C (131 °F) at atmospheric pressure.

12 In concentrations greater than 40 percent, this material has strong oxidizing properties and is capable of starting fires in contact with combustible materials. If appropriate, a package containing this material must comply with the additional labeling requirements of § 172.402 of this subchapter.

13 The words "Inhalation Hazard" shall be entered on each shipping paper in association with the shipping description, shall be marked on each non-bulk package in association with the proper shipping name and identification number, and shall be marked on two opposite sides of each bulk package. Size of markings on bulk packages must conform to § 172.302(b) of this subchapter.

14 Motor fuel antiknock mixtures is (mixture of one or more organic lead mixtures, such as tetraethyl lead, triethylmethyl lead, diethyldimethyl lead, ethyltrimethyl lead, and tetramethyl lead, with one or more halogen compounds such as ethylene dibromide and ethylene dichloride, hydrocarbon solvents or other equally efficient stabilizers) or tetraethyl lead.

17 Aqueous solutions of hydrogen peroxide containing less than 8 percent hydrogen peroxide are not subject to the requirements of this subchapter.

22 If the hazardous material is in dispersion in organic liquid, the organic liquid must have a flash point above 50 °C (122 °F).

27 Sodium carbonate peroxyhydrate is considered non-hazardous.

28 The dihydrated sodium salt of dichloroisocyanuric acid is not subject to the requirements of this subchapter.

31 Materials which have undergone sufficient heat treatment to render them nonhazardous are not subject to the requirements of this subchapter.

33 Ammonium nitrites and mixtures of an inorganic nitrite with an ammonium salt are prohibited.

41 When Packaging Method F1 or F5a (see § 173.224(c) of this subchapter) are used, an EXPLOSIVE label is not required.

42 Fish meal or fish scrap may not be offered for transportation if the temperature of the material exceeds 49 °C (120 °F).

53 Packages of these materials must bear a subsidiary risk label, "EXPLOSIVE", unless exempted by the Associate Administrator for Hazardous Materials Safety or the competent authority of the country of origin. A copy of the exemption shall accompany the shipping papers.

101 The name of the particular substance or article must be specified.

102 The articles may be transported as in Division 1.4 Compatibility Group D (1.4D) if all of the conditions specified in § 173.63(a) of this subchapter are met.

103 Detonators which will not mass detonate and undergo only limited preparation in the shipping package may be assigned to 1.4B classification code. Mass detonate means that more than 90 percent of the devices tested in a package explode practically simultaneously. Limited propagation means that if one detonator near the center of a shipping package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and all additional detonators in the outside packaging that explode may not exceed 25 grams.

104 Detonators which meet the following conditions may be assigned to 1.4S classification code: Each detonator may contain no more than 1 g of explosive, excluding ignition and delay charges, and if one detonator near the center of a package detonates it will not cause functioning of any other device in the same or adjacent packages.

105 The word "Agents" may be used instead of "Explosives" when approved by the Associate Administrator for Hazardous Materials Safety.

106 The recognized name of the particular explosive may be specified in addition to the type.

107 The classification of the substance is expected to vary especially with the particle size and packaging but the border lines have not been experimentally determined; appropriate classifications should be verified following the test procedures in §§ 173.57 and 173.58 of this subchapter.

108 Fireworks must be so constructed and packaged that loose pyrotechnic composition will not be present in packages during transportation.

109 Except as provided in § 173.63(d) of this subchapter, rocket motors must be nonpropulsive in transportation. A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and must not appreciably move in any direction when ignited by any means.

110 Fire extinguisher charges containing 3.2 g or less of propellant explosives per unit are not subject to the requirements of this subchapter.

111 Explosive substances of Division 1.1 Compatibility Group A (1.1A) are forbidden for transportation if dry or not desensitized, unless incorporated in a device.

112 Cartridges, small arms which have been classed in Division 1.4 Compatibility Group S (1.4S) may be reclassed and offered for domestic transportation as ORM-D material if they are offered for transportation and transported in accordance with the limitation and packaging requirements of § 173.230 of this subchapter.

113 The sample must be given a tentative approval by an agency or laboratory in accordance with § 173.56 of this subchapter.

114 Jet perforating guns, charged, oil well, without detonator may be reclassed to Division 1.4 Compatibility Group D (1.4D) if the following conditions are met:

a. The total weight of the explosive contents of the shaped charges assembled in the guns does not exceed 90.5 kg (200 pounds) per vehicle; and

b. The guns are packaged in accordance with Packaging Method US073.

115 Boosters with detonator (detonating primers) in which the total explosive charge per unit does not exceed 25 g, and which will not mass detonate and undergo only limited propagation in the shipping package may be assigned to 1.4B classification code. Mass detonate means more than 90 percent of the devices tested in a package explode practically simultaneously. Limited propagation means that if one booster near the center of the package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and all additional boosters in the outside packaging that explode may not exceed 25 g.

116 Fuzes, detonating may be classed in Division 1.4 if the fuzes do not contain more than 25 g of explosive per fuze and are made and packaged so that they will not cause functioning of other fuzes, explosives or other explosive devices if one of the fuzes detonates in a shipping packaging or in adjacent packages.

117 If shipment of the explosive substance is to take place at a time that freezing weather is anticipated, the water contained in the explosive substance must be mixed with denatured alcohol so that freezing will not occur.

(2) *"A" codes.* These provisions apply only to transportation by aircraft:

Code/Special Provisions

A1 Single packagings are not permitted on passenger aircraft.

A2 Single packagings are not permitted on aircraft.

A3 For combination packagings, if glass inner packagings (including ampoules) are used, they must be packed with absorbent material in tightly closed metal receptacles before packing in outer packagings.

A4 Liquids having an inhalation toxicity of Packing Group I are not permitted on aircraft.

A5 Solids having an inhalation toxicity of Packing Group I are not permitted on passenger aircraft and may not exceed a maximum net quantity per package of 15 kg (33 pounds) on cargo aircraft.

A6 For combination packagings, if plastic inner packagings are used, they must be packed in tightly closed metal receptacles before packing in outer packagings.

A7 Steel packagings must be corrosion-resistant or have protection against corrosion.

A8 For combination packagings, if glass inner packagings (including ampoules) are used, they must be packed with cushioning material in tightly closed metal receptacles before packing in outer packagings.

A9 For combination packagings, if plastic bags are used, they must be packed in tightly closed metal receptacles before packing in outer packagings.

A10 When aluminum or aluminum alloy construction materials are used, they must be resistant to corrosion.

A11 For combination packagings, when metal inner packagings are permitted, only specification cylinders constructed of metals which are compatible with the hazardous material may be used.

A19 Combination packagings consisting of outer fiber drums or plywood drums, with inner plastic packagings, are not authorized for transportation by aircraft.

A20 Plastic bags as inner receptacles of combination packagings are not authorized for transportation by aircraft.

A29 Combination packagings consisting of outer expanded plastic boxes with inner plastic bags are not authorized for transportation by aircraft.

A30 Ammonium permanganate is not authorized for transportation on aircraft.

A33 Ammonium nitrites and mixtures of an inorganic nitrite with an ammonium salt are prohibited.

(3) *"B" codes.* These provisions apply only to bulk packagings:

Code/Special Provisions

B1 If the material has a flash point at or above 38 °C (100 °F) and below 93 °C (200 °F), then the bulk packaging requirements of § 173.241 of this subchapter are applicable. If the material has a flash point of less than 38 °C (100 °F), then the bulk packaging requirements of § 173.242 of this subchapter are applicable.

B2 MC 306 and DOT 406 cargo tanks, DOT 57 portable tanks, and riveted tank car tanks are not authorized.

B4 Riveted tank car tanks, AAR 206 tank car tanks, MC 306 and DOT 406 cargo tanks, and DOT 57 portable tanks are not authorized.

B5 Lading temperature may not exceed 116 °C (240 °F). Only the following bulk packagings are authorized for ammonium nitrate solutions with 35 percent or more water: DOT 103 ALW, 111A60 ALW tank car tanks and MC 307, MC 312, DOT 407 and DOT 412 cargo tanks with at least 172 kPa (25 psig) design pressure. The packaging shall be designed for a working temperature of at least 121 °C (250 °F). Transportation by vessel is not authorized.

B6 Packagings shall be made of steel.

B7 Safety relief devices are not authorized on multi-unit tank car tanks. Openings for safety relief devices shall be plugged or blank flanged.

B8 Packagings shall be made of nickel, stainless steel, or steel with nickel, stainless steel, lead or other suitable corrosion resistant metallic lining.

B9 Bottom outlets are not authorized.

B11 Tank car tanks must have a test pressure of at least 2,068.5 kPa (300 psi). Cargo and portable tanks must have a design pressure of at least 1,207 kPa (175 psig). Pressure relief devices on any tank must be set to function at 1,207 kPa (175 psig).

B12 Tank car tanks must be marked with the name of the lading in accordance with the requirements of § 172.330 of this subchapter.

B13 For compressed gases, §§ 173.314 and 173.315 of this subchapter specify additional requirements.

B14 Each tank, except a multi-unit tank car tank, must be insulated by completely covering it with at least 100 mm (3.9 inches) of cork or other suitable insulation material of sufficient thickness that the overall thermal conductance is not more than 0.080 Btu per hour per square foot per degree Fahrenheit differential.

B15 Packagings must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance.

B16 The lading must be completely covered with an inert gas.

B17 Packagings must be made of aluminum.

B18 Open steel hoppers or bins are authorized.

B19 The hazardous material may not exceed 45 percent concentration in a non-volatile solvent.

B20 The hazardous material may not exceed 50 percent concentration in a non-volatile solvent.

B21 The hazardous material may not exceed 60 percent concentration in a non-volatile solvent.

B22 The hazardous material may not exceed 90 percent concentration in a non-volatile solvent.

B23 Tanks must be made of steel that is rubber lined or unlined. Unlined tanks must be passivated before being placed in service. If unlined tanks are washed out with water, they must be repassivated prior to return to service. Lading in unlined tanks must be inhibited so that the corrosive effect on steel is not greater than that of hydrofluoric acid of 65 percent concentration.

B24 Packagings shall be made of stainless steel—in which the molybdenum content does not exceed 1.0 percent—or of aluminum.

B25 Packagings must be made from monel or nickel or monel-lined or nickel-lined steel.

B26 Tanks must be insulated. Insulation must be at least 102 mm (4 inches) except that insulation thickness may be reduced to 51 mm (2 inches) over exterior heater coils. Interior heating coils are not authorized. The lading shall be immersed in water or blanketed with an inert gas and loaded at a temperature not exceeding 60 °C (140 °F). After unloading, the tank must be filled to its entire capacity with an inert gas or with water having a temperature not exceeding 60 °C (140 °F). Before a tank car tank is offered for return movement, it must be placarded with "SPONTANEOUSLY COMBUSTIBLE RESIDUE" placards as described in § 172.525 of this subchapter. Tanks may not have bottom outlets.

B27 Tanks must have a service pressure of 1,034 kPa (150 psig). Tank car tanks must have a test pressure rating of 1,379 kPa (200 psi). Lading must be blanketed at all times with a dry inert gas at a pressure not to exceed 103 kPa (15 psig).

B28 Packagings must be made of stainless steel.

B29 When the lading is transported in a molten state, tanks may be equipped with heating coils except that interior heating coils are prohibited. Electric standpipe heaters for tank cars are permitted.

B30 MC 330 and MC 331 cargo tanks and DOT 51 portable tanks must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter. Thickness of stainless steel for tank shell and heads for cargo tanks and portable tanks must be the greater of 7.62 mm (0.300 inch) or the thickness required for a tank with a design pressure at least equal to 1.5 times the vapor pressure of the lading at 46 °C (115 °F).

B31 MC 330 and MC 331 cargo tanks and DOT 51 portable tanks must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter. Thickness of stainless steel for tank shell and heads for cargo tanks and portable tanks must be the greater of 7.62 mm (0.300 inch) or the thickness required for a tank with a design pressure at least equal to 1.5 times the vapor pressure of the lading at 46 °C (115 °F).

B32 MC 330 and MC 331 cargo tanks and DOT 51 portable tanks must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter. Thickness of stainless steel for tank shell and heads for cargo tanks and portable tanks must be the greater of 6.35 mm (0.250 inch) or the thickness required for a tank with a design pressure at least equal to 1.3 times the vapor pressure of the lading at 46 °C (115 °F).

B33 MC 330 or MC 331 cargo tanks and DOT 51 portable tanks must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter. Thickness of stainless

steel for tank shell and heads for cargo tanks and portable tanks must be the greater of 6.35 mm (0.250 inch) or the thickness required for a tank with a design pressure at least equal to 1.2 times the vapor pressure of the lading at 46 °C (115 °F).

B34 MC 330 or MC 331 cargo tanks and DOT 51 portable tanks must be made of stainless steel with a design pressure at least equal to 1.1 times the vapor pressure of the lading at 46 °C (115 °F). Steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter.

B35 If LC_{50} is more than 200 ppm but not more than 1000 ppm, Special Provisions B31 and B73 apply. If LC_{50} is more than 1000 ppm but not more than 3000 ppm, Special Provisions B33 and B75 apply. If LC_{50} is more than 3000 ppm but not more than 5000 ppm, Note B34 applies.

B36 DOT 105J500W tank car tanks or Class DOT 106 or 110 tank car tanks are authorized.

B37 The amount of nitric oxide charged into any tank car tank may not exceed 1,379 kPa (200 psig) at 21 °C (70 °F). The amount of nitric oxide charged into cargo or portable tanks may not exceed 1,379 kPa (200 psig) at 21 °C (70 °F) or 0.55 times tank design pressure (MAWP) whichever is less.

B38 If LC_{50} is more than 1000 ppm but not more than 3000 ppm, Special Provisions B31 and B73 apply. If LC_{50} is more than 3000 ppm but not more than 5000 ppm, Special Provisions B33 and B75 apply.

B39 Mixtures with flash points less than 23 °C (73 °F) must bear FLAMMABLE placards as prescribed in Subpart F of part 172.

B40 For liquid materials which are toxic by inhalation (see § 173.133(a)(2) of this subchapter), if LC_{50} is 200 ppm or less, Special Provisions B30 and B72 apply; if LC_{50} is more than 200 ppm but not more than 1000 ppm, Special Provisions B32 and B74 apply.

B41 Notwithstanding the periodic retest intervals specified in Retest Table 1 of 173.31 of this subchapter, the retest interval for safety relief valves on each single-unit tank car tank is 2 years and the retest interval on the tank and interior heater systems, if any, is as follows:

a. For a tank 10 years old or newer, 5 years;

b. For a tank older than 10 years but not older than 22 years, 3 years; and

c. For a tank older than 22 years, 1 year.

B42 Each DOT 105A, 105S and 105J tank car tank must be stenciled DOT105A200W, DOT105S200W, or DOT 105J200W, respectively. Each tank car tank must be equipped with a safety relief valve with a start-to-discharge pressure of 1,034 kPa (150 psig).

B43 For single unit tank car tanks built after June 30, 1982, tank anchor to tank shell fillet welds must be examined by a suitable non-destructive testing method to ensure that welds are free from cracks or other detrimental defects.

B44 All parts of valves and safety relief devices in contact with lading must be of a material which will not cause formation of acetylides.

B45 Safety relief valves must be equipped with stainless steel or platinum frangible discs approved by the AAR Committee on Tank Cars.

B46 The detachable protective housing for the loading and unloading valves of multi-unit tank car tanks must withstand tank test pressure and must be approved by the Associate Administrator for Hazardous Materials Safety.

B49 Tanks equipped with interior heater coils are not authorized. Single unit tank car tanks must have a safety relief valve set at no more than 1551 kPa (225 psig).

B50 Each valve outlet of a multi-unit tank car tank must be sealed by a threaded solid plug or a threaded cap with inert luting or gasket material. Valves must be of stainless steel and the caps, plugs, and valve seats must be of a material that will not deteriorate as a result of contact with the lading.

B51 Tank car tanks must be marked "DISPERSANT GAS" or "REFRIGERANT GAS"or with the proper shipping name.

B52 Notwithstanding the provisions of § 173.24b of this subchapter, non-reclosing pressure relief devices are authorized on DOT 57 portable tanks.

B53 Packagings must be made of either aluminum or stainless steel.

B54 Open-top, sift-proof rail cars are also authorized.

B55 Water-tight, sift-proof, closed-top, metal-covered hopper cars, equipped with a venting arrangement (including flame arrestors) approved by the Associate Administrator for Hazardous Materials Safety are also authorized.

B56 Water-tight, sift-proof, closed-top, metal-covered hopper cars are also authorized if the particle size of the hazardous material is not less than 149 microns.

B57 Class DOT 115A tank car tanks must be equipped with a safety vent of a diameter not less than 305 mm (12 inches) complying with § 179.221-1 of this subchapter and the outer shell must be stenciled "CHLOROPRENE" on both sides in letters not less than 102 mm (4 inches) high.

B58 The provisions of special provision B74 apply, except that Class DOT 112 and 114 tank car tanks are not authorized, aluminum tank car tanks are not authorized, Class DOT 105A tank car tanks must be stenciled DOT 105A100W and must be equipped with steel or stainless steel safety relief valves of the type and size used on DOT specification 105A100W tank car tanks, Class DOT 105S tank car tanks must be stenciled DOT 105S100W and must be equipped with steel or stainless steel safety relief valves of the type and size used on DOT specification 105S100W tank car tanks, and Class DOT 105J tank car tanks must be stenciled DOT 105J100W and must be equipped with steel or stainless steel safety relief valves of the type and size used on DOT specification 105J100W tank car tanks.

B59 AAR Specification 207A40W, 207A40W6, 207A48W, 207A60W, 207A80W tank car tanks are also authorized provided that the lading is completely covered with a moisture-free nitrogen blanket.

B60 DOT Specification 106A500X multi-unit tank car tanks that are not equipped with a safety relief device of any type are authorized. For the transportation of phosgene, the outage must be sufficient to prevent tanks from becoming liquid full at 55 °C (130 °F).

B61 Written procedures covering details of tank car appurtenances, dome fittings, safety devices, and marking, loading, handling, inspection, and testing practices must be approved by the Associate Administrator for Hazardous Materials Safety before any single unit tank car tank is offered for transportation.

B62 Single unit tank car tanks must be equipped with a venting arrangement that is approved by the Associate Administrator for Hazardous Materials Safety.

B63 Notwithstanding the provisions of § 173.314 of this subchapter, DOT Specification 105A100W, 111A100W4, 112A200W, and

114A340W tank car tanks, built before January 1, 1991, are also authorized. Specification 114A340W tank car tanks may not be equipped with any bottom outlet, but bottom washouts are permitted.

B64 Each single unit tank car tank built after December 31, 1990 must be equipped with a tank head puncture resistance system that conforms to § 179.105–5 of this subchapter.

B65 DOT Specification 105A500W tank cars. Tank must be restenciled 105A300W and be equipped with safety valves of the type and size used on specification 105A300W tank cars. Tank car tank must be equipped with approved fittings and safety devices. The maximum filling density is 63 percent of the water capacity of the tank.

B66 Specification 106A500X or 110A500W tanks. Each tank must be equipped with gas tight valve protection caps. Outage must be sufficient to prevent tanks from becoming liquid full at 55 °C (130 °F). Specification 110A500W tanks must be stainless steel.

B67 Specification 105A500W tank cars. Authorized for nitrogen dioxide only. Tanks must be lagged with not less than a 102 mm (4 inch) thickness of cork. All valves and fittings must be protected by a securely attached cover made of metal not subject to deterioration by the lading, and all valve openings, except safety valve, must be fitted with screw plugs or caps to prevent leakage in the event of valve failure.

B68 Sodium must be in a molten condition when loaded and allowed to solidify before shipment. Outage must be at least 5 percent at 98 °C (208 °F). Bulk packagings must have exterior heating coils fusion welded to the tank shell which have been properly stress relieved. The only tank car tanks authorized are Class DOT 105 tank cars having a test pressure of 2069 kPa (300 psig) or greater. Bottom outlets are not authorized on tank car tanks.

B69 Dry sodium cyanide or potassium cyanide may be shipped in sift-proof weather-resistant metal covered hopper cars or non-specification bins. Bins must be approved by the Associate Administrator for Hazardous Materials Safety. FIBCs may also be used under conditions approved by the Associate Administrator for Hazardous Materials Safety.

B70 If DOT 103ANW tank car tank is used: All cast metal in contact with the lading must have 96.7 percent nickel content; and the lading must be anhydrous and free from any impurities.

B71 The only tank cars authorized are Class DOT 105, 112, and 114 tank car tanks with a test pressure of 2069 kPa (300 psig) or greater.

B72 Notwithstanding the provisions of § 173.244(a) of this subchapter, only the following tank car tanks are authorized: DOT 105J500W tank car tanks and Class DOT 106 and 110 multi-unit tank car tanks.

B73 Bottom outlets are not authorized on tank car tanks. Notwithstanding the provisions of §§ 173.243(a) and 173.244(a) of this subchapter, only the following tank car tanks are authorized: DOT 105J300W, 112J340W, 112T340W, 114J340W and 114T340W tank car tanks; Class DOT 106 and 110 multi-unit tank car tanks; and, except for materials meeting the definition of a flammable gas, DOT 105J300ALW tank car tanks.

B74 Bottom outlets are not authorized on tank car tanks. Notwithstanding the provisions of §§ 173.243(a) and 173.244(a) of this subchapter, only the following tank car tanks are authorized: DOT 105J300W, 112J340W, 112T340W, 114J340W, 114T340W and 105J300ALW tank car tanks; and Class DOT 106 and 110 multi-unit tank car tanks.

B75 Bottom outlets are not authorized on tank car tanks. Notwithstanding the provisions of §§ 173.243(a) and 173.244(a) of this subchapter, only the following tank car tanks are authorized: DOT 105J300W, 112J340W, 112T340W, 114J340W, and 114T340W tank car tanks; Class DOT 106 and 110 multi-unit tanks; and, except for materials meeting the definition of a flammable gas, DOT 105J300ALW tank car tanks.

B76 DOT 105S500W tank car tanks restenciled to DOT 105S200W tank car tanks. Each tank car tank must be equipped with a safety relief valve with a start-to-discharge pressure of 1,034 kPa (150 psig).

B77 Other packaging are authorized when approved by the Associate Administrator for Hazardous Materials Safety.

B78 Notwithstanding § 173.240 of this subchapter, the only bulk packagings authorized for transportation by rail are Class DOT 103, 104, 105, 109, 111, 112, and 114 tank car tanks. Heater pipes must be of welded construction designed for a test pressure of 500 pounds per square inch. A 25 mm (1 inch) woven lining of asbestos or other approved material must be placed between the bolster slabbing and the bottom of the tank. If a tank car tank is equipped with a safety vent of the frangible disc type, the frangible disc must be perforated with a 3.2 mm (0.13 inch) diameter hole. If a tank car tank is equipped with a safety relief valve, the tank car tank must also be equipped with a vacuum relief valve.

B79 Tank car tanks have head puncture resistance and thermal protection in accordance with §§ 179.105.4 and 179.105.5 of this subchapter for tanks built before April 1, 1989.

B80 Each cargo tank shall have a minimum design pressure of 276 kPa (40 psig).

B81 Venting and pressure relief devices for tank car tanks and cargo tanks must be approved by the Associate Administrator for Hazardous Materials Safety.

B83 Bottom outlets are prohibited on tank car tanks transporting sulfuric acid in concentrations over 65.25 percent.

B84 Packagings must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance for sulfuric acid or spent sulfuric acid in concentration up to 65.25 percent.

B85 Cargo tanks must be marked with the name of the lading in accordance with the requirements of § 172.302(b).

B86 Only DOT 105S600W tank car tanks are authorized.

B90 Steel tank conforming or equivalent or ASME specifications which contain solid or semisolid residual motor fuel antiknock mixture (including rust, scale, or other contaminants) may be shipped by rail freight or highway. The tank must have been designed and constructed to be capable of withstanding full vacuum. All openings must be closed with gasketed blank flanges or vapor tight threaded closures.

(4) *"H" codes.* These provisions apply only to transportation by highway. [Reserved]

(5) *"N" codes.* These provisions apply only to non-bulk packagings:

Code/Special Provisions

N3 Glass inner packagings are permitted in combination or composite packagings only if the hazardous material is free from hydrofluoric acid.

N4 For combination or composite packagings, glass inner packagings,

other than ampoules, are not permitted.

N5 Glass materials of construction are not authorized for any part of a packaging which is normally in contact with the hazardous material.

N6 Battery fluid packaged with electric storage batteries, wet or dry, must conform to the packaging provisions of § 173.159 (g) or (h) of this subchapter.

N7 The hazard class or division number of the material must be marked on the package in accordance with § 172.302 of this subchapter. However, the hazard label corresponding to the hazard class or division may be substituted for the marking.

N8 Nitroglycerin solution in alcohol may be transported under this entry only when the solution is packed in metal cans of not more than 1 L capacity each, overpacked in a wooden box containing not more than 5 L. Metal cans must be completely surrounded with absorbent cushioning material. Wooden boxes must be completely lined with a suitable material impervious to water and nitroglycerin.

N12 Plastic packagings are not authorized.

N25 Steel single packagings are not authorized.

N32 Aluminum materials of construction are not authorized for single packagings.

N33 Aluminum drums are not authorized.

N34 Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material.

N36 Aluminum or aluminum alloy construction materials are permitted only for halogenated hydrocarbons that will not react with aluminum.

N37 This material may be shipped in a integrally-lined fiber drum (1G) which meets the general packaging requirements of subpart B of part 173 of this subchapter, the requirements of part 178 of this subchapter at the packing group assigned for the material and to any other special provisions of column 7 of the § 172.101 table.

N40 This material is not authorized in the following packagings:

a. A combination packaging consisting of a 4G fiberboard box with inner receptacles of glass or earthenware;

b. A single packaging of a 4C2 sift-proof, natural wood box; or

c. A composite packaging 6PG2 (glass, porcelain or stoneware receptacles within a fiberboard box).

N41 Metal construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material.

N43 Metal drums are permitted as single packagings only if constructed of nickel or monel.

N45 For combination packagings, only copper cartridges are permitted as inner packagings when the hazardous material is not in dispersion.

N65 Outage must be sufficient to prevent cylinders or spheres from becoming liquid full at 55 °C (130 °F). The vacant space (outage) may be charged with a nonflammable nonliquefied compressed gas if the pressure in the cylinder or sphere at 55 °C (130 °F) does not exceed 125 percent of the marked service pressure.

N71 Combination packagings consisting of inner glass packagings of not over 1.0 L (0.3 gallon) capacity each or inner metal packagings of not over 5.0 L (1 gallon) capacity each, placed in strong outer packagings, are authorized. Packagings are not subject to the requirements of part 178 of this subchapter.

N72 Packagings must be examined by the Bureau of Explosives and approved by the Associate Administrator for Hazardous Materials Safety.

N73 Packagings consisting of outer wooden or fiberboard boxes with inner glass, metal or other strong containers; metal or fiber drums; kegs or barrels; or strong metal cans are authorized and need not conform to the requirements of part 178 of this subchapter.

N74 Packages consisting of tightly closed inner containers of glass, earthenware, metal or polyethylene, capacity not over 0.5 kg (1.1 pounds) securely cushioned and packed in outer wooden barrels or wooden or fiberboard boxes, not over 15 kg (33 pounds) net weight, are authorized and need not conform to the requirements of part 178 of this subchapter.

N75 Packages consisting of tightly closed inner packagings of glass, earthenware or metal, securely cushioned and packed in outer wooden barrels or wooden or fiberboard boxes, capacity not over 2.5 kg (5.5 pounds) net weight, are authorized and need not conform to the requirements of part 178 of this subchapter.

N76 For materials of not more than 25 percent active ingredient by weight, packages consisting of inner metal packagings not greater than 250 ml (8 ounces) capacity each, packed in strong outer packagings together with sufficient absorbent material to completely absorb the liquid contents are authorized and need not conform to the requirements of part 178 of this subchapter.

N77 For materials of not more than two percent active ingredients by weight, packagings need not conform to the requirements of part 178 of this subchapter, if liquid contents are absorbed in an inert material.

N78 Packages consisting of inner glass, earthenware, or polyethylene or other nonfragile plastic bottles or jars not over 0.5 kg (1.1 pounds) capacity each, or metal cans not over five pounds capacity each, packed in outer wooden boxes, barrels or kegs, or fiberboard boxes are authorized and need not conform to the requirements of part 178 of this subchapter. Net weight of contents in fiberboard boxes may not exceed 29 kg (64 pounds). Net weight of contents in wooden boxes, barrels or kegs may not exceed 45 kg (99 pounds).

N79 Packages consisting of tightly closed metal inner packagings not over 0.5 kg (1.1 pounds) capacity each, packed in outer wooden or fiberboard boxes, or wooden barrels, are authorized and need not conform to the requirements of part 178 of this subchapter. Net weight of contents may not exceed 15 kg (33 pounds).

N80 Packages consisting of one inner metal can, not over 2.5 kg (5.5 pounds) capacity, packed in an outer wooden or fiberboard box, or a wooden barrel, are authorized and need not conform to the requirements of part 178 of this subchapter.

(6) *"R" codes.* These provisions apply only to transportation by rail. [Reserved]

(7) *"T" codes.* These provisions apply only to transportation in IM portable tanks. They are divided into two groupings, one of which appears as the IM Tank Table in paragraph (c)(7)(i) of this section, and the second of which imposes specific requirements and appears in paragraph (c)(7)(ii) of this section.

(i) *IM Tank Configurations.* Column 1 lists the code for the special provisions

as specified in column 7 of the § 172.101 table. Column 2 specifies the IM tank type, either IM 101 (§§ 178.270 and 178.271 of this subchapter) or IM 102 (§§ 178.270 and 178.272 of this subchapter). Column 3 specifies the minimum test pressure, in bars (1 bar = 14.5 psig), at which the periodic hydrostatic testing required by § 173.32b of this subchapter must be conducted. Column 4 specifies either the section referenced for requirements for bottom openings or "Prohibited", which means bottom openings are prohibited. Column 5 specifies the section reference for requirements applicable to pressure relief devices.

IM TANK CONFIGURATIONS

Code (1)	IM tank type (2)	Minimum test Pressure (bars) (3)	Bottom outlets (4)	Pressure relief devices (5)
T1	102	1.5	§ 173.32c(g)(1)	§ 178.270–11(a)(1),(2)
T2	102	1.5	§ 173.32c(g)(2)	§ 178.270–11(a)(1),(2)
T7	101	2.65	§ 173.32c(g)(1)	§ 178.270–11(a)(1),(2)
T8	101	2.65	§ 173.32c(g)(2)	§ 178.270–11(a)(1),(2)
T9	101	2.65	Prohibited	§ 178.270–11(a)(1),(2)
T11	101	2.65	§ 173.32c(g)(2)	§ 178.270–11(a)(3)
T12	101	2.65	Prohibited	§ 178.270–11(a)(3)
T13	101	4	§ 173.32c(g)(1)	§ 178.270–11(a)(1),(2)
T14	101	4	§ 173.32c(g)(2)	§ 178.270–11(a)(1),(2)
T15	101	4	Prohibited	§ 178.270–11(a)(1),(2)
T16	101	4	§ 173.32c(g)(1)	§ 178.270–11(a)(3)
T17	101	4	§ 173.32c(g)(2)	§ 178.270–11(a)(3)
T18	101	4	Prohibited	§ 178.270–11(a)(3)
T20	101	6	§ 173.32c(g)(2)	§ 178.270–11(a)(1),(2)
T21	101	6	Prohibited	§ 178.270–11(a)(1),(2)
T23	101	6	§ 173.32c(g)(2)	§ 178.270–11(a)(3)
T24	101	6	Prohibited	§ 178.270–11(a)(3)
T28	101	10	Prohibited	§ 178.270–11(a)(1),(2)
T39	101	10	Prohibited	§ 178.270–11(a)(3)
T43	101	9	Prohibited	§ 178.270–11(a)(3)

(ii) *IM Tank special provisions.* These provisions apply only to transportation in IM portable tanks:

Code/Special Provisions

T25 This hazardous material is not permitted for transport in IM portable tanks.

T26 Each tank must have a minimum shell thickness of 6.35 mm (0.250 inch) mild steel.

T27 Each tank must have a minimum shell thickness of 8.0 mm (0.315 inch) mild steel.

T29 The lading must be completely covered with nitrogen or an inert gas.

T30 IM 102 portable tanks without bottom openings authorized for a hazardous material with a flash point of 0 °C (32 °F) or greater and a vapor pressure not greater than 65 kPa (9.4 psia) at 65 °C (150 °F).

T31 IM 102 portable tanks without bottom openings or with bottom openings conforming to § 173.32c(g)(2) of this subchapter are authorized for a hazardous material with a flash point of 0 °C (32 °F) or greater and a vapor pressure not greater than 65 kpa (9.4 psia) at 65 °C (150 °F).

T32 Each tank must have a minimum shell thickness of 10.0 mm (0.394 inch) mild steel with at least 5.0 mm (0.197 inch) lead lining.

T33 Dry phosphorus is not permitted. For transport in a molten state, the tank must be insulated in accordance with Note T38. Air must be eliminated from the interior of the tank. The tank may be heated, however, interior heating coils are prohibited.

T35 Each tank must be equipped with reclosing (spring loaded) pressure relief valves set to discharge at pressures determined according to the pressure characteristics of the organic peroxide lading.

T36 Each tank must be equipped with pressure relief devices with sufficient venting capacity to prevent the tank from bursting.

T38 Each tank must be thermally insulated by completely covering it with at least 100 mm (3.94 inches) of cork or other suitable insulation material of sufficient thickness that the overall thermal conductance is not more than 0.080 Btu per hour per square foot per degree Fahrenheit differential.

T40 Each tank must have a minimum shell thickness of 10.0 mm (0.39 inch) mild steel.

T41 Each tank must have a minimum shell thickness of 12.0 mm (0.47 inch) mild steel.

T42 Transport in IM portable tanks permitted only under conditions approved by the Associate Administrator for Hazardous Materials Safety.

T44 DOT Specification IM 101 portable tanks shall be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter. Thickness of stainless steel for tank shell and heads must be the greater of 7.62 mm (0.300 inch) or the thickness required for a tank with a design pressure at least equal to 1.5 times the vapor pressure of the lading at 46 °C (115 °F).

T45 DOT Specification IM 101 portable tanks shall be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24b(b) of this subchapter. Thickness of stainless steel for tank shell and heads must be the greater of 6.35 mm (0.250 inch) or the thickness required for a tank with a design pressure at least equal to 1.3 times the vapor pressure of the lading at 46 °C (115 °F).

(8) *"W" codes.* These provisions apply only to transportation by water:

Code/Special Provisions

W41 When offered for transportation by water, this material must be packaged in bales and be securely and tightly bound with rope, wire or similar means.

§ 172.201 [Amended]

18. In § 172.201, in paragraph (a)(3) the word "subpart" is changed to "subchapter", and paragraphs (a)(4)(i) and (a)(4)(ii) are removed.

19. Section 172.202 is amended by revising paragraphs (a) through (d) to read as follows:

§ 172.202 Description of hazardous material on shipping papers.

(a) The shipping description of a hazardous material on the shipping paper must include:

(1) The proper shipping name prescribed for the material in Column 2 of the § 172.101 Table;

(2) The hazard class or division prescribed for the material as shown in Column 3 of the § 172.101 Table (class names, IMO class and division numbers or subsidiary hazard classes may be entered in parentheses following the numerical hazard class);

(3) The identification number prescribed for the material as shown in Column 4 of the § 172.101 Table;

(4) The packing group, if any, prescribed for the material in Column 5 of the § 172.101 Table preceded by the letters "PG"; and

(5) Except for empty packagings, the total quantity (by weight, volume or as otherwise appropriate) of the hazardous material covered by the description.

(b) Except as provided in this subpart, the basic description specified in paragraphs (a) (1), (2), (3) and (4) of this section must be shown in sequence with no additional information interspersed. For example: "Gasoline, 3, UN 1203, PG II".

(c) The total quantity of the material covered by one description must appear before or after, or both before and after, the description required and authorized by this subpart. The type of packaging and destination marks may be entered in any appropriate manner before or after the basic description. Abbreviations may be used to express units of measurement and types of packagings.

(d) Technical and chemical group names may be entered in parentheses between the proper shipping name and hazard class or following the basic description. An appropriate modifier, such as "contains" or "containing," may be used. For example: "Flammable liquids, n.o.s. (contains Xylene and Benzene), 3, UN 1993, PG II".

* * * * *

20. In § 172.203, paragraph (l) is removed and reserved, and paragraphs (c)(2), (i)(2), (j), (k), and (m)(3) are revised to read as follows:

§ 172.203 Additional description requirements.

* * * * *

(c) * * *

(2) The letters "RQ" shall be entered on the shipping paper either before or after, the basic description required by § 172.202 for each hazardous substance (see definition in 171.8 of this subchapter). For example: "RQ, Allyl alcohol, 3, UN 1098, PG I"; or "Environmentally hazardous substance, solid, n.o.s., 9, UN 3077, PG III, RQ (Adipic acid)".

* * * * *

(i) * * *

(2) The entry "skin corrosive only" must be included in association with the basic description to authorize "under deck" stowage for Corrosive liquids, n.o.s. and Corrosive solids, n.o.s. that meet only the corrosion to skin criteria of § 173.136(a) of this subchapter.

(j) *Dangerous when wet material.* The words "Dangerous when wet" shall be entered on the shipping paper in association with the basic description for a material which meets the definition of a dangerous when wet material in § 173.124(c) of this subchapter.

(k) *Technical names for "n.o.s." and other generic descriptions.* Unless otherwise excepted, if a material is described on a shipping paper by one of the proper shipping names listed in paragraph (k)(3) of this section, the technical name of the hazardous material must be entered in parentheses in association with the basic description. For example "Corrosive liquid, n.o.s., (Caprylyl chloride), 8, UN 1760, PG II", or "Corrosive liquid, n.o.s., 8, UN 1760, PG II (contains caprylyl chloride)". The word contains may be used in association with the technical name, if appropriate. For organic peroxides which may qualify for more than one generic listing depending on concentration, the technical name must include the actual concentration being shipped or the concentration range for the appropriate generic listing. For example, (1) Organic peroxide type B, solid, UN 3102 (dibenzoyl peroxide, 52–100%), (2) Organic peroxide type E, solid, UN 3108, (dibenzoyl peroxide, paste, <52%).

(1) In addition to the n.o.s. descriptions listed herein, the requirements of this section apply to all shipping descriptions for poisonous materials which are subject to the requirements of paragraph (m) of this section, and for which the proper shipping name does not specifically identify the poisonous constituent by technical name. For example, "Motor fuel antiknock compound (Tetraethyl lead), 6.1 , UN 1649, PG I", or "Motor fuel antiknock compound, 6.1. UN 1649, PG I (Tetraethyl lead)".

(2) If a hazardous material is a mixture or solution of two or more hazardous materials, the technical names of at least two components most predominately contributing to the hazards of the mixture or solution must be entered on the shipping paper as required by paragraph (k) of this section. For example, "Flammable liquid, corrosive, n.o.s., 3, UN 2924, PG II (contains Methanol, Potassium hydroxide)".

(3) Proper shipping names for which the provisions of paragraph (k) apply are as follows:

Aerosols, corrosive, n.o.s.
Aerosols, flammable, n.o.s.
Aerosols, nonflammable, n.o.s.
Aerosols, poison, n.o.s.
Alcohols, n.o.s.
Alcohols, toxic, n.o.s.
Aldehydes, n.o.s.
Aldehydes, toxic, n.o.s.
Alkaloids, liquid, poisonous, n.o.s. [or] Alkaloid salts, liquid, poisonous, n.o.s.
Alkaloids, solid, n.o.s. [or] Alkaloid salts, solid, n.o.s.
Alkylamines, n.o.s. [or] Polyalkyamines, n.o.s.
Ammunition, toxic (with burster expelling charge or propelling charge)
Articles, explosive, n.o.s.
Bisulfites, inorganic, aqueous solution, n.o.s.
Caustic alkali liquids, n.o.s.
Cement, adhesive, n.o.s.
Combustible liquid, n.o.s.
Compounds, cleaning liquid, corrosive
Components, explosive train, n.o.s.
Compressed or Liquefied gases, n.o.s.
Compressed or Liquefied gases, flammable, n.o.s.
Compressed or Liquefied gases, flammable, toxic, n.o.s.
Compressed or Liquefied gases, toxic, n.o.s.
Contrivances, water-activated
Corrosive liquids, flammable, n.o.s.
Corrosive liquids, n.o.s.
Corrosive liquids, oxidizing, n.o.s.
Corrosive liquids, poisonous, n.o.s.
Corrosive liquids, which in contact with water emit flammable gases, n.o.s.
Corrosive solids, flammable, n.o.s.
Corrosive solids, n.o.s.
Corrosive solids, oxidizing, n.o.s.
Corrosive solids, poisonous, n.o.s.
Corrosive solids, self heating, n.o.s.
Corrosive solids, which in contact with water emit flammable gases, n.o.s.
Disinfectants, corrosive, liquid, n.o.s.
Disinfectants, liquid, n.o.s.
Disinfectants, solids, n.o.s.
Dispersant gas, n.o.s.

Dyes, liquid, n.o.s. or Dye intermediates, liquid, n.o.s.
Dyes, solid, n.o.s. or Dye intermediates, solid, n.o.s.
Environmentally hazardous substances, liquid, n.o.s.
Environmentally hazardous substances, solid, n.o.s.
Etiologic agent, n.o.s.
Flammable liquids, corrosive, n.o.s.
Flammable liquids, n.o.s.
Flammable liquids, poisonous, n.o.s.
Flammable solids, corrosive, n.o.s.
Flammable solids, n.o.s.
Flammable solids, poisonous, n.o.s.
Halogenated irritating liquids, n.o.s.
Hazardous waste, liquid, n.o.s.
Hazardous waste, solid, n.o.s.
Hydrides, metal, n.o.s.
Hydrocarbon gases, compressed, n.o.s. [or] Hydrocarbon gas, mixtures, compressed, n.o.s.
Hydrocarbon gases, liquefied, n.o.s. [or] Hydrocarbon gas mixtures, liquefied, n.o.s.
Infectious substances, affecting animals
Infectious substances, affecting humans
Insecticide gases, flammable, n.o.s.
Insecticide gases, n.o.s.
Insecticide gases, toxic, n.o.s.
Isocyanates, liquid [or] solid, n.o.s. [or] Isocyanate solutions, n.o.s.
Isocyanates, n.o.s. [or] Isocyanate solutions, n.o.s.
Ketones, liquid, n.o.s.
Medicines, n.o.s.
Mercaptans, liquid, n.o.s. [or] Mercaptan mixtures, liquid, n.o.s.
Metal alkyl halides, n.o.s.
Metal alkyl hydrides, n.o.s.
Metal alkyls, n.o.s.
Metal alkyl, solution, n.o.s.
Metal powders, flammable, n.o.s.
Organic peroxide type B, liquid
Organic peroxide type B, liquid, temperature controlled
Organic peroxide type B, solid
Organic peroxide type B, solid, temperature controlled
Organic peroxide type C, liquid
Organic peroxide type C, liquid, temperature controlled
Organic peroxide type C, solid
Organic peroxide type C, solid, temperature controlled
Organic peroxide type D, liquid
Organic peroxide type D, liquid, temperature controlled
Organic peroxide type D, solid
Organic peroxide type D, solid, temperature controlled
Organic peroxide type E, liquid
Organic peroxide type E, liquid, temperature controlled
Organic peroxide type E, solid
Organic peroxide type E, solid, temperature controlled
Organic peroxide type F, liquid
Organic peroxide type F, liquid, temperature controlled
Organic peroxide type F, solid
Organic peroxide type F, solid, temperature controlled
Organotin compounds, liquid, n.o.s.
Organotin compounds, solid, n.o.s.
Organotin pesticides, liquid, toxic, n.o.s.
Organotin pesticides, solid, toxic, n.o.s.
Other regulated substances, liquid, n.o.s.
Other regulated substances, solid, n.o.s.
Oxidizing substances, liquid, corrosive, n.o.s.
Oxidizing substances, liquid, n.o.s.
Oxidizing substances, liquid, poisonous, n.o.s.
Oxidizing substances, solid, corrosive, n.o.s.
Oxidizing substances, solid, flammable, n.o.s.
Oxidizing substances, solid, n.o.s.
Oxidizing substances, solid, poisonous, n.o.s.
Oxidizing substances, solid, self-heating, n.o.s.
Pesticides, liquid, flammable, toxic, n.o.s.
Pesticides, liquid, toxic, flammable, n.o.s.
Pesticides, liquid, toxic, n.o.s.
Pesticides, solid, toxic, n.o.s.
Petroleum distillates, n.o.s.
Plastics, nitrocellulose-based, spontaneously combustible, n.o.s.
Poisonous liquids, corrosive, n.o.s.
Poisonous liquids, flammable, n.o.s.
Poisonous liquids, n.o.s.
Poisonous liquids, oxidizing, n.o.s.
Poisonous liquids, which in contact with water emit flammable gases, n.o.s.
Poisonous solids, corrosive, n.o.s.
Poisonous solids, flammable, n.o.s.
Poisonous solids, n.o.s.
Poisonous solids, oxidizing, n.o.s.
Poisonous solids, self-heating, n.o.s.
Poisonous solids, which in contact with water emit flammable gases, n.o.s.
Pyrophoric liquids, n.o.s.
Pyrophoric solids, n.o.s.
Pyrophoric metals, n.o.s. [or] Pyrophoric alloys, n.o.s.
Refrigerant gas, n.o.s.
Refrigerant gases, n.o.s.
Rodenticides, n.o.s.
Samples, explosive (other than initiating explosives)
Self-heating substances, solid, corrosive, n.o.s.
Self-heating substances, solid, n.o.s.
Self-heating substances, solid, oxidizing, n.o.s.
Self-heating substances, solid, poisonous, n.o.s.
Self-reactive substances, Sample, n.o.s.
Self-reactive substances, Trial quantities, n.o.s.
Substances, explosive, n.o.s.
Substances, explosive, very insensitive, n.o.s.
Substances, which in contact with water emit flammable gases, liquid, corrosive, n.o.s.
Substances, which in contact with water emit flammable gases, liquid, n.o.s.
Substances, which in contact with water emit flammable gases, liquid, poisonous, n.o.s.
Substances, which in contact with water emit flammable gases, solid, corrosive, n.o.s.
Substances, which in contact with water emit flammable gases, solid, n.o.s.
Substances, which in contact with water emit flammable gases, solid, oxidizing, n.o.s.
Substances, which in contact with water emit flammable gases, solid, poisonous, n.o.s.
Substances, which in contact with water emit flammable gases, solid, self-heating, n.o.s.
Substances, which in contact with water emit flammable gases, solid, flammable, n.o.s.
Tear gas substances, n.o.s. liquid or solid

(4) The provisions of this paragraph do not apply—

(i) To a material that is a hazardous waste and described using the proper shipping name "Hazardous waste, liquid *or* solid, n.o.s.", classed as a miscellaneous Class 9, provided the EPA hazardous waste number is included on the shipping paper in association with the basic description, or provided the material is described in accordance with the provisions of § 172.203(c) of this part.

(ii) To a material for which the hazard class is to be determined by testing under the criteria in § 172.101(c)(12).

(iii) If the n.o.s. description for the material (other than a mixture of hazardous materials of different classes meeting the definitions of more than one hazard class) contains the name of the chemical element or group which is primarily responsible for the material being included in the hazard class indicated. For example "Mercury compounds, solid, n.o.s., 6.1, UN 2025, PG II".

(iv) If the n.o.s. description for the material (which is a mixture of hazardous materials of different classes meeting the definition of more than one hazard class) contains the name of the chemical element or group responsible for the material meeting the definition of one of these classes. In such cases, only the technical name of the component that is not appropriately identified in the n.o.s. description shall be entered in parentheses. For example: "Carbamate n.o.s., flash point less than 23 °C (contains Xylene) 3(6.1), UN 2758, PG II".

(l) [Reserved]

(m) * * *

(3) For Division 2.3 materials and Division 6.1 Packing Group I materials which are poisonous by inhalation under the criteria specified in § 173.133(a)(2) of this subchapter, the words "Poison-Inhalation Hazard" and the words "Hazard Zone A", "Hazard Zone B", "Hazard Zone C", or "Hazard Zone D", as appropriate, shall be entered on the shipping paper in association with the shipping description. The word "Poison" need not be repeated if it otherwise appears in the shipping description.

21. Section 172.301 is revised to read as follows:

§ 172.301 General marking requirements for non-bulk packagings.

(a) *Proper shipping name and identification number.* (1) Except as otherwise provided by this subchapter, each person who offers for transportation a hazardous material in a non-bulk packaging shall mark the package with the proper shipping name and identification number (preceded by

"UN" or "NA", as appropriate) for the material as shown in the § 172.101 table.

(2) The proper shipping name for a hazardous waste (as defined in § 171.8 of this subchapter) is not required to include the word "waste" if the package bears the EPA marking prescribed by 40 CFR 262.32.

(b) *Technical names.* In addition to the marking required by paragraph (a) of this section, each non-bulk packaging containing hazardous materials subject to the provisions of § 172.203(k) of this part shall be marked with the technical name in parentheses in association with the proper shipping name in accordance with the requirements and exceptions specified for display of technical descriptions on shipping papers in § 172.203(k) of this part.

(c) *Exemption packagings.* The outside of each package authorized by an exemption shall be plainly and durably marked "DOT-E" followed by the exemption number assigned.

(d) *Consignee's or consignor's name and address.* Each person who offers for transportation a hazardous material in a non-bulk package shall mark that package with the name and address of the consignor or consignee except when the package is—

(1) Transported by highway only and will not be transferred from one motor carrier to another; or

(2) Part of a carload lot, truckload lot or freight container load, and the entire contents of the rail car, truck or freight container are shipped from one consignor to one consignee.

(e) *Previously marked packagings.* A package which has been previously marked as required for the material it contains and on which the marking remains legible, need not be remarked. (For empty packagings, see § 173.29 of this subchapter.)

(f) *Marking exceptions.* (1) Identification numbers are not required on packages which contain only limited quantities, as defined in § 171.8 of this subchapter, or ORM-D materials.

(2) The marking of technical names on non-bulk packagings filled for shipment prior to December 31, 1990 is not required until December 31, 1991.

22. Current § 172.302 was removed effective 12-31-90 at 54 FR 27145, and 55 FR 33711 and 33712; a new § 172.302 is added in its place to read as follows:

§ 172.302 General marking requirements for bulk packagings.

(a) Identification numbers. Except as otherwise provided in this subpart, no person may offer for transportation or transport a hazardous material in a bulk packaging unless the packaging is marked as required by § 172.332 with the identification number specified for the material in the § 172.101 Table—

(1) On each side and each end, if the packaging has a capacity of 3,785 L (1,000 gallons) or more;

(2) On two opposing sides, if the packaging has a capacity of less than 3,785 L (1,000 gallons); or

(3) For cylinders permanently installed on a tube trailer motor vehicle, on each side and each end of the motor vehicle.

(b) Size of markings. Except as otherwise provided, markings required by this subpart on bulk packagings must have a width of at least 6.0 mm (0.24 inch) and a height of at least—

(1) 100 mm (3.9 inches) for rail cars;

(2) 75 mm (3.0 inches) for cargo tanks; and

(3) 50 mm (2.0 inches) for other bulk packages.

(c) Exemption packagings. The outside of each bulk package used under the terms of an exemption shall be plainly and durably marked "DOT-E" followed by the exemption number assigned.

(d) Each bulk packaging marked with a proper shipping name, common name or identification number as required by this subpart must remain marked when it is emptied unless it is—

(1) Sufficiently cleaned of residue and purged of vapors to remove any potential hazard; or

(2) Refilled, with a material requiring different markings or no markings, to such an extent that any residue remaining in the packaging is no longer hazardous.

(e) Additional requirements for marking portable tanks, cargo tanks, tank cars, multi-unit tank car tanks, and other bulk packagings are prescribed in §§ 172.326, 172.328, 172.330, and 172.331, respectively, of this subpart.

23. Section 172.303 is added to read as follows:

§ 172.303 Prohibited marking.

(a) No person may offer for transportation or transport a package which is marked with the proper shipping name or identification number of a hazardous material unless the package contains the identified hazardous material or its residue.

(b) This section does not apply to—

(1) Transportation of a package in a transport vehicle or freight container if the package is not visible during transportation and is loaded by the shipper and unloaded by the shipper or consignee.

(2) Markings on a package which are securely covered in transportation.

§ 172.306 [Removed and reserved]

24. Section 172.306 is removed and reserved.

25. Section 172.308 is revised to read as follows:

§ 172.308 Authorized abbreviations.

(a) Abbreviations may not be used in a proper shipping name marking except as authorized in this section.

(b) For marking descriptions of ammunition, such as Ammunition for cannon without projectile, etc., the words "with" or "without" may be abbreviated as "W" or "W/O". For example: "Ammunition for cannon W/O projectile."

(c) The abbreviation "ORM" may be used in place of the words "Other Regulated Material."

(d) Abbreviations which appear as authorized descriptions in Column 2 of the § 172.101 Table (e.g., "TNT" and "2,4-D") are authorized.

26. Section 172.312 is revised to read as follows:

§ 172.312 Liquid hazardous materials in non-bulk packagings.

(a) Except as provided in this section, each non-bulk combination package having inner packagings containing liquid hazardous materials must be:

(1) Packed with closures upward, and

(2) Legibly marked with package orientation markings as specified in § 171.7 of this subchapter ISO Standard R780-1968 on two opposite vertical sides of the package with the arrows pointing in the correct upright direction.

(b) Arrows for purposes other than indicating proper package orientation may not be displayed on a package containing a liquid hazardous material.

(c) The requirements of paragraph (a) of this section do not apply to—

(1) A non-bulk package with inner packagings which are cylinders.

(2) Except when offered or intended for transportation by aircraft, packages containing flammable liquids in inner packagings of one liter or less prepared in accordance with § 173.150 (b) or (c) of this subchapter.

(3) When offered or intended for transportation by aircraft, packages containing flammable liquids in inner packagings of 120 ml (4 fluid oz.) or less prepared in accordance with § 173.150 (b) or (c) of this subchapter when packed with sufficient absorption material between the inner and outer packagings to completely absorb the liquid contents.

26a. Section 172.313 is added to read as follows:

§ 172.313 Poisonous hazardous materials.

(a) Each package containing a Division 2.3 materials or a poisonous liquid subject to the "Poison-Inhalation Hazard" shipping paper description of § 172.203(m)(3) shall be marked "Inhalation Hazard" in association with the required labels or placards, as appropriate. (See § 172.302(b) for size of markings on bulk packages.) Bulk packagings must be marked on two opposing sides.

(b) Each non-bulk plastic outer packaging used as a single or composite packaging for materials meeting the definition of Division 6.1 (in § 173.132 of this subchapter) shall be permanently marked, by embossment or other durable means, with the word "POISON" in letters at least 6.3 mm (0.25 inch) in height. Additional text or symbols related to hazard warning may be included in the marking. The marking shall be located within 150 mm (6 inches) of the closure of the packaging.

27. In § 172.316, paragraphs (a) and (c) are revised to read as follows:

§ 172.316 Packagings containing material classed as ORM-D.

(a) Each non-bulk packaging containing a material classed as ORM-D must be marked on at least one side or end with the ORM-D designation immediately following or below the proper shipping name of the material. The ORM designation must be placed within a rectangle that is approximately 6.3 mm (0.25 inches) larger on each side than the designation. The designation for ORM-D must be:

(1) ORM-D-AIR for an ORM-D that is prepared for air shipment and packaged in accordance with the provisions of § 173.27 of this subchapter.

(2) ORM-D for an ORM-D other than as described in paragraph (a)(1) of this section.

* * * * *

(c) The marking ORM-D is the certification by the person offering the packaging for transportation that the material is properly described, classed, packaged, marked and labeled (when appropriate) and in proper condition for transportation according to the applicable regulations of this subchapter. This form of certification does not preclude the requirement for a certificate on a shipping paper when required by subpart C of this part.

28. Section 172.320 is added to read as follows:

§ 172.320 Explosive hazardous materials.

(a) Except as provided in paragraphs (b), (c) and (d) of this section, each package containing a Class 1 (explosive) material must be marked with the EX-number for each substance, article or device contained therein.

(b) Except for fireworks approved in accordance with § 173.56(j) of this subchapter, a package of Class 1 (explosive) materials may be marked with a national stock number or product code instead of the EX-number required by paragraph (a) of this section if that national stock number or product code is traceable to the specific EX-number assigned by the Associate Administrator for Hazardous Materials Safety.

(c) When more than five different Class 1 (explosive) materials are packed in the same package, the package need not be marked with more than five of the EX-numbers, national stock number, or product code, use of the national stock number and product code must be in compliance with paragraph (b) of this section, or combination thereof.

(d) The requirements of this section do not apply to Class 1 (explosive) materials that—

(1) Are shipped to a testing agency in accordance with § 173.56(d) of this subchapter;

(2) Are shipped in accordance with § 173.56(e) of this subchapter, for the purposes of developmental testing;

(3) Meet the requirements of § 173.56(h) of this subchapter and, thus, are not subject to the approval process of § 173.56 of this subchapter;

(4) Are shipped in accordance with § 171.19 of this subchapter, until October 1, 1993;

(5) Are transported in accordance with § 173.56(c)(2) of this subchapter and, thus, are covered by a national security classification currently in effect; or

(6) Are shipped under an interim classification in accordance with the exemption "DOT E-9256", subject to the conditions, limitations, and terms of the exemption.

29. In § 172.324, the title and the introductory text preceding paragraph (a) are revised to read as follows:

§ 172.324 Hazardous substances in non-bulk packagings.

For each non-bulk package that contains a hazardous substance—

* * * * *

30. Section 172.328 is revised to read as follows:

§ 172.328 Portable tanks.

(a) *Shipping name.* No person may offer for transportation or transport a portable tank containing a hazardous material unless it is legibly marked on two opposing sides with the proper shipping name specified for the material in the § 172.101 Table.

(b) *Owner's name.* The name of the owner or of the lessee, if applicable, must be displayed on a portable tank that contains a hazardous material.

(c) *Identification numbers.* (1) If the identification number markings required by § 172.302(a) are not visible, a transport vehicle or freight container used to transport a portable tank must be marked on each side and each end as required by § 172.332 with the identification number specified for the material in the § 172.101 Table.

(2) Each person who offers a portable tank to a motor carrier, for transportation in a transport vehicle or freight container, shall provide the motor carrier with the required identification numbers on placards, orange panels, or the white square-on-point configuration, as appropriate, for each side and each end of the transport vehicle or freight container from which identification numbers on the portable tank are not visible.

31. Section 172.328 is revised to read as follows:

§ 172.328 Cargo tanks.

(a) *Providing and affixing identification numbers.* Unless a cargo tank is already marked with the identification numbers required by this subpart, the identification numbers must be provided or affixed as follows:

(1) A person who offers a hazardous material to a motor carrier for transportation in a cargo tank shall provide the motor carrier the identification numbers on placards or shall affix orange panels containing the required identification numbers, prior to or at the time the material is offered for transportation.

(2) A person who offers a cargo tank containing a hazardous material for transportation shall affix the required identification numbers on panels or placards prior to or at the time the cargo tank is offered for transportation.

(b) *Required markings: Gases.* Except for certain nurse tanks which must be marked as specified in § 173.315(m) of this subchapter, each cargo tank transporting a Class 2 material subject to this subchapter must be marked, in lettering no less than 50 mm (2.0 inches), on each side and each end with—

(1) The proper shipping name specified for the gas in the § 172.101 Table; or

(2) An appropriate common name for the material (e.g., "Refrigerant Gas").

(c) *OT/NOT markings.* Each MC 330 and MC 331 cargo tank must be marked near the specification plate, in letters no less than 50 mm (2.0 inches) in height, with—

(1) "QT", if the cargo tank is constructed of quenched and tempered steel; or

(2) "NQT", if the cargo tank is constructed of other than quenched and tempered steel.

32. Section 173.330 is revised to read as follows:

§ 172.330 Tank cars and multi-unit tank car tanks.

(a) *Shipping name.* No person may offer for transportation or transport a hazardous material—

(1) In a tank car unless the tank car is marked on each side, when required by a special provision to the § 172.101 Table or part 173 of this subchapter, with the proper shipping name specified for the material in the § 172.101 Table, or with a common name authorized for the material in this subchapter (e.g., "Refrigerant Gas").

(2) In a multi-unit tank car tank, unless the tank is marked on two opposing sides, in letters and numerals no less than 50 mm (2.0 inches) high, with the proper shipping name specified for the material in the § 172.101 Table or with a common name authorized for the material in this subchapter, (e.g., "Refrigerant Gas").

(b) A motor vehicle or rail car used to transport a multi-unit tank car tank containing a hazardous material must be marked on each side and each end, as required by § 172.332, with the identification number specified for the material in the § 172.101 Table.

33. Section 172.331 is revised to read as follows:

§ 172.331 Bulk packagings other than portable tanks, cargo tanks, tank cars and multi-unit tank car tanks.

(a) Each person who offers a hazardous material to a motor carrier for transportation in a bulk packaging shall provide the motor carrier with the required identification numbers on placards or plain white square-on-point display configurations, as authorized, or shall affix orange panels containing the required identification numbers to the packaging prior to or at the time the material is offered for transportation, unless the packaging is already marked with the identification number as required by this subchapter.

(b) Each person who offers a bulk packaging containing a hazardous material for transportation shall affix to the packaging the required identification numbers on orange panels, square-on-point configurations or placards, as appropriate, prior to, or at the time the packaging is offered for transportation unless it is already marked with identification numbers as required by this subchapter.

34. In § 172.332, paragraphs (b)(1), (b)(3), (c)(1), (c)(2), (c)(3) and (c)(5) are revised to read as follows:

§ 172.332 Identification number markings.

* * * * *

(b) * * *

(1) The orange panel must be 160 mm (6.3 inches) high by 400 mm (15.7 inches) wide with a 15 mm (0.6 inches) black outer border. The identification number shall be displayed in 100 mm (3.9 inches) black Helvetica Medium numerals on the orange panel. Measurements may vary from those specified plus or minus 5 mm (0.2 inches).

(2) * * *

(3) The name and hazard class of a material may be shown in the upper left border of the orange panel in letters not more than 18 points high.

(4) * * *

(c) * * *

(1) The identification number shall be displayed across the center area of the placard in 88 mm (3.5 inches) black Alpine Gothic or Alternate Gothic No. 3 numerals on a white background 100 mm (3.9 inches) high and approximately 215 mm (8.5 inches) wide and may be outlined with a solid or dotted line border.

(2) The top of the 100 mm (3.9 inches) high white background shall be approximately 40 mm (1.6 inches) above the placard horizontal center line.

(3) An identification number may be displayed only on a placard corresponding to the primary hazard class of the hazardous material.

(4) * * *

(5) The name of the hazardous material and the hazard class may be shown in letters not more than 18 points high immediately within the upper border of the space on the placard bearing the identification number of the material.

* * * * *

35. In § 172.334, the phrase "or § 172.102 (when authorized)" is removed from paragraph (b)(1), the phrase "or § 172.102" is removed from paragraph (b)(3), and paragraph (a) is revised to read as follows:

§ 172.334 Identification numbers; prohibited display.

(a) No person may display an identification number on a RADIOACTIVE, EXPLOSIVES 1.1, 1.2, 1.3, 1.4, 1.5 or 1.6, or DANGEROUS placard.

* * * * *

36. In § 172.336, the phrase "(e.g., ORM-A, B, C, D, or E)" is removed in paragraph (b) introductory text, and paragraphs (b)(1), (c) (2) and (3) are revised to read as follows:

§ 172.336 Identification numbers: special provisions.

* * * * *

(b) * * *

(1) The 100 cm (3.9 inch) by 215 mm (8.5 inches) area containing the identification number shall be located as prescribed by § 172.332 (c)(1) and (c)(2) and may be outlined with a solid or dotted line border.

(c) * * *

(2) On a cargo tank containing only gasoline, if the cargo tank is marked "Gasoline" on each side and rear in letters no less than 144 points high, or is placarded in accordance with § 172.542(c).

(3) On a cargo tank containing only fuel oil, if the cargo tank is marked "Fuel Oil" on each side and rear in letters no less than 144 points high, or is placarded in accordance with § 172.544(c).

* * * * *

37. Section 172.400 is revised to read as follows:

§ 172.400 General labeling requirements.

(a) Except as specified in § 172.400a, each person who offers for transportation or transports a hazardous material in any of the following packages or containment devices, shall label the package or containment device with labels specified for the material in the § 172.101 Table and in this subpart:

(1) A non-bulk package;

(2) A bulk packaging, other than a cargo tank, portable tank, or tank car, with a volumetric capacity of less than 18 m^3 (640 cubic feet), unless placarded in accordance with subpart F of this part;

(3) A portable tank of less than 3785 L (1000 gallons) capacity or unless placarded in accordance with subpart F of this part;

(4) A DOT Specification 106 or 110 multi-unit tank car tank, unless placarded in accordance with subpart F of this part; and

(5) An overpack, freight container or unit load device, of less than 18 m^3 (640 cubic feet), which contains a package for which labels are required, unless placarded or marked in accordance with § 172.512 of this part.

(b) Labeling is required for a hazardous material which meets one or more hazard class definitions, in accordance with Column 6 of the § 172.101 Table and the following table:

Hazard class or division	Label name	Label design or section reference (§)
1.1	EXPLOSIVE 1.1	172.411
1.2	EXPLOSIVE 1.2	172.411
1.3	EXPLOSIVE 1.3	172.411
1.4	EXPLOSIVE 1.4	172.411
1.5	EXPLOSIVE 1.5	172.411
1.6	EXPLOSIVE 1.6	172.411
2.1	FLAMMABLE GAS.	172.417
2.2	NON-FLAMMABLE GAS.	172.415
2.3	POISON GAS	172.416
3 (flammable liquid). Combustible liquid.	FLAMMABLE LIQUID. (none)	172.419
4.1	FLAMMABLE SOLID.	172.420
4.2	SPONTANEOUSLY COMBUSTIBLE.	172.422
4.3	DANGEROUS WHEN WET.	172.423
5.1	OXIDIZER	172.426
5.	ORGANIC PEROXIDE.	172.427
6.1 (Packing Groups I and II).	POISON	172.430
6.1 (Packing Group III).	KEEP AWAY FROM FOOD.	172.431
6.2	INFECTIOUS SUBSTANCE [1].	172.432
7 (see § 172.403)	RADIOACTIVE WHITE-I.	172.436
7	RADIOACTIVE YELLOW-II.	172.438
7	RADIOACTIVE YELLOW-III.	172.440
7 (empty packages, see § 173.427).	EMPTY	172.450
8	CORROSIVE	172.442
9	CLASS 9	172.446

[1] The ETIOLOGIC AGENT label specified in regulations of the Department of Health and Human Services at 42 CFR 72.3 may apply to packages of infectious substances.

38. Section 172.400a is added to read as follows:

§ 172.400a Exceptions from labeling.

(a) Notwithstanding the provisions of § 172.400, a label is not required on—

(1) A cylinder containing a Division 2.1 or Division 2.2 gas that is

(i) Not poisonous;

(ii) Carried by a private or contract motor carrier;

(iii) Not overpacked; and

(iv) Durably and legibly marked in accordance with CGA Pamphlet C-7, appendix A.

(2) A package or unit of military explosives (including ammunition) shipped by or on behalf of the DOD when in—

(i) Freight containerload, carload or truckload shipments, if loaded and unloaded by the shipper or DOD; or

(ii) Unitized or palletized break-bulk shipments by cargo vessel under charter to DOD if at least one required label is displayed on each unitized or palletized load.

(3) A package containing a hazardous material other than ammunition that is—

(i) Loaded and unloaded under the supervision of DOD personnel, and

(ii) Escorted by DOD personnel in a separate vehicle.

(4) A compressed gas cylinder permanently mounted in or on a transport vehicle.

(5) A freight container, aircraft unit load device or portable tank, which—

(i) Is placarded in accordance with Subpart F of this part, or

(ii) Conforms to paragraph (a)(3) or (b)(3) of § 172.512.

(6) An overpack or unit load device in or on which labels representative of each hazardous material in the overpack or unit load device is visible.

(7) A package of low specific activity radioactive material, when transported under § 173.425(b) of this subchapter.

(b) Certain exceptions to labeling requirements are provided for small quantities and limited quantities in applicable sections in part 173 of this subchapter.

§ 172.401 [Amended]

39. In § 172.401, in paragraph (a) introductory text the phrase "paragraphs (c) and (d)" is changed to read "paragraph (c)" and paragraph (d) is removed.

40. Section 172.402 is revised to read as follows:

§ 172.402 Additional labeling requirements.

(a) *Subsidiary hazard labels.* Notwithstanding the subsidiary labels specified in Column 6 of the § 172.101 Table, each package containing a material, other than a Class 2 material, meeting the definition of more than one hazard class shall be labeled with subsidiary hazard labels in accordance with the following table:

SUBSIDIARY HAZARD LABELS

Subsidiary hazard level (packing group)	Subsidiary Hazard (Class or Division)						
	3	4.1	4.2	4.3	5.1	6.1	8
I	X	---	---	X	X	X	X
II	X	X	X	X	X	X	X
III	*	N	X	X	N	N	**

X—Required for all modes.
*—Required for transport by vessel only.
**—Required for transport by aircraft and vessel only.
***—Impossible as subsidiary hazard.
N—None required.

(b) *Cargo Aircraft Only label.* Each person who offers for transportation or transports by aircraft a package containing a hazardous material which is authorized on cargo aircraft only shall label the package with a CARGO AIRCRAFT ONLY label specified in § 172.448 of this subpart.

(c) *Radioactive Materials.* Each package containing a radioactive material that also meets the definition of one or more additional hazards must be labeled as a radioactive material as required by § 172.403 of this subpart and for each additional hazard.

§ 172.403 [Amended]

41. In § 172.403, paragraph (e) is removed and reserved.

42. Section 172.405 is revised to read as follows:

§ 172.405 Authorized label modifications.

(a) For Classes 1, 2, 3, 4, 5, 6, and 8, text indicating a hazard (for example FLAMMABLE LIQUID) is not required on a label when—

(1) The label otherwise conforms to the provisions of this subpart, and

(2) The hazard class or, for Division 5.1 or 5.2 the division number, is displayed in the lower corner of the label, if the label corresponds to the primary hazard class of the hazardous material.

(b) The appropriate hazard class or, for Division 5.1 or 5.2 the division number, must be displayed in the lower corner of a primary hazard label and may not be displayed on a subsidiary label.

(c) For a package containing Oxygen, compressed, or Oxygen, refrigerated liquid, the OXIDIZER label specified in § 172.426 of this subpart, modified to display the word "OXYGEN" instead of "OXIDIZER" and the Class number "2" instead of "5.1", may be used in place of the NON-FLAMMABLE GAS and OXIDIZER labels.

43. Section 172.406 is revised to read as follows:

§ 172.406 Placement of labels.

(a) General. (1) Except as provided in paragraphs (b) and (e) of this section, each label required by this subpart must—

(i) Be printed on or affixed to a surface (other than the bottom) of the package or containment device containing the hazardous material; and

(ii) Be located on the same surface of the package as the proper shipping name marking, if the package dimensions are adequate.

(2) Except as provided in paragraph (e) of this section, duplicate labeling is

not required on a package or containment device (such as to satisfy redundant labeling requirements).

(b) Exceptions. A label may be printed on or placed on a securely affixed tag, or may be affixed by other suitable means to:

(1) A package that contains no radioactive material and which has dimensions less than those of the required label;

(2) A cylinder; and

(3) A package which has such an irregular surface that a label cannot be satisfactorily affixed.

(c) Placement of multiple labels. When primary and subsidiary hazard labels are required, they must be displayed next to each other. Placement conforms to this requirement if labels are within 150 mm (6 inches) of one another.

(d) Each label must be printed on or affixed to a background of contrasting color, or must have a dotted or solid line outer border.

(e) Duplicate labeling. When labeling is required, duplicate labels must be displayed on at least two sides or two ends (other than the bottom) of—

(1) Each non-bulk package or overpack having a volume of 1.8 m^3 (64 cubic feet) or more;

(2) Each non-bulk package containing a radioactive material;

(3) Each DOT 106 or 110 multi-unit tank car tank. Labels must be displayed on each end;

(4) Each portable tank of less than 3,785 L (1000 gallons) capacity; and

(5) Each freight container or aircraft unit load device having a volume of 1.8 m^3 (64 cubic feet) or more, but less than 18 m^3 (640 cubic feet). One of each required label must be displayed on or near the closure.

(f) Obscured labels. A label must be clearly visible and may not be obscured by markings or attachments.

44. Section 172.407 is revised to read as follows:

§ 172.407 Label specifications.

(a) *Durability* Each label, whether printed on or affixed to a package, must be durable and weather resistant. A label on a package must be able to withstand, without deterioration or a substantial change in color, a 30-day exposure to conditions incident to transportation that reasonably could be expected to be encountered by the labeled package.

(b) *Design.* (1) Except for size and color, the printing, inner border, and symbol on each label must be as shown in §§ 172.411 through 172.448 of this subpart, as appropriate.

(2) The dotted line border shown on each label is not part of the label specification, except when used as an alternative for the solid line outer border to meet the requirements of § 172.406(d) of this subpart.

(c) *Size.* (1) Each diamond (square-on-point) label prescribed in this subpart must be at least 100 mm (3.9 inches) on each side with each side having a solid line inner border 5.0 to 6.3 mm (0.2 to 0.25 inches) from the edge.

(2) The CARGO AIRCRAFT ONLY label must be a rectangle measuring at least 110 mm (4.3 inches) in height by 120 mm (4.7 inches) in width. The word "DANGER" must be shown in letters measuring at least 12.7 mm (0.5 inches) in height.

(3) Except as otherwise provided in this subpart, the hazard class number, or division number, as appropriate, must be at least 6.3 mm (0.25 inches) and not greater than 12.7 mm (0.5 inches).

(4) When text indicating a hazard is displayed on a label, the label name must be shown in letters measuring at least 7.6 mm (0.3 inches) in height except that—

(i) For a SPONTANEOUSLY COMBUSTIBLE or DANGEROUS WHEN WET label, respectively, the words "Spontaneously" and "When Wet" must be shown in letters measuring at least 5.1 mm (0.2 inches) in height.

(ii) For a KEEP AWAY FROM FOOD label, the word "HARMFUL" must be shown in letters measuring at least 7.6 mm (0.3 inches) in height.

(5) The symbol on each label must be proportionate in size to that shown in the appropriate section of this subpart.

(d) *Color.* (1) The background color on each label must be as prescribed in §§ 172.411 through 172.448 of this subpart, as appropriate.

(2) The symbol, text, numbers, and border must be shown in black on a label except that—

(i) White may be used on a label with a one color background of green, red or blue; and

(ii) White must be used for the text and class number for the CORROSIVE label.

(3) Black and any color on a label must be able to withstand, without substantial change, a 72-hour fadeometer test (for a description of equipment designed for this purpose, see ASTM G 23–69 (1975) or ASTM G 26–70).

(4) A color on a label, upon visual examination, must fall within the color tolerances displayed on the appropriate Hazardous Materials Label and Placard Color Tolerance Chart.

(i) A set of six charts, dated January 1973, for comparison with labels and placards surfaced with paint, lacquer, enamel, plastic or other opaque coatings, or ink, may be purchased from the Office of Hazardous Materials Initiatives and Training, U.S. Department of Transportation, Washington, DC 20590–0001, for $5.50.

(ii) A set of six charts, dated January 1974, for comparison with labels and placards surfaced with ink, may be similarly purchased for $12.50.

(iii) Both sets of charts may be inspected in room 8426, Nassif Building, 400 7th Street, SW Washington, DC 20590–0001, or any of the offices of the Federal Highway Administration listed at 49 CFR 390.40.

(iv) The technical specifications for each chart are set forth in appendix A to this part.

(5) The specified label color must extend to the edge of the label in the area designated on each label except the CORROSIVE, RADIOACTIVE YELLOW–II AND RADIOACTIVE YELLOW–III labels on which the color must extend only to the inner border.

(e) *Form identification.* A label may contain form identification information, including the name of its maker, provided that information is printed outside the solid line inner border in no larger than 10-point type.

(f) *Exceptions.* A label conforming to specifications in the UN Recommendations may be used in place of a corresponding label which conforms to the requirements of this subpart.

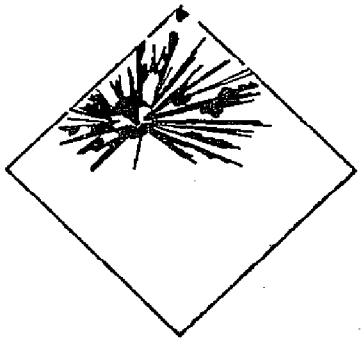
45. Section 172.411 is revised to read as follows:

§ 172.411 EXPLOSIVE 1.1, 1.2, 1.3, 1.4, 1.5 and 1.6 labels, and EXPLOSIVE Subsidiary label.

(a) Except for size and color, the EXPLOSIVE 1.1, EXPLOSIVE 1.2 and EXPLOSIVE 1.3 labels must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the EXPLOSIVE 1.1, EXPLOSIVE 1.2 and EXPLOSIVE 1.3 labels must be orange. The "**" shall be replaced with the appropriate division number and compatibility group. The compatibility group letter must be the same size as the division number and must be shown as a capitalized Roman letter.

(c) Except for size and color, the EXPLOSIVE 1.4, EXPLOSIVE 1.5, EXPLOSIVE 1.6 labels, and EXPLOSIVE Subsidiary labels must be as follows:



(d) In addition to complying with § 172.407 of this subpart, the background color on the EXPLOSIVE 1.4, EXPLOSIVE 1.5, EXPLOSIVE 1.6, and EXPLOSIVE subsidiary label must be orange. Except for the EXPLOSIVE subsidiary label, the "*" shall be replaced with the appropriate compatibility group. The compatibility group letter must be shown as a capitalized Roman letter measuring at least 12.7 mm (0.5 inches) in height. Except for the EXPLOSIVE subsidiary label, division numerals must measure at least 30 mm (1.2 inches) in height and at least 5 mm (0.2 inches) in width.

46. Section 172.415 is revised to read as follows:

§ 172.415 NON-FLAMMABLE GAS label.

(a) Except for size and color, the NON-FLAMMABLE GAS label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the NON-FLAMMABLE GAS label must be green.

47. Section 172.416 is revised to read as follows:

§ 172.416 POISON GAS label.

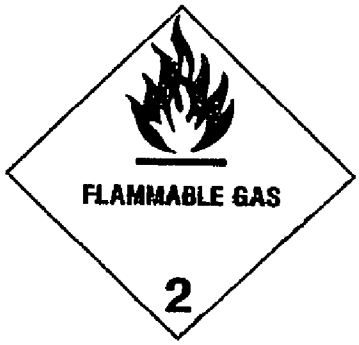
(a) Except for size and color, the POISON GAS label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background on the POISON GAS label must be white.

48. Section 172.417 is revised to read as follows:

§ 172.417 FLAMMABLE GAS label.

(a) Except for size and color, the FLAMMABLE GAS label must be as follows:



(b) In addition to complying with § 172.407 of this subpart, the background color on the FLAMMABLE GAS label must be red.

49. Section 172.419 is revised to read as follows:

§ 172.419 FLAMMABLE LIQUID label.

(a) Except for size and color the FLAMMABLE LIQUID label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the FLAMMABLE LIQUID label must be red.

50. Section 172.420 is revised to read as follows:

§ 172.420 FLAMMABLE SOLID label.

(a) Except for size and color, the FLAMMABLE SOLID label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the FLAMMABLE SOLID label must be white with vertical red stripes equally spaced on each side of a red stripe placed in the center of the label. The red vertical stripes must be spaced so that, visually, they appear equal in width to the white spaces between them. The symbol (flame) and text (when used) must be overprinted. The text "FLAMMABLE SOLID" may be placed in a white rectangle.

51. Section 172.422 is revised to read as follows:

§ 172.422 SPONTANEOUSLY COMBUSTIBLE label.

(a) Except for size and color, the SPONTANEOUSLY COMBUSTIBLE label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the lower half of the SPONTANEOUSLY COMBUSTIBLE label must be red and the upper half must be white.

52. Section 172.423 is revised to read as follows:

§ 172.423 DANGEROUS WHEN WET label.

(a) Except for size and color, the DANGEROUS WHEN WET label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the DANGEROUS WHEN WET label must be blue.

53. Section 172.426 is revised as follows:

§ 172.426 OXIDIZER label.

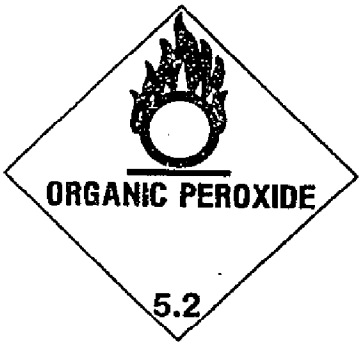
(a) Except for size and color, the OXIDIZER label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the OXIDIZER label must be yellow.

54. Section 172.427 is revised to read as follows:

§ 172.427 ORGANIC PEROXIDE label.

(a) Except for size and color, the ORGANIC PEROXIDE label must be as follows:



(b) In addition to complying with § 172.407 of this subpart, the background color on the ORGANIC PEROXIDE label must be yellow.

55. Section 172.430 is revised as follows:

§ 172.430 POISON label.

(a) Except for size and color, the POISON label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background on the POISON label must be white.

56. Section 172.431 is added to read as follows:

§ 172.431 KEEP AWAY FROM FOOD label.

(a) Except for size and color, the KEEP AWAY FROM FOOD label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background on the KEEP AWAY FROM FOOD label must be white.

57. Section 172.432 is revised to read as follows:

§ 172.432 INFECTIOUS SUBSTANCE label.

(a) Except for size and color, the INFECTIOUS SUBSTANCE label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background on the INFECTIOUS SUBSTANCE label must be white.

58. Section 172.436 is revised to read as follows:

§ 172.436 RADIOACTIVE WHITE–I label.

(a) Except for size and color, the RADIOACTIVE WHITE–I label must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background on the RADIOACTIVE WHITE–I label must be white. The printing and symbol must be black, except for the "I" which must be red.

59. Section 172.438 is revised to read as follows:

§ 172.438 RADIOACTIVE YELLOW–II label.

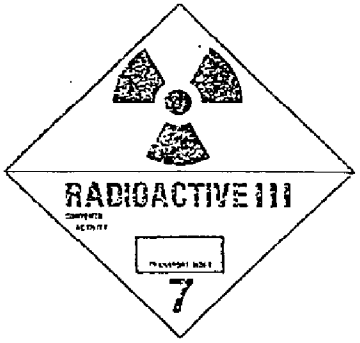
(a) Except for size and color, the RADIOACTIVE YELLOW–II must be as follows:

(b) In addition to complying with § 172.407 of this subpart, the background color on the RADIOACTIVE YELLOW–II label must be yellow in the top half and white in the lower half. The printing and symbol must be black, except for the "II" which must be red.

60. Section 172.440 is revised to read as follows:

§ 172.440 RADIOACTIVE YELLOW–III label.

(a) Except for size and color, the RADIOACTIVE YELLOW–III label must be as follows:

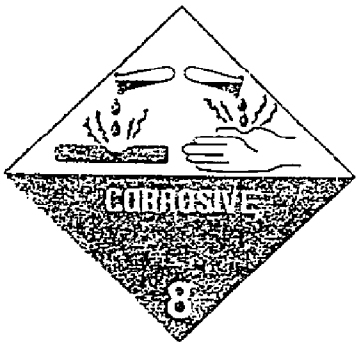


(b) In addition to complying with § 172.407 of this subpart, the background color on the RADIOACTIVE YELLOW-III label must be yellow in the top half and white in the lower half. The printing and symbol must be black, except for the "III" which must be red.

61. Section 172.442 is revised to read as follows:

§ 172.442 CORROSIVE label.

(a) Except for size and color, the CORROSIVE label must be as follows:



(b) In addition to complying with § 172.407 of this subpart, the background on the CORROSIVE label must be white in the top half and black in the lower half.

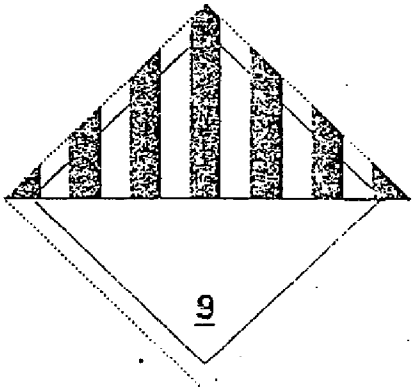
§ 172.444 [Removed and reserved]

62. Section 172.444 is removed and reserved.

63. Section 172.446 is added to read as follows:

§ 172.446 CLASS 9 label.

(a) Except for size and color, the "CLASS 9" (miscellaneous hazardous materials) label must be as follows:

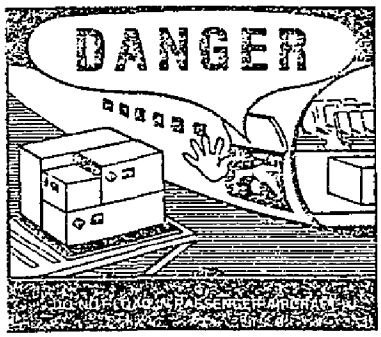


(b) In addition to complying with § 172.407 of this subpart, the background on the CLASS 9 label must be white with seven black vertical stripes on the top half. The black vertical stripes must be spaced, so that, visually, they appear equal in width to the six white spaces between them. The lower half of the label must be white with the class number "9" underlined and centered at the bottom.

64. Section 172.448 is revised to read as follows:

172.448 CARGO AIRCRAFT ONLY label.

(a) Except for size and color, the CARGO AIRCRAFT ONLY label must be as follows:



(b) The CARGO AIRCRAFT ONLY label must be black on an orange background.

65. Section 172.500 is revised to read as follows:

§ 172.500 Applicability of placarding requirements.

(a) Each person who offers for transportation or transports any hazardous material subject to this subchapter shall comply with the applicable placarding requirements of this subpart.

(b) This subpart does not apply to—

(1) Infectious substances;

(2) Hazardous materials classed as ORM-D;

(3) Hazardous materials authorized by this subchapter to be offered for transportation as Limited Quantities when identified as such on shipping papers in accordance with § 172.203(b);

(4) Hazardous materials which are packaged as small quantities under the provisions of § 173.4 of this subchapter; and

(5) Combustible liquids in non-bulk packagings.

66. Section 172.502 is revised to read as follows:

§ 172.502 Prohibited and permissive placarding.

(a) Prohibited placarding. Except as provided in paragraph (b) of this section, no person may affix or display on a packaging, freight container, unit load device, motor vehicle or rail car—

(1) Any placard described in this subpart unless—

(i) The material being offered or transported is a hazardous material;

(ii) The placard represents a hazard of the hazardous material being offered or transported; and

(iii) Any placarding conforms to the requirements of this subpart.

(2) Any sign or other device that, by its color, design, shape or content, could be confused with any placard prescribed in this subpart.

(b) Exceptions. The restrictions in paragraph (a) of this section do not apply to a bulk packaging, freight container, unit load device, motor vehicle or rail car which is placarded in conformance with the TDG Regulations, the IMDG Code or the UN Recommendations.

(c) The restrictions of paragraph (a) of this section do not apply to the display of an identification number on a white square-on-point configuration in accordance with § 172.336(b).

(d) Permissive placarding. Placards may be displayed for a hazardous material, even when not required, if the placarding otherwise conforms to the requirements of this subpart.

67. Section 172.504 is revised to read as follows:

§ 172.504 General placarding requirements.

(a) *General.* Except as otherwise provided in this subchapter, each bulk packaging, freight container, unit load device, motor vehicle or rail car containing any quantity of a hazardous material must be placarded on each side and each end with the type of placards specified in Tables 1 and 2 of this section and in accordance with other placarding requirements of this subpart, including the specifications for the placards named in the tables and described in detail in §§ 172.519 through 172.558.

(b) *DANGEROUS placard.* A freight container, unit load device, motor vehicle or rail car which contains non-bulk packagings with two or more categories of hazardous materials that require different placards specified in Table 2 may be placarded with DANGEROUS placards instead of the separate placarding specified for each of the materials in Table 2. However, when 2,268 kg (5,000 pounds) or more of one category of material is loaded therein at one loading facility, the placard specified in Table 2 of paragraph (e) of this section for that category must be applied.

(c) *Exception for less than 454 kg (1,001 pounds).* Except for transport vehicles and freight containers subject to § 172.505, portable tanks, cargo tanks, tank cars, or transportation by aircraft or vessel, placards for hazardous materials covered by Table 2 are not required on—

(1) A transport vehicle or freight container which contains less than 454 kg (1001 pounds) aggregate gross weight of hazardous materials covered by Table 2 of paragraph (e) of this section; or

(2) A rail car loaded with transport vehicles or freight containers, none of which is required to be placarded. The exceptions provided in paragraph (c) of this section do not prohibit the display of placards in the manner prescribed in this subpart, if not otherwise prohibited (see § 172.502), on transport vehicles or freight containers which are not required to be placarded.

(d) *Exception for empty non-bulk packages.* A non-bulk packaging that contains only the residue of a hazardous material covered by Table 2 of paragraph (e) of this section need not be included in determining placarding requirements.

(e) *Placarding tables.* Placards are specified for hazardous materials in accordance with the following tables:

TABLE 1

Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
1.1	EXPLOSIVES 1.1	177.522
1.2	EXPLOSIVES 1.2	172.522
1.3	EXPLOSIVES 1.3	172.522
2.3	POISON GAS	172.540
4.3	DANGEROUS WHEN WET	172.548
6.1 (PG I, inhalation hazard only)	POISON	172.554
7 (Radioactive Yellow III label only)	RADIOACTIVE	172.556

TABLE 2

Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
1.4	EXPLOSIVES 1.4	172.523
1.5	EXPLOSIVES 1.5	172.524
1.6	EXPLOSIVES 1.6	172.525
2.1	FLAMMABLE GAS	172.532
2.2	NON-FLAMMABLE GAS	172.528
3	FLAMMABLE	172.542
Combustible liquid	COMBUSIBLE	172.544
4.1	FLAMMABLE SOLID	172.546
4.2	SPONTANEOUSLY COMBUSTIBLE	172.547
5.1	OXIDIZER	172.550
5.2	ORGANIC PEROXIDE	172.552
6.1 (PG I or II, other than PG I inhalation hazard)	POISON	172.554
6.1 (PG III)	KEEP AWAY FROM FOOD	172.553
8.2	(None)	
8	CORROSIVE	172.558
9	CLASS 9	172.560
ORM-D	(None)	

(f) *Additional placarding exceptions.*

(1) An EXPLOSIVES 1.2 placard is not required for Division 1.2 explosives on a motor vehicle, rail car, freight container or unit load device which contains Division 1.1 explosives, and is placarded with EXPLOSIVES 1.1 placards, as required.

(2) A FLAMMABLE placard may be used in place of a COMBUSTIBLE placard on—

(i) A cargo tank or portable tank.

(ii) A compartmented tank car which contains both flammable and combustible liquids.

(3) A NON-FLAMMABLE GAS placard is not required on a motor vehicle which contains non-flammable gas if the motor vehicle also contains flammable gas or oxygen and it is placarded with FLAMMABLE GAS or OXYGEN placards, as required.

(4) An EXPLOSIVES 1.4, 1.5 or OXIDIZER placard is not required for Division 1.4, 1.5 or 5.1 materials on a freight container, unit load device, motor vehicle or rail car which also contains Division 1.1 or 1.2 explosives and is

placarded with EXPLOSIVES 1.1 or 1.2 placards, as required.

(5) For transportation by motor vehicle or rail car only, an OXIDIZER placard is not required for Division 5.1 materials on a motor vehicle, rail car or freight container which also contains Division 1.5 explosives and is placarded with EXPLOSIVES 1.5 placards, as required.

(6) The EXPLOSIVE 1.4 placard is not required for those Division 1.4 Compatibility Group S (1.4S) materials that are not required to be labeled 1.4S.

(7) The RADIOACTIVE and CORROSIVE placards are not required for exclusive use shipments (see § 173.403 of this subchapter) of low specific activity radioactive materials, transported in accordance with § 173.425 (b) or (c) of this subchapter.

(8) For domestic transportation of oxygen, compressed or oxygen, refrigerated liquid in § 173.530 of this subpart may be used in place of a NON-FLAMMABLE GAS placard.

68. Section 172.505 is revised to read as follows:

§ 172.505 Multiple placarding.

(a) Each transport vehicle, portable tank, freight container or unit load device that contains a poisonous material subject to the "Poison—Inhalation Hazard" shipping description of § 172.203(m)(3) shall be placarded with POISON or POISON GAS placards, as appropriate, on each side and each end, in addition to the placards required by § 172.504. Duplication of the POISON or POISON GAS placard is not required.

(b) Each transport vehicle, portable tank or freight container that contains 454 kg (1001 pounds) or more gross weight of missile or low specific activity uranium hexafluoride shall be placarded with RADIOACTIVE and CORROSIVE placards on each side and each end.

(c) Each transport vehicle, portable tank, freight container or unit load device that contains a material which has a subsidiary hazard of being dangerous when wet, as defined in § 173.124 of this subchapter, shall be placarded with DANGEROUS WHEN WET placards, on each side and each end, in addition to the placards required by § 172.504.

69. In § 172.508, paragraph (a) is revised to read as follows:

§ 172.508 Placarding and affixing placards: Rail.

(a) Each person offering a hazardous material for transportation by rail shall affix to the rail car containing the material, the placards specified by this subpart. Placards displayed on motor vehicles transport containers, or portable tanks may be used to satisfy this requirement, if the placards otherwise conform to the provisions of this subpart.

* * * * *

70. In § 172.510, paragraph (a) is revised to read as follows:

§ 172.510 Special placarding provisions: Rail.

(a) *Square background required.* (1) A material classed in Division 1.1 or 1.2 transported by rail, and which require EXPLOSIVES 1.1 or EXPLOSIVES 1.2 placards affixed to a rail car, must have the placard placed on a square background as described in § 172.527.

(2) A material classed in Division 2.3, Packing Group I, Hazard Zone A or 6.1, Packing Group I, Hazard Zone A which is transported by rail and which requires POISONOUS GAS or POISON placards affixed to a rail car, must have the placards placed on a square background as described in § 172.527.

(3) A tank car which contains a residue of a Division 2.3, Packing Group I, Hazard Zone A or 6.1, Packing Group I, Hazard Zone A material, and which require POISONOUS GAS–RESIDUE or POISON-RESIDUE placards affixed to a rail car, must have the RESIDUE placard placed on a square background as described in § 172.527.

* * * * *

§ 172.512 [Amended]

71. In § 172.512, the following changes are made:

a. In the title and introductory text of paragraph (b), the term "640 cubic feet" is removed and replaced with the term "18 m^3 (640 cubic feet)".

b. In paragraphs (b)(1) and (b)(2), the section references "§ 172.406(e) (3)" and "§ 172.406(e)", respectively, are revised to read "subpart E of this part, including § 172.406(e)".

72. Section 172.514 is revised to read as follows:

§ 172.514 Bulk packagings other than tank cars.

(a) Except as provided in paragraph (c) of this section, each person who offers for transportation a bulk packaging, other than a tank car, which contains a hazardous material, shall affix the placards specified for the material in §§ 172.504 and 172.505.

(b) Each bulk packaging, other than a tank car, that is required to be placarded when it contains a hazardous material, must remain placarded when it is emptied, unless it is—

(1) Sufficiently cleaned of residue and purged of vapors to remove any potential hazard; or

(2) Refilled, with a material requiring different placards or no placards, to such an extent that any residue remaining in the packaging is no longer hazardous.

(c) Exceptions. The following packagings may be placarded on only two opposite sides or, alternatively, may be labeled instead of placarded in accordance with subpart E of this part:

(1) A portable tank having a capacity of less than 3,785 L (1000 gallons);

(2) A DOT 106 or 110 multi-unit tank car tank;

(3) A bulk packaging other than a portable tank, cargo tank, or tank car (e.g., a bulk bag or box) with a volumetric capacity of less than 18 m^3 (640 cubic feet).

73. In § 172.516, the introductory text of paragraph (c) is revised and paragraph (c)(7) is added to read as follows:

§ 172.516 Visibility and display of placards.

* * * * *

(c) Each placard on a transport vehicle, bulk packaging, freight container or aircraft unit load device must—

* * * * *

(7) Be affixed to a background of contrasting color, or must have a dotted or solid line outer border which contrasts with the background color.

* * * * *

74. Section 172.519 is revised to read as follows:

§ 172.519 General specifications for placards.

(a) *Strength and durability.* Placards must conform to the following:

(1) A placard may be made of any plastic, metal or other material capable of withstanding, without deterioration or a substantial reduction in effectiveness, a 30-day exposure to open weather conditions.

(2) Each placard must be able to pass a 414 kPa (60 p.s.i.) Mullen test.

(3) A placard made of tagboard must be at least equal to that designated commercially as white tagboard. Tagboard must have a weight of at least 80 kg (176 pounds) per ream of 610 by 910 mm (24 by 36-inch) sheets, waterproofing materials included.

(4) Reflective or retroreflective materials may be used on a placard if the prescribed colors, strength and durability are maintained.

(b) *Design.* (1) Except as provided in § 172.332 of this part, each placard must be as described in this subpart, and except for size and color, the printing, inner border and symbol must be as

shown in §§ 172.521 through 172.558 of this subpart, as appropriate.

(2) The dotted line border shown on each placard is not part of the placard specification. However, a dotted or solid line outer border may be used when needed to indicate the full size of a placard that is part of a larger format or is on a background of a non-contrasting color.

(3) For other than Class 7, text indicating a hazard (for example, "FLAMMABLE") is not required.

(4) For a placard corresponding to the primary hazard class of a material, the hazard class or division number must be displayed in the lower corner of the placard. However, no hazard class or division number may be displayed on a placard corresponding to a subsidiary hazard of the material.

(c) *Size.* (1) Each placard prescribed in this subpart must measure at least 273 mm (10.8 inches) on each side and must have a solid line inner border approximately 12.7 mm (0.5 inches) from each edge.

(2) Except as otherwise provided in this subpart, the hazard class or division number, as appropriate, must be shown in numerals measuring at least 41 mm (1.6 inches) in height.

(3) Except as otherwise provided in this subpart, when text indicating a hazard is displayed on a placard, the printing must be in letters measuring at least 41 mm (1.6 inches) in height.

(d) *Color.* (1) The background color, symbol, text, numerals and inner border on a placard must be as specified in §§ 172.521 through 172.558 of this subpart, as appropriate.

(2) Black and any color on a placard must be able to withstand, without substantial change—

(i) A 72-hour fadeometer test (for a description of equipment designed for this purpose, see ASTM G 23–69 or ASTM G 26–70); and

(ii) A 30-day exposure to open weather.

(3) Upon visual examination, a color on a placard must fall within the color tolerances displayed on the appropriate Hazardous Materials Label and Placard Color Tolerance Chart (see § 172.407(d)(4)).

(4) The placard color must extend to the inner border and may extend to the edge of the placard in the area designated on each placard except the color on the CORROSIVE and RADIOACTIVE placards (black and yellow, respectively) must extend only to the inner border.

(e) *Form identification.* A placard may contain form identification information, including the name of its maker, provided that information is printed outside of the solid line inner border in no larger than 10-point type.

(f) *Exceptions.* A placard conforming to specifications in the UN Recommendations or the TDG Regulations may be used in place of a corresponding placard which conforms to the requirements of this subpart.

75. Section 172.522 is revised to read as follows:

§ 172.522 EXPLOSIVES 1.1, EXPLOSIVES 1.2 and EXPLOSIVES 1.3 placards.

(a) Except for size and color, the EXPLOSIVES 1.1, EXPLOSIVES 1.2 and EXPLOSIVES 1.3 placards must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the EXPLOSIVES 1.1, EXPLOSIVES 1.2 and EXPLOSIVES 1.3 placards must be orange. The "*" shall be replaced with the appropriate division number. The symbol, text, numerals and inner border must be black.

76. Section 172.523 is revised to read as follows:

§ 172.523 EXPLOSIVES 1.4 placard.

(a) Except for size and color, the EXPLOSIVES 1.4 placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the EXPLOSIVES 1.4 placard must be orange. The division numeral, 1.4, must measure at least 64 mm (2.5 inches) in height. The text, numerals and inner border must be black.

77. Section 172.524 is revised to read as follows:

§ 172.524 EXPLOSIVES 1.5 placard.

(a) Except for size and color, the EXPLOSIVES 1.5 placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the EXPLOSIVES 1.5 placard must be orange. The division numeral, 1.5, must measure at least 64 mm (2.5 inches) in height. The text, numerals and inner border must be black.

78. Section 172.525 is redesignated as § 172.526 and a new § 172.525 is added to read as follows:

§ 172.525 EXPLOSIVES 1.6 placard.

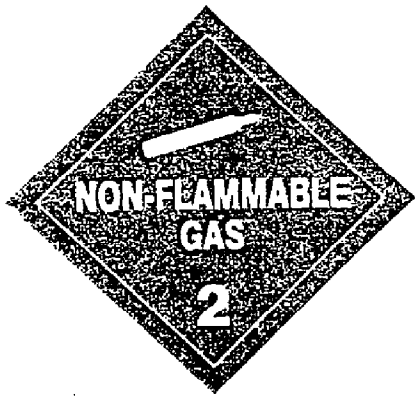
(a) Except for size and color the EXPLOSIVES 1.6 placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the EXPLOSIVES 1.6 placard must be orange. The division numerals, 1.6, must measure at least 64 mm (2.5 inches) in height. The text, numerals and inner border must be black.

79. Section 172.528 is revised to read as follows:

§ 172.528 NON-FLAMMABLE GAS placard.

(a) Except for size and color, the NON-FLAMMABLE GAS placard must be as follows:



(b) In addition to complying with § 172.519 of this subpart, the background color on the NON-FLAMMABLE GAS placard must be green. The letters in both words must be at least 38 mm (1.5 inches) high. The symbol, text, class number and inner border must be white.

80. Section 172.530 is revised to read as follows:

§ 172.530 OXYGEN placard.

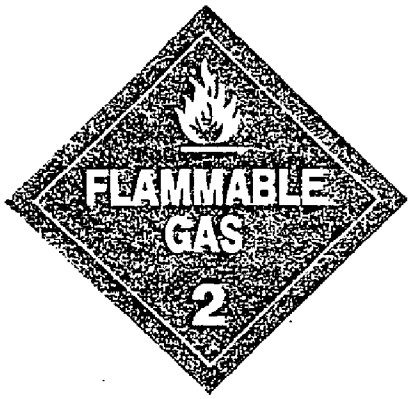
(a) Except for size and color, the OXYGEN placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the OXYGEN placard must be yellow. The symbol, text, class number and inner border must be black.

81. Section 172.532 is revised to read as follows:

§ 172.532 FLAMMABLE GAS placard.

(a) Except for size and color, the FLAMMABLE GAS placard must be as follows:



(b) In addition to complying with § 172.519 of this subpart, the background color on the FLAMMABLE GAS placard must be red. The symbol, text, class number and inner border must be white.

§ 172.536 [Removed]

82. Section 172.536 is removed and reserved.

83. Section 172.540 is revised to read as follows:

§ 172.540 POISON GAS placard.

(a) Except for size and color, the POISON GAS placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the POISON GAS placard must be white. The symbol, text, class number and inner border must be black.

84. Section 172.542 is revised to read as follows:

§ 172.542 FLAMMABLE placard.

(a) Except for size and color, the FLAMMABLE placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the FLAMMABLE placard must be red. The symbol, text, class number and inner border must be white.

(c) The word "GASOLINE" may be used in place of the word "FLAMMABLE" on a placard that is displayed on a cargo tank or a portable tank being used to transport gasoline by

highway. The word "GASOLINE" must be shown in white.

85. Section 172.544 is revised to read as follows:

§ 172.544 COMBUSTIBLE placard.

(a) Except for size and color, the COMBUSTIBLE placard must be as follows:

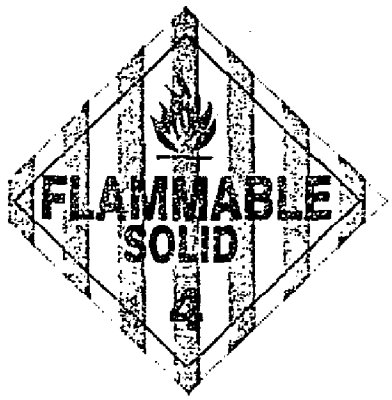
(b) In addition to complying with § 172.519 of this subpart, the background color on the COMBUSTIBLE placard must be red. The symbol, text, class number and inner border must be white. On a COMBUSTIBLE placard with a white bottom as prescribed by § 172.332(c)(4) of this part, the class number must be red or black.

(c) The words "FUEL OIL" may be used in place of the word "COMBUSTIBLE" on a placard that is displayed on a cargo tank or portable tank being used to transport by highway fuel oil that is not classed as a flammable liquid. The words "FUEL OIL" must be shown in white.

86. Section 172.546 is revised to read as follows:

§ 172.546 FLAMMABLE SOLID placard.

(a) Except for size and color, the FLAMMABLE SOLID placard must be as follows:



(b) In addition to complying with § 172.519 of this subpart, the background on the FLAMMABLE SOLID placard must be white with seven vertical red stripes. The stripes must be equally spaced, with one red stripe placed in the center of the label. Each red stripe and each white space between two red stripes must be 25 mm (1 inch) wide. The letters in the word "SOLID" must be at least 38 mm (1.5 inches) high. The symbol, text, class number and inner border must be black.

87. Section 172.547 is added to read as follows:

§ 172.547 SPONTANEOUSLY COMBUSTIBLE placard.

(a) Except for size and color, the SPONTANEOUSLY COMBUSTIBLE placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the SPONTANEOUSLY COMBUSTIBLE placard must be red in the lower half and white in upper half. The letters in the word "SPONTANEOUSLY" must be at least 25 mm (1 inch) high. The symbol, text, class number and inner border must be black.

88. Section 172.548 is revised to read as follows:

§ 172.548 DANGEROUS WHEN WET placard.

(a) Except for size and color, the DANGEROUS WHEN WET placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the DANGEROUS WHEN WET placard must be blue. The letters in the words "WHEN WET" must be at least 25 mm (1 inch) high. The symbol, text, class number and inner border must be white.

89. Section 172.550 is revised to read as follows:

§ 172.550 OXIDIZER placard.

(a) Except for size and color, the OXIDIZER placard must be as follows:

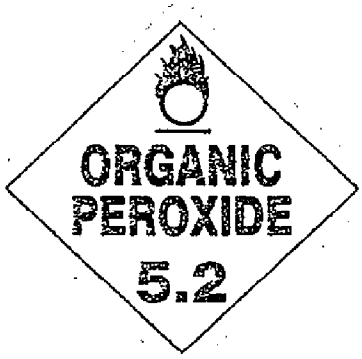
(b) In addition to complying with § 172.519 of this subpart, the background

color on the OXIDIZER placard must be yellow. The symbol, text, division number and inner border must be black.

90. Section 172.552 is revised to read as follows:

§ 172.552 ORGANIC PEROXIDE placard.

(a) Except for size and color, the ORGANIC PEROXIDE placard must be as follows:



(b) In addition to complying with § 172.519 of this subpart, the background color on the ORGANIC PEROXIDE placard must be yellow. The symbol, text, division number and inner border must be black.

91. Section 172.553 is added to read as follows:

§ 172.553 KEEP AWAY FROM FOOD placard.

(a) Except for size and color, the KEEP AWAY FROM FOOD placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background on the KEEP AWAY FROM FOOD placard must be white. The size of the lettering below the word "HARMFUL" must be proportional to that shown. The symbol, text, class number and inner border must be black.

92. Section 172.554 is revised to read as follows:

§ 172.554 POISON placard.

(a) Except for size and color, the POISON placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background on the POISON placard must be white. The symbol, text, class number and inner border must be black.

93. Section 172.556 is revised to read as follows:

§ 172.556 RADIOACTIVE placard.

(a) Except for size and color, the RADIOACTIVE placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the RADIOACTIVE placard must be white in the lower portion with a yellow triangle in the upper portion. The base of the yellow triangle must be 29 mm ±5 mm (1.1 inches ±0.2 inches) above the placard horizontal center line. The symbol, text, class number and inner border must be black.

94. Section 172.558 is revised to read as follows:

§ 172.558 CORROSIVE placard.

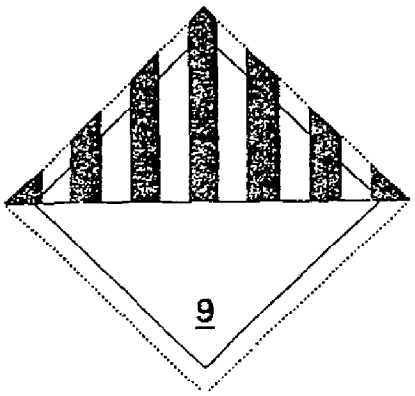
(a) Except for size and color, the CORROSIVE placard must be as follows:

(b) In addition to complying with § 172.519 of this subpart, the background color on the CORROSIVE placard must be black in the lower portion with a white triangle in the upper portion. The base of the white triangle must be 38 mm ± 5 mm (1.5 inches ± 0.2 inches) above the placard horizontal center line. The text and class number must be white. The symbol and inner border must be black.

95. Section 172.560 is added to read as follows:

§ 172.560 CLASS 9 placard.

(a) Except for size and color the CLASS 9 (miscellaneous hazardous materials) placard must be as follows:



(b) In addition to complying with § 172.519 of this subpart, the background on the CLASS 9 placard must be white with seven black vertical stripes on the top half. The black vertical stripes must be spaced so that, visually, they appear equal in width to the six white spaces between them. The lower half of the placard must be white with the class number 9 underlined and centered at the bottom.

Appendix B [Removed and Reserved]

96. Appendix B to part 172 is removed and reserved.

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

97. The authority citation for part 173 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1806, 1807, 1808; 49 CFR part 1, unless otherwise noted.

Subpart A—General

98. In § 173.1, paragraph (d) is added to read as follows:

§ 173.1 Purpose and scope.

* * * * *

(d) In general, the Hazardous Materials Regulations (HMR) contained in this subchapter are based on the Recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods and are consistent with international regulations issued by the International Civil Aviation Organization (ICAO Technical Instructions) and the International Maritime Organization (IMDG Code). However, the HMR are not consistent in all respects with the UN Recommendations, the ICAO Technical Instructions or the IMDG Code, and compliance with the HMR will not guarantee acceptance by regulatory bodies outside of the United States.

99. Section 173.2 is revised to read as follows:

§ 173.2 Hazardous materials classes and index to hazard class definitions.

The hazard class of a hazardous material is indicated either by its class (or division) number, its class name, or by the letters "ORM-D". The following table lists class numbers, division numbers, class or division names and those sections of this subchapter which contain definitions for classifying hazardous materials, including forbidden materials.

Class No.	Division No. (if any)	Name of class or division	49 CFR reference for definitions
None		Forbidden materials	173.21
None		Forbidden explosives	173.53
1	1.1	Explosives (with a mass explosion hazard)	173.50
1	1.2	Explosives (with a projection hazard)	173.50
1	1.3	Explosives (with predominately a fire hazard)	173.50
1	1.4	Explosives (with no significant blast hazard)	173.50
1	1.5	Very insensitive explosives; blasting agents	173.50
1	1.6	Extremely insensitive detonating substances	173.50
2	2.1	Flammable gas	173.115
2	2.2	Non-flammable compressed gas	173.115
2	2.3	Poisonous gas	173.115
3		Flammable and combustible liquid	173.120
4	4.1	Flammable solid	173.124
4	4.2	Spontaneously combustible material	173.124
4	4.3	Dangerous when wet material	173.124
5	5.1	Oxidizer	173.128
5	5.2	Organic peroxide	173.128
6	6.1	Poisonous materials	173.132
6	6.2	Infectious substance (Etiologic agent)	173.134
7		Radioactive material	173.403
8		Corrosive material	173.136
9		Miscellaneous hazardous material	173.140
None		Other regulated material: ORM-D	173.144

100. Section 173.2a is added to read as follows:

§ 173.2a Classification of a material having more than one hazard.

(a) *Classification of a material having more than one hazard.* Except as provided in paragraph (c) of this section, a material not specifically listed in the § 172.101 Table that meets the definition of more than one hazard class or division as defined in this part, shall be classed according to the highest applicable hazard class of the following hazard classes, which are listed in descending order of hazard:

(1) Class 7 (radioactive materials, other than limited quantities).

(2) Division 2.3 (poisonous gases).

(3) Division 2.1 (flammable gases).

(4) Division 2.2 (nonflammable gases).

(5) Division 6.1 (poisonous liquids), Packing Group I, poisonous-by-inhalation only.

(6) A material that meets the definition of a pyrophoric material in § 173.124(b)(1) of this subchapter (Division 4.2).

(7) A material that meets the definition of a self-reactive material in § 173.124(a)(2) of this subchapter (Division 4.1).

(8) Class 3 (flammable liquids), Class 8 (corrosive materials), Division 4.1 (flammable solids), Division 4.2 (spontaneously combustible materials), Division 4.3 (dangerous when wet materials), Division 5.1 (oxidizers) or Division 6.1 (poisonous liquids or solids

other than Packing Group I, poisonous-by-inhalation). The precedence of hazards for a material meeting more than one of these hazards shall be determined using the precedence table in paragraph (b) of this section.

(9) Combustible liquids.

(10) Class 9 (miscellaneous hazardous materials).

(b) *Precedence of hazard table for Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1 and 6.1.* The following table ranks those materials that meet the definition of Classes 3 and 8 and Divisions 4.1, 4.2, 4.3 5.1 and 6.1:

PRECEDENCE OF HAZARD TABLE

[Hazard class and packing group]

		4.2	4.3	5.1 I [1]	5.1 II [1]	5.1 III [1]	6.1, I dermal	6.1, I oral	6.1 II	6.1 III	8, I liquid	8, I solid	8, II liquid	8, II solid	8, III liquid	8, III solid
3	I						3	3	3	3	3	[3]	3	[3]	3	[3]
3	II						3	3	3	3	3	[3]	3	[3]	3	[3]
3	III						6.1	6.1	6.1	3	8	[3]	8	[3]	3	[3]
4.1	II [2]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	4.1	4.1	[3]	8	[3]	4.1	[3]	4.1
4.1	III [2]	4.2	4.3	5.1	4.1	4.1	6.1	6.1	6.1	4.1	[3]	8	[3]	8	[3]	4.1
4.2	II		4.3	5.1	4.2	4.2	6.1	6.1	4.2	4.2	[3]	8	[3]	4.2	[3]	4.2
4.2	III		4.3	5.1	5.1	4.2	6.1	6.1	6.1	4.2	[3]	8	[3]	8	[3]	4.2
4.3	I			5.1	4.3	4.3	6.1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4.3	II			5.1	4.3	4.3	6.1	4.3	4.3	4.3	8	8	8	4.3	4.3	4.3
4.3	III			5.1	5.1	4.3	6.1	6.1	6.1	4.3	8	8	8	8	4.3	4.3
5.1	I [1]						5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
5.1	II [1]						6.1	5.1	5.1	5.1	8	8	8	5.1	5.1	5.1
5.1	III [1]						6.1	6.1	6.1	5.1	8	8	8	8	5.1	5.1
6.1	I, Dermal										8	6.1	6.1	6.1	6.1	6.1
6.1	I, Oral										8	6.1	6.1	6.1	6.1	6.1
6.1	II, Inhalation										8	6.1	6.1	6.1	6.1	6.1
6.1	II, Dermal										8	6.1	8	6.1	6.1	6.1
6.1	II, Oral										8	8	8	6.1	6.1	6.1
6.1	III										8	8	8	8	8	8

[1] There are at present no established criteria for determining Packing Groups for liquids in Division 5.1. For the time being, the degree of hazard is to be assessed by analogy with listed substances, allocating the substances to Packing Group I, great; II, medium; or III, minor danger.

[2] Substances of Division 4.1 other than self-reactive substances.

[3] Denotes an impossible combination.

(c) The following materials are not subject to the provisions of paragraph (a) of this section because of their unique properties:

(1) A Class 1 (explosive) material that meets any other hazard class or division as defined in this part shall be assigned a division in Class 1. Class 1 materials shall be classed and approved in accordance with § 173.56 of this part;

(2) A Division 5.2 (organic peroxide) material that meets the definition of any other hazard class or division as defined in this part, shall be classed as Division 5.2;

(3) A Division 6.2 (infectious substance) material that meets the definition of any other hazard class or division as defined in this part shall be classed as Division 6.2;

(4) A material that meets the definition of a wetted explosive in § 173.124(a)(1) of this subchapter (Division 4.1). Wetted explosives are either specifically listed in the § 172.101 Table or are approved by the Associate Administrator for Hazardous Materials Safety (see § 173.124(a)(1) of this subchapter); and

(5) A limited quantity of a Class 7 (radioactive) material that meets the definition for more than one hazard class or division shall be classed in accordance with § 173.421–2.

101. Section 173.3 is revised to read as follows:

§ 173.3 Packaging and exceptions.

(a) The packaging of hazardous materials for transportation by air, highway, rail, or water must be as specified in this part. Methods of manufacture, packing, and storage of hazardous materials, that affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or of the Department. Methods of manufacture and related functions necessary for completion of a DOT specification or U.N. standard packaging must be open to inspection by a representative of the Department.

(b) The regulations setting forth packaging requirements for a specific material apply to all modes of transportation unless otherwise stated, or unless exceptions from packaging requirements are authorized.

(c) Salvage drums. Packages of hazardous materials that are damaged, defective, or found leaking and hazardous materials that have spilled or leaked may be placed in a metal or plastic removable head salvage drum that is compatible with the lading and shipped for repackaging or disposal under the following conditions:

(1) The drum must be a UN 1A2, 1B2, 1N2 or 1H2 drum tested and marked at least for the Packing Group III performance standard for liquids with a specific gravity of 1.2 and a hydrostatic pressure test of 35 kPa (5 psig). Capacity of the drum may not exceed 450 L (119 gallons).

(2) Each drum shall be provided when necessary with sufficient cushioning and absorption material to prevent excessive movement of the damaged package and to eliminate the presence of any free liquid at the time the salvage drum is closed. All cushioning and absorbent material used in the drum must be compatible with the hazardous material.

(3) Each drum shall be marked with the proper shipping name of the material inside the defective packaging and the name and address of the consignee. In addition, the drum shall be marked "Salvage Drum".

(4) Each drum shall be labeled as prescribed for the respective material.

(5) The shipper shall prepare shipping papers in accordance with subpart C of Part 172 of this subchapter.

(6) The overpack requirements of § 173.25 do not apply to drums used in accordance with this paragraph.

102. Section 173.4 is revised to read as follows:

§ 173.4 Exceptions for small quantities.

(a) Small quantities of Class 3, Division 4.1, Division 5.1, Division 5.2, Class 8, Division 6.1 materials, and Class 7 materials, and Class 9 materials that also meet the definition of one or more of these hazard classes, are not subject to any other requirements of this subchapter if:

(1) The maximum quantity of material per inner receptacle is limited to:

(i) Thirty (30) ml (1 ounce) for authorized liquids, other than Division 6.1, Packing Group I, materials;

(ii) Thirty (30) g (1 ounce) for authorized solids, other than Division 6.1, Packing Group I, materials;

(iii) One (1) g (0.04 ounce) for authorized materials classed as Division 6.1, Packing Group I; and

(iv) An activity level not exceeding that specified in §§ 173.421, 173.422 or 173.424, as appropriate, for a package containing a Class 7 material.

(2) With the exception of temperature sensing devices, each inner receptacle:

(i) Is not liquid-full at 55 °C (131 °F), and

(ii) Is constructed of plastic having a minimum thickness of no less than 0.2 mm (0.008 inch), or earthenware, glass, or metal;

(3) Each inner receptacle with a removable closure has its closure held securely in place with wire, tape, or other positive means;

(4) Unless equivalent cushioning and absorbent material surrounds the inside packaging, each inner receptacle is securely packed in an inside packaging with cushioning and absorbent material that:

(i) Will not react chemically with the material, and

(ii) Is capable of absorbing the entire contents (if a liquid) of the receptacle;

(5) The inside packaging is securely packed in a strong outside packaging;

(6) The completed package, as demonstrated by prototype testing, is capable of sustaining—

(i) Each of the following free drops made from a height of 1.8 m (5.9 feet) directly onto a solid unyielding surface without breakage or leakage from any inner receptacle and without a substantial reduction in the effectiveness of the package:

(A) One drop flat on bottom;

(B) One drop flat on top;

(C) One drop flat on the long side;

(D) One drop flat on the short side; and

(E) One drop on a corner at the junction of three intersecting edges; and

(ii) A compressive load in pounds, determined by multiplying by two the maximum horizontal cross section of the package (in square inches) in the position in which it would normally be transported, without a substantial reduction in effectiveness; the load shall be applied continuously during a period of 24 hours, uniformly against the top and bottom of the package which is in the position in which it is intended to be normally transported.

Note: Each of the tests in paragraph (a)(6) of this section may be performed on a different, but identical, package; i.e., all tests need not be performed on the same package.

(7) Placement of the material in the package or packing different materials in the package does not result in a violation of § 173.21;

(8) The gross mass of the completed package does not exceed 29 kg (64 pounds);

(9) The shipper certifies conformance with this section by marking the outside of the package with the statement: "This package conforms to conditions and limitations specified in 49 CFR 173.4";

(10) The package is not opened or otherwise altered until it is no longer in commerce; and

(11) The package, unless specifically approved by the Associate Administrator for Hazardous Materials Safety does not contain a material assigned any of the following identification numbers associated with the hazardous materials description in the § 172.101 Table:

1092 1131 1259 1380 1397 1419 1422 1432 1433 1491 1504 1749 1798 1831 1073 2031 2032 2495 2626 2313 2845 2924 2925 9191 9193

(b) A package containing a Class 7 material also must conform to the requirements of § 173.421 (a) through (e), or § 173.422 (a) through (f), as appropriate. After May 2, 1967, a package containing a Class 7 material may not be offered for transportation aboard a passenger—carrying aircraft unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

§ 173.5 [Amended]

103. In § 173.5, the following changes are made:

a. In paragraph (a)(2), the phrase "2½ gallons" is changed to "10 L (2.6 gallons)" and the phrase "25 pounds" is removed and replaced with the phrase "15 kg (33 pounds)".

b. In paragraph (a)(3) the phrase "100 pounds" is removed and replaced with the phrase "50 kg (110 pounds)."

c. In paragraph (b), the phrase "55 gallons" is removed and replaced with the phrase "220 L (58 gallons)".

§ 173.6 [Removed]

104. Section 173.6 is removed.

§ 173.7 [Amended]

105. In § 173.7, in paragraphs (b) and (d), the word "radioactive" is removed and replaced with the phrase "Class 7".

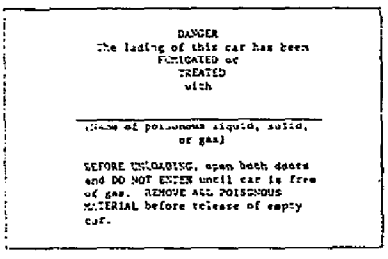
106. Section 173.9 is revised to read as follows:

§ 173.9 Cars, truck bodies, freight containers, or trailers containing lading which has been fumigated or treated with Class 3, Division 2.1, 2.3, or 6.1 materials.

(a) Delivery for transportation by rail carrier of any rail car, freight container, truck body, or trailer containing lading which has been fumigated or treated with Class 3 or Division 2.1 materials is prohibited until 48 hours have elapsed after such fumigation or treatment, or until the rail car, freight container, truck body or trailer has been ventilated so as to remove any danger of fire or explosion due to the presence of flammable vapors.

(b) Any rail car, freight container, truck body or trailer containing lading which has been fumigated or treated with Division 6.1 or Division 2.3 materials, such as carbolic acid, liquid or solid, chlorpicrin, hydrocyanic acid, methyl bromide, etc., must be placarded on each door or near thereto with the FUMIGANT placard prescribed in paragraph (c) of this section or a placard as required by the Environmental Protection Agency (EPA).

(c) *FUMIGANT placard.* The FUMIGANT placard must consist of red letters on a white background which is at least 25 cm (9.8 inches) wide and 20 cm (7.9 inches) high. It must contain the name of the fumigant and other text as follows:



(d) See § 174.615 of this subchapter for requirements for cleaning fumigated cars

§ 173.10 [Amended]

107. In § 173.10, the following changes are made:

a. In paragraph (a), the phrase "flammable gas" is removed and replaced with the phrase "2.1 material" and the phrase "flammable liquid" is

removed and replaced with "Class 3 material with a flash point below 30 °C (100 °F)".

b. In paragraph (b), the phrase "compressed gas" is removed and replaced with the phrase "Class 2 material".

c. In paragraph (e), the phrase "Flammable liquids and flammable gases" is removed and replaced with the phrase "Class 3 materials with a flash point below 38 °C (100 °F) and Division 2.1 materials."

107a. Section 173.12 is revised to read as follows:

§ 173.12 Exceptions for shipment of waste materials.

(a) *Open head drums.* If a hazardous material that is a hazardous waste is required by this subchapter to be shipped in a closed head drum (i.e., a drum with a 7.0 cm (3 inches) or less bung opening) and the hazardous waste contains solids or semisolids that make its placement in a closed head drum impracticable, an equivalent (except for closure) open head drum may be used for the hazardous waste.

(b) *Lab packs.* Waste materials classed as Class or Division 3, 4.1, 4.2, 4.3, 5.1, 6.1, 8, or 9 are excepted from the specification packaging requirements of this subchapter if packaged in combination packagings in accordance with this paragraph and transported for disposal or recovery by highway only. In addition, a generic description from the § 172.101 Table may be used in place of specific chemical names, when two or more chemically compatible waste materials in the same hazard class are packaged in the same outside packaging. Additional packaging requirements are to read as follows:

(1) The outer packaging must be a UN 1A2 or UN 1B2 metal drum, a UN 1D plywood drum, a UN 1G fiber drum or a UN 1H2 plastic drum.

(2) The inner packagings must be either glass not exceeding 4 L (1 gallon) rated capacity or metal or plastic not exceeding 20 L (5.3 gallons) rated capacity;

(3) Each outer packaging may contain only one class of hazardous material;

(4) Inner packagings containing liquid must be surrounded by a chemically compatible absorbent material in sufficient quantity to absorb the total liquid contents;

(5) Gross weight of the complete package may not exceed 205 kg (452 lbs); and

(6) Materials meeting the definition of Division 6.1, Packing Group I, or Division 4.2, Packing Group I, may not be packaged or described under the provisions of this paragraph.

(c) *Reuse of packagings.* A previously used packaging may be reused for the shipment of hazardous waste to designated facilities, not subject to the reconditioning and reuse provisions contained in § 173.28 and part 178 of this subchapter, under the following conditions:

(1) Except as authorized by this paragraph, the waste must be packaged in accordance with this part and offered for transportation in accordance with the requirements of this subchapter.

(2) Transportation is performed by highway only.

(3) A package is not offered for transportation less than 24 hours after it is finally closed for transportation, and each package is inspected for leakage and is found to be free from leaks immediately prior to being offered for transportation.

(4) Each package is loaded by the shipper and unloaded by the consignee, unless the motor carrier is a private or contract carrier.

(5) The packaging may be used only once under this paragraph and may not be used again for shipment of hazardous materials except in accordance with § 173.28.

Subpart B—Preparation of Hazardous Materials for Transportation

108. Section 173.21 is revised to read as follows:

§ 173.21 Forbidden materials and packages.

Unless otherwise provided in this subchapter, the offering for transportation or transportation of the following is forbidden:

(a) Materials that are designated "Forbidden" in Column 3 of the § 172.101 Table.

(b) Forbidden explosives as defined in § 173.51 of this part.

(c) Electrical devices which are likely to create sparks or generate a dangerous quantity of heat, unless packaged in a manner which precludes such an occurrence.

(d) For carriage by aircraft, any package which has a magnetic field of more than 0.00525 gauss measured at 4.5 m (15 feet) from any surface of the package.

(e) A material in the same packaging, freight container, or overpack with another material, the mixing of which is likely to cause a dangerous evolution of heat, or flammable or poisonous gases or vapors, or to produce corrosive materials.

(f) A package containing a material which is likely to polymerize at a temperature of 54 °C (130 °F) or less with an evolution of a dangerous quantity of heat or gas unless stabilized or inhibited in a manner to preclude such evolution, or a material which has a self accelerating decomposition temperature (SADT) of 50 °C (122 °F) or less. The SADT may be determined by any of the test methods described in Part II of the UN Recommendations on the Transport of Dangerous Goods, Tests and Criteria, Second Edition (1990).

(1) A package meeting the criteria of paragraph (f) of this section may be required to be shipped under controlled temperature conditions. The control temperature and emergency temperature for a package shall be as specified in the table in this paragraph based upon the SADT of the material. The control temperature is the temperature above which a package of the material may not be offered for transportation or transported. The emergency temperature is the temperature at which, due to imminent danger, emergency measures must be initiated.

SECTION 173.21 TABLE: METHOD OF DETERMINING CONTROL AND EMERGENCY TEMPERATURE.

SADT [1]	Control temperatures	Emergency temperature
SADT < 20 °C (69 °F).	20 °C (36 °F) below SADT.	10 °C (18 °F) below SADT.
20 °C (68 °F) < SADT < 35 °C (95 °F).	15 °C (27 °F) below SADT.	10 °C (18 °F) below SADT.
35 °C (95 °F) < SADT < 50 °C (122 °F).	10 °C (18 °F) below SADT.	5 °C (9 °F) below SADT.
50 °C (122 °F) < SADT.	[2]	[2]

[1] Self-accelerating decomposition temperature.
[2] Temperature control not required.

(2) For self-reactive materials listed in § 173.224(b) Table control and emergency temperatures, where required are shown in Columns 4a and 4b, respectively. For organic peroxides listed in The Organic Peroxides Table in 173.225 control and emergency temperatures, where required, are shown in Columns 7a and 7b, respectively.

(3) Refrigeration may be used as a means of stabilization only when approved by the Associate Administrator for Hazardous Materials Safety. For status of approvals previously issued by the Bureau of Explosives, see § 171.19 of this subchapter.

(g) Packages which give off a flammable gas or vapor, released from a material not otherwise subject to this

subchapter, likely to create a flammable mixture with air in a transport vehicle.

(h) Packages containing materials (other than those classed as explosive) which will detonate in a fire.

(1) For purposes of this paragraph, "detonate" means an explosion in which the shock wave travels through the material at a speed greater than the speed of sound.

(2) When tests are required to evaluate the performance of a package under the provisions of this paragraph, the testing must be done or approved by one of the agencies specified in § 173.56.

(i) A package containing a cigarette lighter, or other similar device, equipped with an ignition element and containing fuel; except that a cigarette lighter or similar device subject to this paragraph may be shipped if the design of the device and its packaging has been examined by the Bureau of Explosives and specifically approved by the Associate Administrator for Hazardous Materials Safety. The examination of cigarette lighters and similar devices containing gaseous fuel will include scrutiny for compliance with § 173.308 of this part. For the status of approvals previously issued by the Bureau of Explosives, see § 171.18 of this subchapter.

(j) An organic peroxide of the "ketone peroxide" category which contains more than 9 percent available oxygen as calculated using the equation in § 173.128(b)(4)(iii). The category, ketone peroxide, includes, but is not limited to:

Acetyl acetone peroxide
Cyclohexanone peroxide(s)
Diacetone alcohol peroxides
Methylcyclohexanone peroxide(s)
Methyl ethyl ketone peroxide(s)
Methyl isobutyl ketone peroxide(s)

109. In § 173.22 paragraph (a)(4) is added to read as follows:

§ 173.22 Shipper's responsibility.

(a) * * *

(4) For a DOT specification or UN Standard packaging, a person shall perform all functions necessary to bring that package into compliance with part 178 of this subchapter, as identified by the packaging manufacturer or subsequent distributor, in accordance with § 178.2(d) of this subchapter.

* * * * *

10. In § 173.23, paragraph (a) is revised to read as follows:

§ 173.23 Previously authorized packaging.

(a) When the regulations specify a packaging with a specification marking prefix of "DOT," a packaging marked prior to January 1, 1970, with the prefix of "ICC" may be used in its place if the packaging otherwise conforms to applicable specification requirements.

* * * * *

111. Section 173.24 is revised to read as follows:

§ 173.24 General requirements for packagings and packages.

(a) Applicability. Except as otherwise provided in this subchapter, the provisions of this section apply to—

(1) Bulk and non-bulk packagings;

(2) New packagings and packagings which are reused; and

(3) Specification and non-specification packagings.

(b) Each package used for the shipment of hazardous materials under this subchapter shall be designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation—

(1) Except as otherwise provided in this subchapter, there will be no identifiable (without the use of instruments) release of hazardous materials to the environment;

(2) The effectiveness of the packaging will not be significantly reduced;

(3) There will be no mixture of gases or vapors in the package which could, through any credible spontaneous increase of heat or pressure, significantly reduce the effectiveness of the packaging.

(c) Authorized packagings. A packaging is authorized for a hazardous material only if—

(1) The packaging is prescribed or permitted for the hazardous material in a packaging section specified for that material in Column 8 of the § 172.101 Table and conforms to applicable requirements in the special provisions of Column 7 of the § 172.101 Table and, for specification packagings (including U.N. standard packagings), the specification requirements in parts 178 and 179 of this subchapter; or

(2) The packaging is permitted under, and conforms to, provisions contained in §§ 171.11, 171.12, 171.12a, 173.3, 173.4, 173.5, 173.6, 173.7, or 173.11 of this subchapter.

(d) DOT specification and U.N. standard packagings. For DOT specification packagings (including U.N. standard packagings), conformance to the applicable specifications in parts 178 and 179 of this subchapter is required in all details. For performance-oriented packagings covered by subpart L of part 178 of this subchapter, each packaging must be capable of meeting the performance test requirements specified in subpart M of part 178 of this subchapter for the applicable packing group shown in Column 5 of the § 172.101 Table.

(e) Compatibility. (1) Even though certain packagings are specified in this part, it is, nevertheless, the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their lading. This particularly applies to corrosivity, permeability, softening, premature aging and embrittlement.

(2) Packaging materials and contents must be such that there will be no significant chemical or galvanic reaction between the materials and contents of the package.

(3) *Plastic packagings and receptacles.* (i) Plastic used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous condition is likely to occur during transportation, handling or refilling.

(ii) Each plastic packaging or receptacle which is used for liquid hazardous materials must be capable of withstanding without failure the procedure specified in Appendix B of this part ("Procedure for Testing Chemical Compatibility and Rate of Permeation in Plastic Packagings and Receptacles"). The procedure specified in appendix B of this part must be performed on each plastic packaging or receptacle used for Packing Group I materials. The maximum rate of permeation of hazardous lading through or into the plastic packaging or receptacles may not exceed 0.5 percent for materials meeting the definition of a Division 6.1 material according to § 173.132 and 2.0 percent for other hazardous materials, when subjected to a temperature no lower than—

(A) 18 °C (64 °F) for 180 days in accordance with Test Method 1 in appendix B of this part;

(B) 50 °C (122 °F) for 28 days in accordance with Test Method 2 in appendix B of this part; or

(C) 60 °C (140 °F) for 14 days in accordance with Test Method 3 in appendix B of this part.

(iii) Alternative procedures or rates of permeation are permitted if they yield a level of safety equivalent to or greater than that provided by paragraph (e)(3)(ii) of this section and are specifically approved by the Associate Administrator for Hazardous Materials Safety.

(4) Mixed contents. Hazardous materials may not be packed or mixed together in the same outer packaging with other hazardous or nonhazardous materials if such materials are capable

of reacting dangerously with each other and causing—

(i) Combustion or dangerous evolution of heat;

(ii) Evolution of flammable or poisonous gases; or

(iii) Formation of unstable or corrosive materials.

(5) Packagings used for solids, which may become liquid at temperatures likely to be encountered during transportation, must be capable of containing the hazardous material in the liquid state.

(f) Closures. (1) Closures on packagings shall be so designed and closed that under conditions (including the effects of temperature and vibration) normally incident to transportation—

(i) Except as provided in paragraph (g) of this section, there is no identifiable release of hazardous materials to the environment from the opening to which the closure is applied; and

(ii) The closure is secure and leakproof.

(2) Except as otherwise provided in this subchapter, a closure (including gaskets or other closure components, if any) used on a specification packaging must conform to all applicable requirements of the specification.

(g) Venting. Venting of packagings, to reduce internal pressure which may develop by the evolution of gas from the contents, is permitted only when—

(1) Transportation by aircraft is not involved;

(2) Except as otherwise provided in this subchapter, the evolved gases are not toxic, flammable or asphyxiant gases;

(3) The packaging is designed so as to preclude an identifiable release of hazardous materials from the receptacle; and

(4) For shipments in bulk packagings, venting is authorized for the specific hazardous material by a special provision in the § 172.101 Table or by the applicable bulk packaging specification in part 178 of this subchapter.

(h) Outrage and filling limits—(1) *General.* When filling packagings and receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the packaging or receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to be encountered during transportation. Requirements for outage and filling limits for non-bulk and bulk packagings are specified in §§ 173.24a(d) and 173.24b(a), respectively.

(2) *Compressed gases and cryogenic liquids.* Filling limits for compressed gases and cryogenic liquids are specified in §§ 173.301 through 173.306 for cylinders and §§ 173.314 through 173.319 for bulk packagings.

(i) Air transportation. Packages offered or intended for transportation by aircraft must conform to the general requirements for transportation by aircraft in § 173.27, except as provided in § 171.11 of this subchapter.

112. Section 173.24a is added to read as follows:

§ 173.24a Additional general requirements for non-bulk packagings and packages.

(a) Packaging design. Except as provided in § 172.312 of this subchapter:

(1) *Inner packaging closures.* A combination packaging containing liquid hazardous materials must be packed so that closures on inner packagings are upright.

(2) *Friction.* The nature and thickness of the outer packaging must be such that friction during transportation is not likely to generate an amount of heat sufficient to alter dangerously the chemical stability of the contents.

(3) *Securing and cushioning.* Inner packagings of combination packagings must be so packed, secured and cushioned to prevent their breakage or leakage and to control their movement within the outer packaging under conditions normally incident to transportation. Cushioning material must not be capable of reacting dangerously with the contents of the inner packagings.

(4) *Metallic devices.* Nails, staples and other metallic devices shall not protrude into the interior of the outer packaging in such a manner as to be likely to damage inner packagings or receptacles.

(5) *Vibration.* Each non-bulk package must be capable of withstanding, without rupture or leakage, the vibration test procedure specified in § 178.608 of this subchapter.

(b) Non-bulk packaging filling limits. (1) A single or composite non-bulk packaging may be filled with a liquid hazardous material only when the specific gravity of the material does not exceed that marked on the packaging, or a specific gravity of 1.2 if not marked, except as follows:

(i) A Packing Group I packaging may be used for a Packing Group II material with a specific gravity not exceeding the greater of 1.8, or 1.5 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material;

(ii) A Packing Group I packaging may be used for a Packing Group III material with a specific gravity not exceeding the greater of 2.7, or 2.25 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material; and

(iii) A Packing Group II packaging may be used for a Packing Group III material with a specific gravity not exceeding the greater of 1.8, or 1.5 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material.

(2) A single or composite non-bulk packaging may not be filled with a solid hazardous material to a gross mass greater than the maximum gross mass marked on the packaging.

(3) A single or composite non-bulk packaging which is tested and marked for liquid hazardous materials may be filled with a solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.

(4) Packagings tested as prescribed in § 178.605 of this subchapter and marked with the hydrostatic test pressure as prescribed in § 178.503(a)(5) of this subchapter may be used for liquids only when the vapor pressure of the liquid conforms to one of the following:

(i) The vapor pressure must be such that the total pressure in the packaging (i.e., the vapor pressure of the liquid plus the partial pressure of air or other inert gases, less 100 kPa (15 psi)) at 55 °C (131 °F), determined on the basis of a maximum degree of filling in accordance with paragraph (b)(1) of this section and a filling temperature of 15 °C (59 °F)), will not exceed two-thirds of the marked test pressure;

(ii) The vapor pressure at 50 °C (122 °F) must be less than four-sevenths of the sum of the marked test pressure plus 100 kPa (15 psi); or

(iii) The vapor pressure at 55 °C (131 °F) must be less than two-thirds of the sum of the marked test pressure plus 100 kPa (15 psi).

(5) No hazardous material may remain on the outside of a package after filling

(c) Mixed contents. (1) An outer non-bulk packaging may contain more than one hazardous material only when—

(i) The inner and outer packagings used for each hazardous material conform to the relevant packaging sections of this part applicable to that hazardous material;

(ii) The package as prepared for shipment meets the performance tests prescribed in part 178 of this subchapter for the packing group indicating the highest order of hazard for the

hazardous materials contained in the package;

(iii) Corrosive materials in bottles are further packed in securely closed inner receptacles before packing in outer packagings; and

(iv) For transportation by aircraft, the total net quantity does not exceed the lowest permitted maximum net quantity per package as shown in Column 9a or 9b, as appropriate, of the § 172.101 Table. The permitted maximum net quantity must be calculated in kilograms if a package contains both a liquid and a solid.

(2) A packaging containing inner packagings of Division 6.2 materials may not contain other hazardous materials, except dry ice.

(d) Liquids must not completely fill a receptacle at a temperature of 55 °C (131 °F) or less.

113. Section 173.24b is added to read as follows:

§ 173.24b Additional general requirements for bulk packagings.

(a) *Outage and filling limits.* (1) Liquids must be so loaded that the outage is at least one percent of the total capacity of a cargo or portable tank, or compartment thereof, or at least one percent of the total capacity of the tank and dome for tank car and multi-unit tank car tanks at the reference temperature of 46 °C (115 °F) for uninsulated tanks and 41 °C (105 °F) for insulated tanks.

(2) Hazardous materials may not be loaded into the dome of a tank car. If the dome of the tank car does not provide sufficient outage, vacant space must be left in the shell to provide the required outage.

(3) Bulk packagings for liquids toxic by inhalation. For a liquid which meets the definition for Division 6.1, Packing Group I, based on inhalation toxicity, the outage in a bulk packaging must be at least five percent of the total capacity of the tank or compartment at the reference temperature of 46 °C (115 °F) for uninsulated tanks and 41 °C (105 °F) for insulated tanks.

(b) *Equivalent steel.* For the purposes of this section, stainless steel is steel with a guaranteed minimum tensile strength of 51.7 deka newtons per square millimeter (75,000 psi) and a guaranteed elongation of 40 percent or greater. Where the regulations permit steel other than stainless steel to be used in place of a specified stainless steel (for example, as in § 172.102 of this subchapter, special provision B30); the minimum thickness for the steel must be obtained from one of the following formulas, as appropriate:

Formula for metric units:

$e_1 = (12.74e_0)/(Rm_1 A_1)^{1/2}$

Formula for non-metric units:

$e_1 = (144.2e_0)/(Rm_1 A_1)^{1/2}$

where:

e_0 = Required thickness of the reference stainless steel in millimeters or inches respectively;

e_1 = Equivalent thickness of the steel used in millimeters or inches respectively;

Rm_1 = Specified minimum tensile strength of the steel used in deka-newtons per square millimeter or pounds per square inch respectively; and

A_1 = Specified minimum percentage elongation of the steel used multiplied by 100 (for example, 20 percent times 100 equals 20). Elongation values used must be determined from a 50 mm or 2 inch test specimen.

(c) Air pressure in excess of ambient atmospheric pressure may not be used to load or unload any lading which may create an air-enriched mixture within the flammability range of the lading in the vapor space of the tank.

(d) A bulk packaging may not be loaded with a hazardous material that:

(1) Is at a temperature outside of the packaging's design temperature range; or

(2) Due to its density, exceeds the maximum weight of lading marked on the specification plate.

114. In § 173.25, paragraph (b) is removed and reserved, paragraph (a)(3) is revised, and paragraph (a)(5) is added to read as follows:

§ 173.25 Authorized packages and overpacks.

(a) * * *

(3) Each package subject to the orientation marking requirements of § 172.312 of this subchapter is packed in the overpack with its filling holes up and the overpack is marked with package orientation marking arrows on two opposite vertical sides of the overpack with the arrows pointing in the correct direction of orientation.

* * * * *

(5) Packages containing Class 8 (corrosive) or Division 5.1 (oxidizing) materials in Packing Group I may not be overpacked with any other materials.

(b) [Reserved]

* * * * *

115. Section 173.26 is revised to read as follows:

§ 173.26 Quantity limitations.

When quantity limitations do not appear in the packaging requirements of this subchapter, the permitted gross weight or capacity authorized for a packaging is as shown in the packaging specification or standard in part 178 or 179, as applicable, of this subchapter.

116. Section 173.27 is revised to read as follows:

§ 173.27 General requirements for transportation by aircraft.

(a) The requirements of this section are in addition to the requirements in § 173.24 and apply to packages offered or intended for transportation aboard aircraft. Notwithstanding any Packing Group III performance level specified in Column 5 of the § 172.101 Table, the required performance level for packages containing Class 4, 5, or 8 materials, when offered or intended for transportation aboard aircraft, is at the Packing Group II performance level, unless otherwise excepted from performance requirements in subpart E of this part.

(b) Packages authorized on board aircraft. (1) When Column 9a of the § 172.101 Table indicates that a material is "Forbidden", that material may not be offered for transportation or transported aboard passenger-carrying aircraft.

(2) When Column 9b of the § 172.101 Table indicates that a material is "Forbidden", that material may not be offered for transportation or transported aboard aircraft.

(3) The maximum quantity of hazardous material in a package that may be offered for transportation or transported aboard a passenger-carrying aircraft or cargo aircraft may not exceed that quantity prescribed for the material in Column 9a or 9b, respectively, of the § 172.101 Table.

(4) A package containing a hazardous material which is authorized aboard cargo aircraft but not aboard passenger aircraft must be labeled with the CARGO AIRCRAFT ONLY label required by § 172.402(b) of this subchapter and may not be offered for transportation or transported aboard passenger-carrying aircraft.

(c) Pressure requirements. (1) Packagings must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during transportation aboard aircraft.

(2) Packagings for which retention of liquid is a basic function must be capable of withstanding without leakage the greater of—

(i) An internal pressure which produces a pressure of not less than 75 kPa (11 psi) for liquids in Packing Group III of Class 3 or Division 6.1, or 95 kPa (14 psi) for other liquids; or

(ii) A pressure related to the vapor pressure of the liquid to be conveyed, determined by one of the following:

(A) The total gauge pressure measured in the receptacle (i.e., the

vapor pressure of the material and the partial pressure of air or other inert gases, less 100 kPa (15 psi)) at 55 °C (131 °F), multiplied by a safety factor of 1.5; determined on the basis of a filling temperature of 15 °C (59 °F) and a degree of filling such that the receptacle is not completely liquid full at a temperature of 55 °C (131 °F) or less;

(B) 1.75 times the vapor pressure at 50 °C (122 °F) less 100 kPa (15 psi); or

(C) 1.5 times the vapor pressure at 55 °C (131 °) less 100 kPa (15 psi).

(3) Notwithstanding the provisions of paragraph (c)(2) of this section—

(i) Hazardous materials may be contained in an inner packaging which does not itself meet the pressure requirement provided that the inner packaging is packed within a supplementary packaging which does meet the pressure requirement and other applicable packaging requirements of this subchapter.

(ii) Packagings which are subject to the hydrostatic pressure test and marking requirements of §§ 178.605 and 178.503(a)(5), respectively, of this subchapter must have a marked test pressure of not less than 250 kPa (36 psi) for liquids in Packing Group I, 80 kPa (12 psi) for liquids in Packing Group III of Class 3 or Division 6.1, and 100 kPa (15 psi) for other liquids.

(d) Closures. Stoppers, corks or other such friction-type closures must be held securely, tightly and effectively in place by positive means. Each screw-type closure on any packaging must be secured to prevent closure from loosening due to vibration or substantial change in temperature.

(e) Absorbent materials. Except as otherwise provided in this subchapter, liquids in Packing Group I or II of Class 3, 4, 5, 6, or 8, when in glass or earthenware inner packagings, must be packaged using material capable of absorbing and not likely to react dangerously with the liquid. Absorbent material is not required if the inner packagings are so protected that breakage of them and leakage of their contents from the outer packaging is not likely to occur under normal conditions of transportation and is not required for packagings containing liquids in Packing Group II for transport aboard cargo aircraft only. Where absorbent material is required and an outer packaging is not liquid-tight, a means of containing the liquid in the event of leakage must be used in the form of a leakproof liner, plastic bag or other equally efficient means of containment. Where absorbent material is required, the quantity and disposition of it in each outer packaging must be as follows:

(1) For packagings containing liquids in Packing Group I offered for transportation or transported aboard passenger-carrying aircraft, each packaging must contain sufficient absorbent material to absorb the contents of all inner packagings containing such liquids;

(2) For packagings containing liquids in Packing Group I offered for transportation or transported aboard cargo aircraft only and packagings containing liquids in Packing Group II offered for transportation or transported aboard passenger aircraft, each package must contain sufficient absorbent material to absorb the contents of any one of the inner packagings containing such liquids and, where they are of different sizes and quantities, sufficient absorbent material to absorb the contents of the inner packaging containing the greatest quantity of liquid.

(f) Combination packagings. Unless otherwise specified in this part, or in § 171.11 of this subchapter, when combination packagings are offered for transportation aboard aircraft, inner packagings must conform to the quantity limitations set forth in Table 1 of this paragraph for transport aboard passenger-carrying aircraft and Table 2 of this paragraph for transport aboard cargo aircraft only, as follows:

TABLE 1.—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON PASSENGER-CARRYING AIRCRAFT

Maximum net quantity per package from Column 9a of the § 172.101 Table	Maximum authorized net capacity *of each inner packaging*	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 0.5L	0.5L	0.5L.
Greater than 0.5L, not greater than 1L	0.5L	1L.
Greater than 1L, not greater than 5L	1L	5L.
Greater than 5L, not greater than 60L	2.5L	10L.
Greater than 60L, not greater than 220L	5L	25L.
Greater than 220L	No limit	No limit.
Solids:		
Not greater than 5 kg	0.5 kg	1 kg.
Greater than 5 kg, not greater than 25 kg	1 kg	2.5 kg.
Greater than 25 kg, not greater than 200 kg	5 kg	10 kg.
Greater than 200 kg	No limit	No limit.

TABLE 2.—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON CARGO AIRCRAFT

Maximum net quantity per package from Column 9b of the § 172.101 Table	Maximum authorized net capacity *of each inner packaging*	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 2.5L	1L	1L.
Greater than 2.5L, not greater than 30L	2.5L	2.5L.
Greater than 30L, not greater than 60L	5L	10L.
Greater than 60L, not greater than 220L	5L	25L.

TABLE 2.—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON CARGO AIRCRAFT—Continued

Maximum net quantity per package from Column 9b of the § 172.101 Table	Maximum authorized net capacity *of each inner packaging*	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Greater than 220L	No limit	No limit.
Solids:		
Not greater than 15 kg	1kg	2.5 kg.
Greater than 15 kg, not greater than 50 kg	2.5 kg	5 g.
Greater than 50 kg, not greater than 200 kg	5 kg	10 kg.
Greater than 200 kg	No limit	No limit.

(g) Cylinders. For any cylinder containing hazardous materials and incorporating valves, sufficient protection must be provided to prevent operation of, and damage to, the valves during transportation, by one of the following methods:

(1) By equipping each cylinder with securely attached valve caps or protective headings; or

(2) By boxing or crating the cylinder.

(h) Tank cars and cargo tanks. Any tank car or cargo tank containing a hazardous material may not be transported aboard aircraft.

117. Section 173.28 is revised as follows:

§ 173.28 Reuse reconditioning and remanufacture of packagings.

(a) *General.* Packagings and receptacles used more than once must be in such condition, including closure devices and cushioning materials, that they conform in all respects to the prescribed requirements of this subchapter. Before reuse, each packaging must be inspected and may not be reused unless free from incompatible residue, rupture, or other damage which reduces its structural integrity.

(b) *Reuse of non-bulk packaging.* A non-bulk packaging used more than once must conform to the following provisions and limitations:

(1) A non-bulk packaging which, upon inspection, shows evidence of a reduction in integrity may not be reused unless it is reconditioned in accordance with paragraph (c) of this section.

(2) Before reuse, packagings subject to the leakproofness test with air prescribed in § 178.604 of this subchapter shall be—

(i) Retested in accordance with § 178.604 of this subchapter using an internal air pressure (gauge) of at least 48 kPa (7.0 psi); and

(ii) Marked as required by paragraph (c) of this section and § 178.503(c) of this subchapter;

(3) Packagings made of paper, plastic film, or textile are not authorized for reuse;

(4) Metal and plastic drums and jerricans used as single packagings or the outer packagings of composite packagings are authorized for reuse only when they are marked in millimeters with the minimum thickness of the packaging material and conform to the following minimum construction criteria:

Marked, or rated, capacity (net mass) not over	Minimum thickness of packaging material	
	Metal drum or jerrican	Plastic drum or jerrican
20L (20 kg)	0.6 mm (0.024 inch).	1.2 mm (0.047 inch).
40L (40 kg)	0.7 mm (0.028 inch).	1.8 mm (0.071 inch).
120L (120 kg)	0.9 mm (0.035 inch).	2.2 mm (0.087 inch).
220L (220 kg)	0.96 mm (0.038 inch)[1].	2.2 mm (0.087 inch).
450L (450 kg)	1.8 mm (0.071 inch).	5.0 mm (0.197 inch).

[1] Metal drums or jerricans constructed with a minimum thickness of 0.82 mm (0.032 inch) body and 1.09 mm (0.043 inch) heads are authorized.

(5) Plastic inner receptacles of composite packagings must have a minimum thickness of 1.5 mm (0.059 inch).

(6) A previously used non-bulk packaging may be reused for the shipment of hazardous waste, not subject to the reconditioning and reuse provisions of this section, in accordance with § 173.12(c).

(c) *Reconditioning of non-bulk packaging.* (1) For the purpose of this subchapter, reconditioning of metal drums is:

(i) Cleaning to base material of construction, with all former contents, internal and external corrosion, and any coatings and labels removed;

(ii) Restoring to original shape and contour, with chimes (if any) straightened and sealed, and all non-integral gaskets replaced; and

(iii) Inspecting after cleaning but before painting. Packagings that have visible pitting, significant reduction in material thickness, metal fatigue, damaged threads or closures, or other significant defects, must be rejected.

(2) For the purpose of this subchapter, reconditioning of a non-bulk packaging other than a metal drum is restoring the packaging by repair, or replacement of non-integral packaging components (such as removable gaskets, closure devices, cushioning material, etc.) to a condition such that it conforms in all respects with the prescribed requirements of this subchapter. Packagings which have significant defects which cannot be repaired may not be reused.

(3) A person who reconditions a packaging manufactured and marked under the provisions of subpart L of part 178 of this subchapter, shall mark that packaging as required by § 178.503(c) of this subchapter. The marking is the certification of the reconditioner that the packaging conforms to the standard for which it is marked and that all functions performed by the reconditioner which are prescribed by this subchapter have been performed in compliance with this subchapter.

(d) *Remanufacture of non-bulk packagings.* For the purpose of this subchapter, remanufacture is the conversion of a non-specification, non-bulk packaging to a DOT specification or U.N. standard, the conversion of a packaging meeting one specification or standard to another specification or standard (for example, conversion of 1A1 non-removable head drums to 1A2 removable head drums) or the replacement of integral structural packaging components (such as non-removable heads on drums). A person who remanufactures a non-bulk packaging to conform to a specification or standard in part 178 of this subchapter is subject to the requirements of part 178 of this subchapter as a manufacturer.

118. Section 173.29 is revised to read as follows:

§ 173.29 Empty packagings.

(a) General. Except as otherwise provided in this section, an empty

packaging containing only the residue of a hazardous material shall be offered for transportation and transported in the same manner as when it previously contained a greater quantity of that hazardous material.

(b) Notwithstanding the requirements of paragraph (a) of this section, an empty packaging is not subject to any other requirements of this subchapter if it conforms to the following provisions:

(1) Any hazardous material shipping name and identification number markings, and any hazard warning labels or placards are removed, obliterated, or securely covered in transportation. This provision does not apply to transportation in a transport vehicle or a freight container if the packaging is not visible during transportation and the packaging is loaded by the shipper and unloaded by the shipper or consignee;

(2) The packaging—

(i) Is unused;

(ii) Is sufficiently cleaned of residue and purged of vapors to remove any potential hazard;

(iii) Is refilled with a material which is not hazardous to such an extent that any residue remaining in the packaging no longer poses a hazard; or

(iv) Contains only the residue of—

(A) An ORM–D material; or

(B) A non-flammable gas with no subsidiary hazard at an absolute pressure less than 276 kPa (40 psia); at 21 °C (70 °F); and

(3) Any material contained in the packaging does not meet the definitions in § 171.8 of this subchapter for either a hazardous substance or a hazardous waste.

(c) A non-bulk packaging containing only the residue of a hazardous material covered by Table 2 of § 172.504 of this subchapter—

(1) Does not have to be included in determining the applicability of the placarding requirements of subpart F of part 172 of this subchapter; and

(2) Is not subject to the shipping paper requirements of this subchapter when collected and transported by a contract or private carrier for reconditioning, remanufacture or reuse.

(d) Notwithstanding the stowage requirements in Column 10a of the § 172.101 Table for transportation by vessel, an empty drum or cylinder may be stowed on deck or under deck.

(e) Specific provisions for describing an empty packaging on a shipping paper appear in § 172.203(e) of this subchapter.

(f) An empty tank car must conform to the placarding requirements specified in § 172.510(c) of this subchapter.

119. In § 173.31, in Retest Table 1 in paragraph (c), the footnote designator ▼ in the Table is removed and footnote ▼ is removed and reserved, paragraph (a)(1) is revised, and paragraphs (a)(12) through (a)(17) are added to read as follows:

§ 173.31 Qualification, maintenance, and use of tank cars.

(a) * * * (1) Except as otherwise provided in paragraphs (a)(2) and (a)(11) of this section, each tank car used for the transportation of hazardous materials must meet the requirements of the applicable specification and regulations for the transportation of the particular hazardous material. See paragraph (a)(3) of this section.

* * * * *

(12) Pressure relief devices on tank car tanks must be of a type and design approved by the AAR Committee on Tank Cars and be constructed of metal not subject to deterioration by the lading.

(13) A Specification DOT–106A or 110A multi-unit tank car tank may be offered for transportation aboard a passenger vessel only as authorized in § 173.32(a)(4).

(14) Tank test pressure must be equal to or greater than the greatest of the following:

(i) Except for shipments of carbon dioxide, anhydrous hydrogen chloride, vinyl fluoride, ethylene, or hydrogen, 133 percent of the sum of lading vapor pressure at the reference temperature of 46 °C (115 °F) for uninsulated tanks or 41 °C (105 °F) for insulated tanks plus static head plus gas padding pressure in the ullage space or dome of tank;

(ii) 133 percent of the maximum loading or unloading pressure, whichever is greater; or

(iii) The minimum pressure prescribed by the specification in Part 179 of this subchapter or for the specific hazardous material in the applicable packaging section in Subpart F or G of this Part.

(15) Except for shipments of chloroprene in Class DOT 115 tank car tanks, single unit tank car tanks used for materials meeting the definition for Division 6.1 liquids, Packing Group I or II, Class 2 gases, or Class 3 or 4 liquids, may not be equipped with nonreclosing pressure relief devices. However, a tank car tank built before January 1, 1991 and equipped with non-reclosing pressure relief devices may be used to transport a Division 6.1 or Class 4 liquid provided that the liquid does not meet the definition of Division 6.1, Packing Group I, for inhalation toxicity (See §§ 173.132 and 173.133 of this subchapter). Unless otherwise specifically provided in this subchapter, breather holes are not authorized on frangible discs of tank car tank safety vents.

(16) For tanks used to transport materials with a primary or secondary hazard of Class 8 which are to be reused for Class 2 materials, both tank and pressure relief valves shall be retested prior to loading with the Class 2 material.

(17) *Heating coils.* Tank car tanks used for materials meeting the definition for Division 2.3 or for Division 6.1, Packing Group I, based on inhalation toxicity, may not be equipped with interior heating coils.

* * * * *

120. In § 173.32 paragraph (a)(6) and paragraphs (q) through (s) are added to read as follows:

§ 173.32 Qualification, maintenance and use of portable tanks.

(a) * * *

(6) A DOT 51 portable tank may be used where DOT 56 or DOT 57 type portable tanks or DOT 60 portable tanks are authorized. A DOT 60 portable tank may be used where DOT 56 or DOT 57 type portable tanks are authorized. A higher integrity tank used instead of a specified portable tank must meet the same design profile; e.g., a DOT 51 portable tank must be lined if used instead of a lined DOT 60 portable tank.

* * * * *

(q) *Maximum Lading Pressure.* Prior to filling and offering a portable tank for transportation, the person must confirm that the portable tank conforms to the specification required for the lading and that the maximum allowable working pressure (MAWP) of the portable tank is greater to or equal to the largest pressure obtained under the following conditions:

(1) For compressed gases and certain refrigerated liquids that are not cryogenic liquids, the pressure prescribed in § 173.315 of this subchapter.

(2) For liquid hazardous materials not covered in paragraph (q)(1) of this section, the sum of the vapor pressure of the lading at 46 °C (115 °F), plus the tank static head exerted by the lading, plus any pressure exerted by the gas padding, including air in the ullage space.

(3) The pressure prescribed in Subpart B, D, E, F, G or H of this part, as applicable.

(4) The maximum pressure used to load or unload the lading.

(r) Unless otherwise specified, where a portable tank is authorized, minimum tank design pressure is 172 kPa (25 psig) for any Packing Group I or Packing Group II liquid lading that meets more than one hazard class definition.

(s) Any DOT specification portable tank manufactured prior to January 1, 1992 that is equipped with a non-reclosable pressure relief device can continue in service for the commodities for which it is authorized. Except for DOT Specification 56 and 57 portable tanks, any DOT specification portable tank manufactured after January 1, 1992 used for materials meeting the definition for Division 6.1 liquids, Packing Group I or II, Class 2 gases, or Class 3 or 4 liquids, must be equipped with a reclosing pressure relief valve having adequately-sized venting capacity.

121. In § 173.32c, paragraphs (a), (b), (g)(2) and (o) are revised and paragraph (p) is added to read as follows:

§ 173.32c Use of Specification IM portable tanks.

(a) No person may offer a hazardous material for transportation in an IM portable tank except as authorized by this subchapter.

(b) Except as otherwise provided in this subpart, an IM portable tank may not be used for the transportation of a hazardous material unless it meets the requirements of this subchapter.

* * * * *

(g) * * *

(2) When this paragraph (g)(2) is specified for a hazardous material by the IM Tank Table in § 172.102 of this subchapter, each filling or discharge connection located below the normal liquid level of the tank, or compartment thereof, has three serially-mounted closures consisting of an internal discharge valve capable of being closed from a location remote from the valve itself, an external valve, and a bolted blank flange or other suitable, liquid-tight closure on the outlet side of the external valve.

* * * * *

(o) An IM 101 tank may be used whenever an IM 102 tank is authorized provided it meets the requirements for pressure relief devices, bottom outlets and any other special provisions specified for the IM 102 tank in § 172.102 of this subchapter.

(p) Any IM 101 or IM 102 portable tank certified by an approval agency prior to January 1, 1992, that is equipped with a non-reclosable pressure relief device may continue in service for the commodities for which it is authorized. Any IM 101 and IM 102 portable tank certified after January 1, 1992, used for materials meeting the definition for Division 6.1 liquids, Packing Group I or II, or Class 3 or 4 liquids, must be equipped with a reclosing pressure relief valve having adequately-sized venting capacity.

§ 173.32d [Removed]

122. Section 173.32d is removed.

123. In 173.33, paragraphs (b)(2)(ii) and (b)(2)(iii) are removed and reserved and paragraphs (f) and (g) are added to read as follows:

§ 173.33 Hazardous materials in cargo tank motor vehicles.

* * * * *

(f) An MC 331 type cargo tank may be used where MC 306, MC 307, MC 312, DOT 406, DOT 407 or DOT 412 type cargo tanks are authorized. An MC 307, MC 312, DOT 407 or DOT 412 type cargo tank may be used where MC 306 or DOT 406 type cargo tanks are authorized. A higher integrity tank used instead of a specified tank must meet the same design profile (for example, an MC 331 cargo tank must be lined if used in place of a lined MC 312 cargo tank.)

(g) Unless otherwise specified, where MC 307, MC 312, DOT 407 or DOT 412 cargo tanks are authorized, minimum tank design pressure is 172.4 kPa (25 psig) for any Packing Group I or Packing Group II liquid lading that meets more than one hazard class definition.

124. Section 173.40 is added to subpart B of part 173 to read as follows:

§ 173.40 General packaging requirements for poisonous materials required to be packaged in cylinders.

When this section is referenced in the packaging section for a hazardous material elsewhere in this part, the following requirements are applicable to cylinders used for that material:

(a) *Authorized cylinders.* A cylinder must conform to one of the specifications for cylinders in subpart C of part 178 of this subchapter, except that Specification 8, 8AL and 39 cylinders are not authorized.

(b) *Outage and pressure requirements.* The pressure of the hazardous material at 55 °C (131 °F) must not exceed the service pressure of the cylinder. Sufficient outage shall be provided so that the cylinder will not be liquid full at 55 °C (131 °F).

(c) *Closures.* Each cylinder must be closed with a plug or valve conforming to the following:

(1) Each plug or valve must have a taper-threaded connection directly to the cylinder and be capable of withstanding the test pressure of the cylinder;

(2) Each valve must be of the packless type with non-perforated diaphragm, except that for corrosive materials, a valve may be of the packed type provided the assembly is made gas-tight by means of a seal cap with gasketed joint attached to the valve body or the cylinder to prevent loss of material through or past the packing;

(3) Each valve outlet must be sealed by a threaded cap or threaded solid plug, and

(4) Cylinder, valves, plugs, outlet caps, luting and gaskets must be compatible with each other and with the lading.

(d) *Additional protection.* Additional protection requirements for thin-walled cylinders and for cylinders equipped with valves are as follows:

(1) Each cylinder which has a wall thickness at any point of less than 2.03 mm (0.080 inch) and each cylinder which does not have fitted valve protection must be overpacked in a 4Cl, 4D, 4F, 4G, 4Hl or 4H2 box. The box must conform to overpack provisions in § 173.25. Box and valve protection must be of sufficient strength to protect all parts of the cylinder and valve, if any, from deformation and breakage resulting from a drop of 2.0 m (7 ft) or more onto a concrete floor, impacting at an orientation most likely to cause damage.

(2) Each cylinder equipped with a valve, if not overpacked in a box in accordance with paragraph (d)(1) of this section, must be equipped with a protective cap or other means of valve protection sufficient to protect the valve from deformation and breakage resulting from a drop of 2.0 m (7 ft) or more onto a concrete floor, impacting at an orientation most likely to cause damage.

(e) *Interconnection.* Cylinders may not be interconnected.

124a. In part 173, subparts C, D, E and F are revised to read as follows:

Subpart C—Definitions, Classification and Packaging for Class 1

Sec.

173.50 Class 1—definitions.
173.51 Authorization to offer and transport explosives.
173.52 Classification codes and compatibility groups of explosives.
173.53 Provisions for using old classifications of explosives.
173.54 Forbidden explosives.
173.55 [Reserved].
173.56 New explosives—definition and procedures for classification and approval.
173.57 Acceptance criteria for new explosives.
173.58 Assignment of class and division for new explosives.
173.59 Description of terms for explosives.
173.60 General packaging requirements for explosives.
173.61 Mixed packaging requirements.
173.62 Specific packaging requirements.
173.63 Packaging exceptions.

Subpart D—Definitions, Classification, Packing Group Assignments and Exceptions for Hazardous Material Other Than Class 1 and Class 7

Sec.
173.115 Class 2, Divisions 2.1, 2.2, and 2.3—Definitions.
173.116 Class 2—Assignment of hazard zone.
173.117—173.119 [Reserved].
173.120 Class 3—Definitions.
173.121 Class 3—Assignment of packing group.
173.124 Class 4, Divisions 4.1, 4.2, and 4.3—Definitions.
173.125 Class 4—Assignment of packing group.
173.127 Class 5, Division 5.1—Definition and assignment of packing groups.
173.128 Class 5, Division 5.2—Definitions and types.
173.129 Class 5, Division 5.2—Assignment of packing group.
173.132 Class 6, Division 6.1—Definitions.
173.133 Division 6.1—Assignment of packing group and hazard zones.
173.134 Class 6, Division 6.2—Definitions.
173.136 Class 8—Definitions.
173.137 Class 8—Assignment of packing group.
173.140 Class 9—Definitions.
173.141 Class 9—Assignment of packing group.
173.144 Other Regulated Materials (ORM)—Definitions.
173.145 Other Regulated Materials—Assignment of packing group.
173.150 Exceptions for Class 3 (flammable and combustible liquids).
173.151 Exceptions for Division 4.1 (flammable solids).
173.152 Exceptions for Division 5.1 (oxidizers) and Division 5.2 (organic peroxides).
173.153 Exceptions for Division 6.1 (poisonous materials).
173.154 Exceptions for Class 8 (corrosive materials).
173.155 Exceptions for Class 9 (miscellaneous hazardous materials).
173.156 Exceptions for ORM materials.

Subpart E—Non-bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

Sec.
173.158 Nitric acid.
173.159 Batteries, wet.
173.160 Bombs, smoke, non-explosive (corrosive).
173.161 Chemical kits.
173.162 Gallium.
173.163 Hydrogen fluoride.
173.164 Mercury (metallic and articles containing mercury).
173.171 Smokeless powder for small arms.
173.172 Aircraft hydraulic power unit fuel tank.
173.173 Paint, paint-related material, adhesives and ink.
173.174 Refrigerating machines.
173.181 Pyrophoric materials (liquids).
173.182 Barium azide—50 percent or more water wet.
173.183 Nitrocellulose base film.
173.184 Highway or rail fusee.
173.185 Lithium batteries and cells.
173.186 Matches.
173.187 Pyrophoric solids, metals or alloys, n.o.s.
173.188 White or yellow phosphorous.
173.192 Packaging for certain Packing Group I poisonous materials.
173.193 Bromoacetone, methyl bromide, chloropicrin and methyl bromide or methyl chloride mixtures, etc.
173.194 Gas identification sets.
173.195 Hydrocyanic acid, liquid (prussic acid) and hydrocyanic acid liquefied.
173.196 Infectious substances (etiologic agents).
173.198 Nickel carbonyl.
173.201 Non-bulk packagings for liquid hazardous materials in Packing Group I.
173.202 Non-bulk packagings for liquid hazardous materials in Packing Group II.
173.203 Non-bulk packagings for liquid hazardous materials in Packing Group III.
173.204 Non-bulk, non-specifications packagings for certain hazardous materials.
173.205 Specification cylinders for liquid hazardous materials.
173.211 Non-bulk packagings for solid hazardous materials in Packing Group I.
173.212 Non-bulk packagings for solid hazardous materials in Packing Group II.
173.213 Non-bulk packagings for solid hazardous materials in Packing Group III.
173.214 Packagings which require approval by the Associate Administrator for Hazardous Materials Safety.
173.216 Asbestos, blue, brown, or white.
173.217 Carbon dioxide, solid (dry ice).
173.218 Fish meal or fish scrap.
173.219 Life-saving appliances.
173.220 Internal combustion engines, self-propelled vehicles, and mechanical equipment containing internal combustion engines or wet batteries.
173.221 Polystyrene beads, expandable.
173.222 Wheelchairs equipped with wet electric storage batteries.
173.224 Packaging and control and emergency temperatures for self-reactive materials.
173.225 Packaging requirements and other provisions for organic peroxides.
173.226 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone A.
173.227 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone B.
173.228 Bromine pentaflourids or bromine trifluoride.
173.229 Chloric acid solution or chlorine dioxide hydrate, frozen.
173.230 Non-bulk packagings for ORM-D materials.

Subpart F—Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

Sec.
173.240 Bulk packaging for certain low hazard solid materials.
173.241 Bulk packaging for certain low hazard liquid and solid materials.
173.242 Bulk packagings for certain medium hazard liquids and solids, including solids with dual hazards.
173.243 Bulk packaging for certain high hazard liquids and dual hazard liquids which pose a moderate hazard.
173.244 Bulk packaging for certain pyrophoric liquids (Division 4.2), poisonous liquids with inhalation hazards (Division 6.1), and gases (Class 2).
173.245 Bulk packaging for extremely hazardous materials such as poisonous gases (Division 2.3).
173.249 Bromine.

Subpart C—Definitions, Classification and Packaging for Class [1]

§ 173.50 Class 1—definitions.

(a) Explosive. For the purpose of this subchapter, an "explosive" means any substance or article, including a device, which is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion, unless the substance or article is otherwise classed under the provision of this subchapter.

(b) Explosives in Class 1 are divided into six divisions as follows:

(1) *Division 1.1* consists of explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

(2) *Division 1.2* consists of explosives that have a projection hazard but not a mass explosion hazard.

(3) *Division 1.3* consists of explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

(4) *Division 1.4* consists of explosive devices that present a minor explosion hazard. No device in this division may contain more than 25 g (0.9 ounce) of a detonating material.

(5) *Division 1.5* [1] consists of very insensitive explosives. This division is comprised of substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

(6) Division 1.6 [2] consists of extremely insensitive articles which do not have a

[1] The Probability of transition from burning to detonation is greater when large quantities are transported in a vessel.

[2] The risk from articles of Division 1.6 is limited to the explosion of a single article.

mass explosive hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

§ 173.51 Authorization to offer and transport explosives.

(a) Unless otherwise provided in this subpart, no person may offer for transportation or transport an explosive, unless it has been tested and classed and approved by the Associate Administrator for Hazardous Materials Safety (§ 173.56).

(b) Reports of explosives approved by the Department of Defense or the Department of Energy must be filed with, and receive acknowledgement in writing by, the Associate Administrator for Hazardous Materials Safety prior to such explosives being offered for transportation.

§ 173.52 Classification codes and compatibility groups of explosives.

(a) The classification code for an explosive, which is assigned by the Associate Administrator for Hazardous Materials Safety in accordance with this subpart, consists of the division number followed by the compatibility group letter. Compatibility group letters are used to specify the controls for the transportation, and storage related thereto, of explosives and to prevent an increase in hazard that might result if certain types of explosives were stored or transported together. Transportation compatibility requirements for carriers are prescribed in §§ 174.81, 175.78, 176.83 and 177.848 of this subchapter for transportation by rail, air, vessel, and public highway, respectively, and storage incidental thereto.

(b) Compatibility groups and classification codes for the various types of explosives are set forth in the following tables. Table 1 sets forth compatibility groups and classification codes for substances and articles described in the first column of Table 1. Table 2 shows the number of classification codes that are possible within each explosive division. Altogether, there are 35 possible classification codes for explosives.

TABLE 1.—CLASSIFICATION CODES

Description of substances or article to be classified	Compatibility group	Classification code
Primary explosive substance	A	1.1A
Article containing a primary explosive substance and not containing two or more effective protective features	B	1.1B
		1.2B
		1.4B
Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance	C	1.1C
		1.2C
		1.3C
		1.4C
Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features.	D	1.1D
		1.2D
		1.4D
		1.5D
Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid).	E	1.1E
		1.2E
		1.4E
Article containing a secondary detonating explosive substance with its means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid) or without a propelling charge.	F	1.1F
		1.2F
		1.3F
		1.4F
Pyrotechnic substance or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear-producing or smoke-producing substance (other than a water-activated article or one containing white phosphorus, phosphide or flammable liquid or gel or hypergolic liquid).	G	1.1G
		1.2G
		1.3G
		1.4G
Article containing both an explosive substance and white phosphorus	H	1.2H
		1.3H
Article containing both an explosive substance and flammable liquid or gel	J	1.1J
		1.2J
		1.3J
Article containing both an explosive substance and a toxic chemical agent	K	1.2K
		1.3K
Explosive substance or article containing an explosive substance and presenting a special risk (e.g., due to water-activation or presence of hybergolic liquids, phosphides or pyrophoric substances) needing isolation of each type.	L	1.1L
		1.2L
		1.3L
Articles containing only extremely insensitive detonating substances.	N	1.6N
Substance or article so packed or designed that any hazardous effects arising from accidental functioning are limited to the extent that they do not significantly hinder or prohibit fire fighting or other emergency response efforts in the immediate vicinity of the package.	S	1.4S

TABLE 2.—SCHEME OF CLASSIFICATION OF EXPLOSIVES, COMBINATION OF HAZARD DIVISION WITH COMPATIBILITY GROUP

Hazard division	Compatibility group													
	A	B	C	D	E	F	G	H	J	K	L	N	S	A–S
1.1	1.1A	1.1B	1.1C	1.1D	1.1E	1.1F	1.1G		1.1J		1.1L			9
1.2		1.2B	1.2C	1.2D	1.2E	1.2F	1.2G	1.2H	1.2J	1.2K	1.2L			10
1.3			1.3C			1.3F	1.3G	1.3H	1.3J	1.3K	1.3L			7
1.4		1.4B	1.4C	1.4D	1.4E	1.4F	1.4G						1.4S	7
1.5				1.5D										1
1.6												1.6N		1

TABLE 2.—SCHEME OF CLASSIFICATION OF EXPLOSIVES, COMBINATION OF HAZARD DIVISION WITH COMPATIBILITY GROUP—Continued

Hazard division	Compatibility group													
	A	B	C	D	E	F	G	H	J	K	L	N	S	A-S
1.1–1.6	1	3	4	4	3	4	4	2	3	2	3	1	1	35

§ 173.53 Provisions for using old classifications of explosives.

Where the classification system in effect prior to January 1, 1991, is referenced in State or local laws, ordinances or regulations not pertaining to the transportation of hazardous materials, the following table may be used to compare old and new hazard class names:

Current classification	Class name prior to Jan. 1, 1991
Division 1.1	Class A explosives.
Division 1.2	Class A or Class B explosives.
Division 1.3	Class B explosive.
Division 1.4	Class C explosives.
Division 1.5	Blasting agents.
Division 1.6	No applicable hazard class.

§ 173.54 Forbidden explosives.

Unless otherwise provided in this subchapter, the following explosives shall not be offered for transportation or transported:

(a) An explosive that has not been approved in accordance with § 173.56 of this subpart

(b) An explosive mixture or device containing a chlorate and also containing:

(1) An ammonium salt, including a substituted ammonium or quaternary ammonium salt; or

(2) An acidic substance, including a salt of a weak base and a strong acid.

(c) A leaking or damaged package of explosives.

(d) Propellants that are unstable, condemned or deteriorated.

(e) Nitroglycerin, diethylene glycol dinitrate, or any other liquid explosives not specifically authorized by this subchapter.

(f) A loaded firearm (except as provided in 14 CFR 108.11).

(g) Fireworks that combine an explosive and a detonator.

(h) Fireworks containing yellow or white phosphorus.

(i) A toy torpedo, the maximum outside dimension of which exceeds 23 mm (0.906 inch), or a toy torpedo containing a mixture of potassium chlorate, black antimony (antimony sulfide), and sulfur, if the weight of the explosive material in the device exceeds 0.26 g (0.01 ounce).

(j) Explosives specifically forbidden in the Hazardous Materials Table in § 172.101 of this subchapter.

(k) Explosives not meeting the acceptance criteria specified in § 173.57 of this subchapter.

§ 173.55 [Reserved]

§ 173.56 New explosives—definition and procedures for classification and approval.

(a) Definition of new explosive. For the purposes of this subchapter a "new explosive" means an explosive produced by a person who:

(1) Has not previously produced that explosive; or

(2) Has previously produced that explosive but has made a change in the formulation, design or process so as to alter any of the properties of the explosive. An explosive will not be considered a "new explosive" if an agency listed in paragraph (b) of this section has determined, and confirmed in writing to the Associate Administrator for Hazardous Materials Safety, that there are no significant differences in hazard characteristics from the explosive previously approved.

(b) Examination, classing and approval. Except as provided in paragraph (j) of this section, no person may offer a new explosive for transportation unless that person has specified to the examining agency the ranges of composition of ingredients and compounds, showing the intended manufacturing tolerances in the composition of substances or design of articles which will be allowed in that material or device, and unless it has been examined, classed and approved as follows:

(1) A new explosive must be examined and assigned a recommended shipping description' class, and classification code by the Bureau of Explosives (BOE) or the Bureau of Mines, U.S Department of Interior (BOM). The recommendation of class and classification code must be based on the tests and criteria prescribed in §§ 173.52, 173.57 and 173.58 of this subchapter. Each person requesting approval of a new explosive must submit a copy of the report of examination and assignment of recommended shipping description, class and classification code to the Associate Administrator for Hazardous Materials Safety for approval and must receive written approval and an EX-number from the Associate Administrator for Hazardous Materials Safety before offering that explosive for transportation.

(2) A new explosive made by or under the direction or supervision of a component of the DOD may be examined, classed, and approved by: (i) The U.S. Army Materiel Command Field Safety Activity (AMXOS–SE), Naval Sea Systems Command (SEA–665), or Headquarters U.S. Air Force (HQUSAF; ISC/SEWV), in accordance with the Department of Defense Explosives Hazard Classification Procedures (TB 700–2, dated December 1989); or

(ii) The agencies and procedures specified in paragraph (b)(1) of this section.

(3) A new explosive made by or under the direction or supervision of the Department of Energy (DOE) may be—

(i) Examined by the DOE in accordance with the Explosives Hazard Classification Procedures (TB 700–2, dated December, 1989), and must be classed and approved by DOE; or

(ii) Examined, classed, and approved in accordance with paragraph (b)(1) of this section.

(4) For a material shipped under the description of "ammonium nitrate-fuel oil mixture (ANFO)", the only test required for classification purposes is the Cap Sensitivity Test (Test Method 5(a), prescribed in the Explosive Test Manual). The test must be performed by an agency listed in paragraph (b)(1), (b)(2), or (b)(3) of this section, the manufacturer, or the shipper. A copy of the test report must be submitted to the Associate Administrator for Hazardous Materials Safety before the material is offered for transportation, and a copy of the test report must be retained by the shipper for as long as that material is shipped. At a minimum, the test report must contain the name and address of the person or organization conducting the test, date of the test, quantitative description of the mixture, including prill size and porosity, and a description of the test results.

(c) Filing DOD or DOE approval report. DOD or DOE must file a copy of each approval, accompanied by supporting laboratory data, with the

Associate Administrator for Hazardous Materials Safety and receive acknowledgement in writing before offering the new explosive for transportation, unless the new explosive is:

(1) Being transported under paragraph (d) or (e) of this section; or

(2) Covered by a national security classification currently in effect.

(d) Transportation of explosive samples for examination. Notwithstanding the requirements of paragraph (b) of this section with regard to the transportation of a new explosive that has not been approved, a person may offer a sample of a new explosive for transportation, by railroad, highway, or vessel from the place where it was produced to an agency identified in paragraph (b) of this section, for examination if—

(1) The new explosive has been assigned a tentative shipping description and class in writing by the testing agency;

(2) The new explosive is packaged as required by this part according to the tentative description and class assigned, unless otherwise specified in writing by the testing agency; and,

(3) The package is labeled as required by this subchapter and the following is marked on the package:

(i) The words "SAMPLE FOR LABORATORY EXAMINATION";

(ii) The net weight of the new explosive; and

(iii) The tentative shipping name and identification number.

(e) Transportation of unapproved explosives for developmental testing. Notwithstanding the requirements of paragraph (b) of this section, the owner of a new explosive that has not been examined or approved may transport that new explosive from the place where it was produced to an explosives testing range if—

(1) It is not a primary (a 1.1A initiating) explosive or a forbidden explosive according to this subchapter;

(2) It is described as a Division 1.1 explosive (substance or article) and is packed, marked, labeled, described on shipping papers and is otherwise offered for transportation in conformance with the requirements of this subchapter applicable to Division 1.1;

(3) It is transported in a motor vehicle operated by the owner of the explosive; and

(4) It is accompanied by a person, in addition to the operator of the motor vehicle, who is qualified by training and experience to handle the explosive.

(f) Notwithstanding the requirements of paragraphs (b) and (d) of this section, the Associate Administrator for Hazardous Materials Safety may approve a new explosive on the basis of an approval issued for the explosive by the competent authority of a foreign government, or when examination of the explosive by the Bureau of Explosives or the Bureau of Mines is impracticable, on the basis of reports of tests conducted by disinterested third parties, or may approve the transportation of an explosives sample for the purpose of examination by the BOE, the BOM, or other government agency.

(g) Notwithstanding the requirements of paragraph (b) of this section, an explosive may be transported under §§ 171.11, 171.12, or § 176.11 of this subchapter without the approval of the Associate Administrator for Hazardous Materials Safety if the Associate Administrator for Hazardous Materials Safety has acknowledged, in writing, the acceptability of an approval issued by the competent authority of a foreign government pursuant to the provisions of the UN Recommendations, the ICAO Technical Instructions, the IMDG Code, or other national or international regulations based on the UN Recommendations. In such a case, a copy of the foreign competent authority approval, and a copy of the written acknowledgement of its acceptance must accompany each shipment of that explosive.

(h) The requirements of this section do not apply to cartridges, small arms which are:

(1) Not a forbidden explosive under § 173.54 of this subchapter;

(2) Ammunition for rifle, pistol, or shotgun;

(3) Ammunition with inert projectile or blank ammunition; or

(4) Ammunition not exceeding 50 caliber for rifle or pistol cartridges or 8 gauge for shotgun shells.

Cartridges, small arms meeting the criteria of this paragraph (h) may be assigned a classification code of 1.4S by the manufacturer.

(i) If experience or other data indicate that the hazard of a material or a device containing an explosive composition is greater or less than indicated according to the definition and criteria specified in §§ 173.50, 173.56, and 173.58 of this subchapter, the Associate Administrator for Hazardous Materials Safety may, following examination in accordance with paragraph (b) of this section, revise its classification or except the material or device from the requirements of this subchapter.

(j) Fireworks. Notwithstanding the requirements of paragraph (b) of this section, Division 1.3 and 1.4 fireworks may be classed and approved by the Associate Administrator for Hazardous Materials Safety without prior examination and offered for transportation if the following conditions are met:

(1) The fireworks are manufactured in accordance with the applicable requirements in APA Standard 87–1;

(2) A thermal stability test is conducted on the device by the BOE, the BOM, or the manufacturer. The test must be performed by maintaining the device, or a representative prototype of a large device such as a display shell, at a temperature of 75 °C (167 °F) for 48 consecutive hours. When a device contains more than one component, those components which could be in physical contact with each other in the finished device must be placed in contact with each other during the thermal stability test; and

(3) The manufacturer applies in writing to the Associate Administrator for Hazardous Materials Safety following the applicable requirements in APA Standard 87–1, and is notified in writing by the Associate Administrator for Hazardous Materials Safety that the fireworks have been classed, approved, and assigned an EX-number. Each application must be complete, including all relevant background data and copies of all applicable drawings, test results, and any other pertinent information on each device for which approval is being requested. The manufacturer must sign the application and certify that the device for which approval is requested conforms to APA Standard 87–1 and that the descriptions and technical information contained in the application are complete and accurate. If the application is denied, the manufacturer will be notified in writing of the reasons for the denial. The Associate Administrator for Hazardous Materials Safety may require that the fireworks be examined by an agency listed in paragraph (b)(1) of this section.

§ 173.57 Acceptance criteria for new explosives.

(a) Unless otherwise excepted, an explosive substance must be subjected to the Drop Weight Impact Sensitivity Test (Test Method 3(a)(i)), the Friction Sensitivity Test (Test Method 3(b)(iii)), the Thermal Stability Test (Test Method 3(c)) at 75 °C (167 °F) and the Small-Scale Burning Test (Test Method 3(d)(i)), each as described in the Explosive Test Manual (UN Recommendations on the Transport of Dangerous Goods, Tests and Criteria, Part I, Second Edition (see § 171.8 of this subchapter). A substance is forbidden for transportation if any one of the following occurs:

(1) For a liquid, failure to pass the test criteria when tested in the Drop Weight Impact Sensitivity Test apparatus for liquids;

(2) For a solid, failure to pass the test criteria when tested in the Drop Weight Impact Sensitivity Test apparatus for solids;

(3) The substance has a friction sensitiveness equal to or greater than that of dry pentaerythrite tetranitrate (PETN) when tested in the Friction Sensitivity Test;

(4) The substance fails to pass the test criteria specified in the Thermal Stability Test at 75 °C (167 °F); or

(5) Explosion occurs when tested in the Small-Scale Burning Test.

(b) An explosive article, packaged or unpackaged, or a packaged explosive substance must be subjected to the Thermal Stability Test for Articles and Packaged Articles (Test method 4(a)(i)) and the Twelve Meter Drop Test (Test Method 4(b)(ii)), when appropriate, in the Explosive Test Manual. An article or packaged substance is forbidden for transportation if evidence of thermal instability or excessive impact sensitivity is found in those tests according to the criteria and methods of assessing results prescribed therein.

(c) Dynamite (explosive, blasting, type A) is forbidden for transportation if any of the following occurs:

(1) It does not have uniformly mixed with the absorbent material a satisfactory antacid in a quantity sufficient to have the acid neutralizing power of an amount of magnesium carbonate equal to one percent of the nitroglycerin or other liquid explosive ingredient;

(2) During the centrifuge test (Test Method D–2, in appendix D to this part) or the compression test (Test Method D–3 in appendix D to this Part), a non-gelatin dynamite loses more than 3 percent by weight of the liquid explosive or a gelatin dynamite loses more than 10 percent by weight of the liquid explosive; or

(3) During the leakage test (Test Method D–1 in appendix D to this Part), there is any loss of liquid.

§ 173.58 Assignment of class and division for new explosives.

(a) Division 1.1, 1.2, 1.3, and 1.4 explosives. In addition to the test prescribed in § 173.57 of this subchapter, a substance or article in these divisions must be subjected to Test Methods 6(a), 6(b), and 6(c), as described in the Explosive Test Manual, for assignment to an appropriate division. The criteria for assignment of class and division are as follows:

(1) Division 1.1 if the major hazard is mass explosion;

(2) Division 1.2 if the major hazard is dangerous projections;

(3) Division 1.3 if the major hazard is radiant heat or violent burning, or both, but there is no blast or projection hazard;

(4) Division 1.4 if there is a small hazard with no mass explosion and no projection of fragments of appreciable size or range;

(5) Division 1.4 Compatibility Group S (1.4S) if the hazardous effects are confined within the package or the blast and projection effects do not significantly hinder emergency response efforts; or

(6) Not in the explosive class if the substance or article does not have significant explosive hazard or if the effects of explosion are completely confined within the article.

(b) Division 1.5 explosive. Except for ANFO, a substance that has been examined in accordance with the provisions § 173.57(a) of this subchapter, must be subjected to the following additional tests: Cap Sensitivity Test, Princess Incendiary Spark Test, DOT Test, and External Fire Test, each as described in the Explosive Test Manual. A material may not be classed as a Division 1.5 explosive if any of the following occurs:

(1) Detonation occurs in the Cap Sensitivity Test (Test Method 5(a));

(2) Detonation occurs in the DOT Test (Test Method 5(b)(ii));

(3) An explosion, evidenced by a loud noise and projection of fragments, occurs in the External Fire Test (Test Method 5(c); or

(4) Ignition or explosion occurs in the Princess Incendiary Spark Test (Test Method 5(d)).

(c) Division 1.6 explosive. (1) In order to be classed as a 1.6 explosive, an article must pass all of the following tests, as prescribed in the Explosive Test Manual:

(i) The 1.6 Article External Fire Test;

(ii) The 1.6 Article Slow Cook-off Test; and

(iii) The 1.6 Article Propagation Test.

(2) A substance intended for use as the explosive load in an article of Division 1.6 must be an extremely insensitive detonating substance (EIDS). In order to determine if a substance is an EIDS, it must be subjected to the tests in paragraphs (c)(2)(i) through (c)(2)(x) of this section, which are described in the Explosive Test Manual. The substance must be tested in the form (i.e., composition, granulation, density, etc.) in which it is to be used in the article. A substance is not an EIDS if it fails any of the following tests:

(i) The Drop Weight Impact Sensitivity Test;

(ii) The Friction Sensitivity Test;

(iii) The Thermal Sensitivity Test at 75 °C (167 °F);

(iv) The Small Scale Burning Test;

(v) The EIDS Cap Test;

(vi) The EIDS Gap Test;

(vii) The Susan Test;

(viii) The EIDS Bullet Impact Test;

(ix) The EIDS External Fire Test; and

(x) The EIDS Slow Cook-off Test.

(d) The Associate Administrator for Hazardous Materials Safety may waive or modify certain test(s) identified in §§ 173.57 and 173.58 of this subchapter, or require additional testing, if appropriate. In addition, the Associate Administrator for Hazardous Materials Safety may limit the quantity of explosive in a device.

(e) Each explosive is assigned a compatibility group letter by the Associate Administrator for Hazardous Materials Safety based on the criteria prescribed in § 173.52(b) of this subchapter.

§ 173.59 Description of terms for explosives.

For the purpose of this subchapter, a description of the following terms is provided for information only. They must not be used for purposes of classification or to replace proper shipping names prescribed in § 172.101 of this subchapter.

Ammonium-nitrate—fuel oil mixture (ANFO). A blasting explosive containing no essential ingredients other than prilled ammonium nitrate and fuel oil.

Ammunition. Generic term related mainly to articles of military application consisting of all types of bombs, grenades, rockets, mines, projectiles and other similar devices or contrivances.

Ammunition, illuminating, with or without burster, expelling charge or propelling charge. Ammunition designed to produce a single source of intense light for lighting up an area. The term includes illuminating cartridges, grenades and projectiles, and illuminating and target identification bombs. The term excludes the following articles which are listed separately: *cartridges, signal; signal devices; hand signals; distress flares, aerial* and *flares, surface.*

Ammunition, incendiary. Ammunition containing an incendiary substance which may be a solid, liquid or gel including white phosphorus. Except when the composition is an explosive *per se*, it also contains one or more of the following: a propelling charge with primer and igniter charge, or a fuze with burster or expelling charge. The term

includes: *Ammunition, incendiary,* liquid or gel, with burster, expelling charge or propelling charge; *Ammunition, incendiary* with or without burster, expelling charge or propelling charge; and *Ammunition, incendiary, white phosphorus,* with burster, expelling charge or propelling charge.

Ammunition, practice. Ammunition without a main bursting charge, containing a burster or expelling charge. Normally it also contains a fuze and propelling charge. The term excludes the following article which is listed separately: *Grenades, practice.*

Ammunition, proof. Ammunition containing pyrotechnic substance, used to test the performance or strength of new ammunition, weapon component or assemblies.

Ammunition, smoke. Ammunition containing a smoke-producing substance such as chlorosulphonic acid mixture (CSAM), titanium tetrachloride (FM), white phosphorus, or smoke-producing substance whose composition is based on hexachlorothannol (HC) or red phosphorus. Except when the substance is an explosive *per se,* the ammunition also contains one or more of the following: a propelling charge with primer and igniter charge, or a fuze with burster or expelling charge. The term includes: *Ammunition, smoke,* with or without burster, expelling charge or propelling charge; *Ammunition, smoke, white phosphorus* with burster, expelling charge or propelling charge.

Ammunition, tear-producing with burster, expelling charge or propelling charge. Ammunition containing tear-producing substance. It may also contain one or more of the following: a pyrotechnic substance, a propelling charge with primer and igniter charge, or a fuze with burster or expelling charge.

Ammunition, toxic. Ammunition containing toxic agent. It may also contain one or more of the following: a pyrotechnic substance, a propelling charge with primer and igniter charge, or a fuze with burster or expelling charge.

Articles, explosive, extremely insensitive (Articles, EEI). Articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation under normal conditions of transport and which have passed Test Series 7.

Articles, pyrophoric. Articles which contain a pyrophoric substance (capable of spontaneous ignition when exposed to air) and an explosive substance or component. The term excludes articles containing white phosphorus.

Articles, pyrotechnic for technical purposes. Articles which contain pyrotechnic substances and are used for technical purposes, such as heat generation, gas generation, theatrical effects, etc. The term excludes the following articles which are listed separately: all ammunition; *cartridges, signal; cutters, cable, explosive; fireworks; flares, aerial; flares, surface; release devices, explosives; rivets, explosive; signal devices, hand; signals, distress; signals, railway track, explosive;* and *signals, smoke.*

Black powder (gunpowder). Substance consisting of an intimate mixture of charcoal or other carbon and either potassium or sodium nitrate, and sulphur. It may be meal, granular, compressed, or pelletized.

Bombs. Explosive articles which are dropped from aircraft. They may contain a flammable liquid with bursting charge, a photo-flash composition or bursting charge. The term excludes *torpedoes* (aerial) and includes *bombs, photo-flash; bombs* with bursting charge; *bombs with flammable liquids,* with bursting charge.

Boosters. Articles consisting of a charge of detonating explosive without means of initiation. They are used to increase the initiating power of detonators or detonating cord.

Bursters, explosive. Articles consisting of a small charge of explosive to open projectiles or other ammunition in order to disperse their contents.

Cartridges, blank. Articles which consist of a cartridge case with a center or rim fire primer and a confined charge of smokeless or black powder, but no projectile. Used in training, saluting, or in starter pistols, etc.

Cartridges, flash. Articles consisting of a casing, a primer and flash powder, all assembled in one piece for firing.

Cartridges for weapons. (1) Fixed (assembled) or semi-fixed (partially assembled) ammunition designed to be fired from weapons. Each cartridge includes all the components necessary to function the weapon once. The name and description should be used for military small arms cartridges that cannot be described as cartridges, small arms. Separate loading ammunition is included under this name and description when the propelling charge and projectile are packed together (see also Cartridges, blank).

(2) Incendiary, smoke, toxic, and tear-producing cartridges are described under *ammunition, incendiary,* etc.

Cartridges for weapons, inert projectile. Ammunition consisting of a casing with propelling charge and a solid or empty projectile.

Cartridges, oil well. Articles consisting of a casing of thin fiber, metal or other material containing only propellant explosive. The term excludes charges, shaped, commercial.

Cartridges, power device. Articles designed to accomplish mechanical actions. They consist of a casing with a charge of deflagrating explosive and a means of ignition. The gaseous products of the deflagration produce inflation, linear or rotary motion; activate diaphragms, valves or switches, or project fastening devices or extinguishing agents.

Cartridges, signal. Articles designed to fire colored flares or other signals from signal pistols or devices.

Cartridges, small arms. Ammunition consisting of a cartridge case fitted with a center or rim fire primer and containing both a propelling charge and solid projectile(s). They are designed to be fired in weapons of caliber not larger than 19.1 mm. Shotgun cartridges of any caliber are included in this description. The term excludes: Cartridges, small arms, blank, and some military small arms cartridges listed under *Cartridges for weapons, inert projectile.*

Cases, cartridge, empty with primer. Articles consisting of a cartridge case made from metal, plastics or other non-flammable materials, in which only the explosive component is the primer.

Cases, combustible, empty, without primer. Articles consisting of cartridge cases made partly or entirely from nitrocellulose.

Charges, bursting. Articles consisting of a charge of detonating explosive such as hexolite, octolite, or plastics-bonded explosive designed to produce effect by blast or fragmentation.

Charges, demolition. Articles consisting of a charge of detonating explosive in a casing of fiberboard, plastics, metal or other material. The term excludes articles identified as bombs, mines, etc.

Charges, depth. Articles consisting of a charge of detonating explosive contained in a drum or projectile. They are designed to detonate under water.

Charges, expelling. A charge of deflagrating explosive designed to eject the payload from the parent article without damage.

Charges, explosive, commercial without detonator. Articles consisting of a charge of detonating explosive without means of initiation, used for explosive welding, joining, forming, and other commercial processes.

Charges, propelling. Articles consisting of propellant charge in any physical form, with or without a casing, for use in cannon or as a component of rocket motors.

Charges, shaped commercial, without detonator. Articles consisting of a casing

containing a charge of detonating explosive with a cavity lined with rigid material, without means of initiation. They are designed to produce a powerful, penetrating jet effect.

Charges, shaped, flexible, linear. Articles consisting of a V-shaped core of a detonating explosive clad by a flexible metal sheath.

Charges, supplementary, explosive. Articles consisting of a small removable booster used in the cavity of a projectile between the fuze and the bursting charge.

Components, explosive train, n.o.s.. Articles containing an explosive designed to transmit a detonation or deflagration within an explosive train.

Contrivance, water-activated with burster, expelling charge or propelling charge. Articles whose functioning depends of physico-chemical reaction of their contents with water.

Cord, detonating, flexible. Articles consisting of a core of detonating explosive enclosed in spun fabric with plastics or other covering.

Cord (fuse) detonating, metal clad. Articles consisting of a core of detonating explosive clad by a soft metal tube with or without protective covering. When the core contains a sufficiently small quantity of explosive, the words "mild effect" are added.

Cord igniter. Articles consisting of textile yarns covered with black powder or another fast-burning pyrotechnic composition and a flexible protective covering, or consisting of a core of black powder surrounded by a flexible woven fabric. It burns progressively along its length with an external flame and is used to transmit ignition from a device to a charge or primer.

Cutters, cable, explosive. Articles consisting of a knife-edged device which is driven by a small charge of deflagrating explosive into an anvil.

Detonator assemblies, non-electric, for blasting. Non-electric detonators assembled with and activated by such means as safety fuse, shock tube, flash tube, or detonating cord. They may be of instantaneous design or incorporate delay elements. Detonating relays incorporating detonating cord are included. Other detonating relays are included in Detonators, nonelectric.

Detonators. Articles consisting of a small metal or plastic tube containing explosives such as lead azide, PETN, or combinations of explosives. They are designed to start a detonation train. They may be constructed to detonate instantaneously, or may contain a delay element. They may contain no more than 10 g of total explosives weight, excluding ignition and delay charges, per unit. The term includes: detonators for ammunition; detonators for blasting, both electric and non-electric; and detonating relays without flexible detonating cord.

Dynamite. A detonating explosive containing a liquid explosive ingredient (generally nitroglycerin, similar organic nitrate esters, or both) that is uniformly mixed with an absorbent material, such as wood pulp, and usually contains materials such as nitrocellulose, sodium and ammonium nitrate.

Entire load and total contents. The phrase means such a substantial portion of the material explodes that the practical hazard should be assessed by assuming simultaneous explosion of the whole of the explosive content of the load or package.

Explode. The term indicates those explosive effects capable of endangering life and property through blast, heat, and projection of missiles. It encompasses both deflagration and detonation.

Explosion of the total contents. The phrase is used in testing a single article or package or a small stack of articles or packages.

Explosive, blasting. Detonating explosive substances used in mining, construction, and similar tasks. Blasting explosives are assigned to one of five types. In addition to the ingredients listed below for each type, blasting explosives may also contain inert components, such as kieselguhr, and other minor ingredients, such as coloring agents and stabilizers.

Explosive, blasting, type A. Substances consisting of liquid organic nitrates, such as nitroglycerin, or a mixture of such ingredients with one or more of the following: nitrocellulose, ammonium nitrate or other inorganic nitrates, aromatic nitro-derivatives, or combustible materials, such as wood-meal and aluminum powder. Such explosives must be in powdery, gelatinous, plastic or elastic form. The term includes dynamite, blasting gelatine and gelatine dynamites.

Explosive, blasting, type B. Substances consisting of a mixture of ammonium nitrate or other inorganic nitrates with an explosive, such as trinitrotoluene, with or without other substances, such as wood-meal or aluminum powder, or a mixture of ammonium nitrate or other inorganic nitrates with other combustible substances which are not explosive ingredients. Such explosives may not contain nitroglycerin, similar liquid organic nitrates, or chlorates.

Explosive, blasting, type C. Substances consisting of a mixture of either potassium or sodium chlorate or potassium, sodium or ammonium perchlorate with organic nitro-derivatives or combustible materials, such as wood-meal or aluminum powder, or a hydrocarbon. Such explosives must not contain nitroglycerin or any similar liquid organic nitrate.

Explosive, blasting, type D. Substances consisting of a mixture of organic nitrate compounds and combustible materials, such as hydrocarbons and aluminum powder. Such explosives must not contain nitroglycerin, any similar liquid organic nitrate, chlorate or ammonium-nitrate. The term generally includes plastic explosives.

Explosive, blasting, type E. Substances consisting of water as an essential ingredient and high proportions of ammonium nitrate or other oxidizer, some or all of which are in solution. The other constituents may include nitro-derivatives, such as trinitrotoluene, hydrocarbons or aluminum powder. The term includes: explosives, emulsion; explosives, slurry; and explosives, watergel.

Explosive, deflegrating. A substance, e.g., propellant, which reacts by deflagration rather than detonation when ignited and used in its normal manner.

Explosive, detonating. A substance which reacts by detonation rather than deflagration when initiated and used in its normal manner.

Explosive, extremely insensitive detonating substance (EIDS). A substance which, although capable of sustaining a detonation, has demonstrated through tests that it is so insensitive that there is very little probability of accidental initiation.

Explosive, primary. Explosive substance which is manufactured with a view to producing a practical effect by explosion, is very sensitive to heat, impact, or friction, and even in very small quantities, detonates. The major primary explosives are mercury fulminate, lead azide, and lead styphnate.

Explosive, secondary. An explosive substance which is relatively insensitive (when compared to primary explosives) and is usually initiated by primary explosives with or without the aid of boosters or supplementary charges. Such an explosive may react as a deflagrating or as a detonating explosive.

Fireworks. Pyrotechnic articles designed for entertainment.

Flares. Articles containing pyrotechnic substances which are designed to illuminate, identify, signal,

or warn. The term includes: flares, aerial and flares, surface.

Flash powder. Pyrotechnic substance which, when ignited, produces an intense light.

Fracturing devices, explosive, for oil wells, without detonators. Articles consisting of a charge of detonating explosive contained in a casing without the means of initiation. They are used to fracture the rock around a drill shaft to assist the flow of crude oil from the rock.

Fuse/Fuze. Although these two words have a common origin (French fusee, fusil) and are sometimes considered to be different spellings, it is useful to maintain the convention that fuse refers to a cord-like igniting device, whereas fuze refers to a device used in ammunition which incorporates mechanical, electrical, chemical, or hydrostatic components to initiate a train by deflagration or detonation.

Fuse, igniter. Articles consisting of a metal tube with a core of deflagrating explosives.

Fuse, instantaneous, non detonating (Quickmatch). Article consisting of cotton yarns impregnated with fine black powder. It burns with an external flame and is used in ignition trains for fireworks, etc.

Fuse, safety. Article consisting of a core of fine-grained black powder surrounded by a flexible woven fabric with one or more protective outer coverings. When ignited, it burns at a predetermined rate without any explosive effect.

Fuzes. Articles designed to start a detonation or deflagration in ammunition. They incorporate mechanical, electrical, chemical, or hydrostatic components and generally protective features. The term includes: Fuzes, detonating; fuzes detonating with protective features; and fuzes igniting.

Grenades, hand or rifle. Articles which are designed to be thrown by hand or to be projected by rifle. The term includes: grenades, hand or rifle, with bursting charge; and grenades, practice, hand or rifle. The term excludes: grenades, smoke.

Igniters. Articles containing one or more explosive substance used to start deflagration of an explosive train. They may be actuated chemically, electrically, or mechanically. The term excludes: cord, igniter; fuse, igniter; fuse, instantaneous, non-detonating; fuze, igniting; lighters, fuse, instantaneous, non-detonating; fuzes, igniting; lighters, fuse; primers, cap type; and primers, tubular.

Ignition, means of. A general term used in connection with the method employed to ignite a deflagrating train of explosive or pyrotechnic substances (for example: a primer for propelling charge, an igniter for a rocket motor or an igniting fuze).

Initiation, means of. (1) A device intended to cause the detonation of an explosive (for example: detonator, detonator for ammunition, or detonating fuze).

(2) The term "with its own means of initiation" means that the contrivance has its normal initiating device assembled to it and this device is considered to present a significant risk during transport but not one great enough to be unacceptable. The term does not apply, however, to a contrivance packed together with its means of initiation, provided the device is packaged so as to eliminate the risk of causing detonation of the contrivance in the event of functioning of the initiating device. The initiating device can even be assembled in the contrivance provided there are protective features ensuring that the device is very unlikely to cause detonation of the contrivance under conditions which are associated with transport.

(3) For the purposes of classification, any means of initiation without two effective protective features should be regarded as Compatibility Group B; an article with its own means of initiation, without two effective protective features, is Compatibility Group F. A means of initiation which itself possesses two effective protective features is Compatibility Group D, and an article with its own means of initiation which possesses two effective features is Compatibility Group D or E. A means of initiation, adjudged as having two effective protective features, must be approved by the Associate Administrator for Hazardous Materials Safety. A common and effective way of achieving the necessary degree of protection is to use a means of initiation which incorporates two or more independent safety features.

Jet perforating guns, charged, oil well, without detonator. Articles consisting of a steel tube or metallic strip, into which are inserted shaped charges connected by detonating cord, without means of initiation.

Lighters, fuse. Articles of various design actuated by friction, percussion, or electricity and used to ignite safety fuse.

Mass explosion. Explosion which affects almost the entire load virtually instantaneously.

Mines. Articles consisting normally of metal or composition receptacles and bursting charge. They are designed to be operated by the passage of ships, vehicles, or personnel. The term include Bangalore torpedoes.

Powder cake (powder paste). Substance consisting of nitrocellulose impregnated with not more than 60 percent of nitroglycerin or other liquid organic nitrates or a mixture of these.

Powder, smokeless. Substance generally based on nitrocellulose used as propellant. The term includes propellants with a single base (nitrocellulose (NC) alone), those with a double base (such as NC and nitroglycerin (NG)) and those with a triple base (such as NC/NG/nitroguanidine). Cast pressed or bag-charges of smokeless powder are listed under *charges, propelling.*

Primers, cap type. Articles consisting of a metal or plastic cap containing a small amount of primary explosive mixture that is readily ignited by impact. They serve as igniting elements in small arms cartridges and in percussion primers for propelling charges.

Primers, tubular. Articles consisting of a primer for ignition and an auxiliary charge of deflagrating explosive, such as black powder, used to ignite the propelling charge in a cartridge case for cannon, etc.

Projectiles. Articles, such as a shell or bullet, which are projected from a cannon or other artillery gun, rifle, or other small arm. They may be inert, with or without tracer, or may contain a burster, expelling charge or bursting charge. The term includes: projectiles, inert, with tracer; projectiles, with burster or expelling charge; and projectiles, with bursting charge.

Propellants. Deflagrating explosives used for propulsion.

Release devices, explosive. Articles consisting of a small charge of explosive with means of initiation. They sever rods or links to release equipment quickly.

Rocket motors. Articles consisting of a solid, liquid, or hypergolic propellant contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or guided missile. The term includes: rocket motors; rocket motors with hypergolic liquids with or without an expelling charge; and rocket motors, liquid fuelled.

Rockets. Articles containing a rocket motor and a payload which may be an explosive warhead or other device. The term includes: guided missiles; rockets, line-throwing; rockets, liquid fuelled, with bursting charge; rockets, with bursting charge; rockets, with expelling charge; and rockets, with inert head.

Signals. Articles consisting of pyrotechnic substances designed to produce signals by means of sound,

flame, or smoke or any combination thereof. The term includes: signal devices, hand; signals, distress ship; signals, railway track, explosive; signals, smoke.

Sounding devices, explosive. Articles consisting of a charge of detonating explosive. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

Substance, explosive, very insensitive (Substance, EVI) N.V.S. Substances which present a mass explosive hazard but which are so insensitive that there is very little probability of initiation, or of transition from burning to detonation under normal conditions of transport and which have passed test series 5.

Torpedoes. Articles containing an explosive or non-explosive propulsion system and designed to be propelled through water. They may contain an inert head or warhead. The term includes: torpedoes, liquid fuelled, with inert head; torpedoes, liquid fuelled, with or without bursting charge; and torpedoes, with bursting charge.

Tracers for ammunition. Sealed articles containing pyrotechnic substances, designed to reveal the trajectory of a projectile.

Warheads. Articles containing detonating explosives, designed to be fitted to a rocket, guided missile, or torpedo. They may contain a burster or expelling charge or bursting charge. The term includes: warhead rocket with bursting charge; and warheads, torpedo, with bursting charge.

§ 173.60 General packaging requirements for explosives.

(a) Unless otherwise provided in this subpart and in § 173.7(a) of this subchapter, the packaging used for explosives (Class 1) must meet Packing Group II requirements. Each packaging used for an explosive must be capable of meeting the test requirements of subpart M of part 178 of this subchapter, at the specified level of performance, and the applicable general packaging requirements of paragraph (b) of this section.

(b) The general requirements for packaging of explosives are as follows:

(1) Nails, staples, and other closure devices, made of metal, having no protective covering may not penetrate to the inside of the outer packaging unless the inner packaging adequately protects the explosive against contact with the metal.

(2) The closure device of containers for liquid explosives must provide double protection against leakage, such as a screw cap secured in place with tape.

(3) Inner packagings, fitting, and cushioning materials, and the placing of explosive substances or articles in packages, must be such that no dangerous movement may occur within the packages during transportation.

(4) When the packaging includes water that could freeze during transportation, a sufficient amount of anti-freeze, such as denatured ethyl alcohol, must be added to the water to prevent freezing. Anti-freeze that could create a fire hazard because of excessive volatility or excessive concentration may not be used.

(5) Each article fitted with a means of ignition or initiation must be effectively protected from accidental operation during normal conditions of transportation.

(6) For a metal packaging that is double-seamed, entry of an explosive substances into the recesses of the seams must be prevented.

(7) The closure device of a aluminum or steel drum should include a suitable gasket; if the closure device includes a screw-thread, the ingress of explosive substances must not be possible.

(8) If a metal-lined or rigid plastic box is used for packaging an explosive substance, the box must be constructed in such a way that the explosive substance carried cannot get between the liner and the sides or bottom of the box.

(9) Whenever a box of ordinary natural wood is specified, plywood or reconstituted wood may be substituted for that material, if it is compatible with the explosive carried and is in compliance with the appropriate specification, if any.

(10) An explosive article containing an electrical means of initiation that is sensitive to external electromagnetic radiation, must have its means of initiation effectively protected from electromagnetic radiation sources (for example, radar or radio transmitters) through either design of packaging or the article, or both.

(11) If a plastic bag or plastic container is used in direct contact with the explosive, only those types of plastic may be used that:

(i) Will not build up an electrostatic charge which would lead to ignition of the explosive; and

(ii) Will not be deteriorated by or react dangerously with the explosive.

(12) A metal surface that could increase the sensitivity or decrease the thermal stability of an explosive may not be in contact with that explosive.

(13) An explosive must be in a waterproof receptacle if:

(i) It is water soluble;

(ii) It contains water or a water solution when offered for transportation; or

(iii) It contains a water soluble stabilizer.

(14) When this subpart requires a specified percentage of desensitizer or phlegmatizer to be mixed with an explosive, the percentage is based on the total weight of the mixture, not the weight of the explosive alone. When a percentage of water is specified and antifreeze must be added in accordance with paragraph (a)(4) of this section, the combined weight of the water and the antifreeze may be substituted for the weight of water required.

§ 173.61 Mixed packaging requirements.

(a) Unless specifically authorized in this subchapter, an explosive may not be packed in the same outside packaging with any other material, unless packaged by the DOD or DOE in accordance with § 173.7(a) of this subchapter.

(b) Hardware necessary for assembly of explosive articles at the point-of-use may be packed in the same outside packaging with the explosive articles. The hardware must be securely packed in a separate inside packaging. Sufficient cushioning materials must be used to ensure that all inside packagings are securely packed in the outside packaging.

(c) The following explosives may not be packed together with other Class 1 explosives: UN 0029, UN 0030, UN 0073, UN 0106, UN 0107, UN 0255, UN 0257, UN 0267, UN 0360, UN 0361, UN 0364, UN 0365, UN 0366, UN 0367, UN 0408, UN 0409, UN 0410, UN 0455, UN 0456, and NA 0350. These explosives may be mix-packed with each other in accordance with the compatibility requirements prescribed in paragraph (e).

(d) Division 1.1 and 1.2 explosives may not be packed with the following explosives: UN 0333, 0334, 0335, 0336, and 0337.

(e) Except as prescribed in paragraphs (c) and (d) of this section, different explosives may be packed in one outside packaging in accordance with the following compatibility requirements:

(1) Explosives of the same compatibility group and same division number may be packed together.

(2) Explosives of the same compatibility group or authorized combination of compatibility group but different division number may be packed together, provided that the whole package is treated as though its entire contents were comprised of the

lower division number. For example, a mixed package of Division 1.2 explosives (Class A explosive) and Division 1.4 explosives (Class C explosive), compatibility group D, must be treated as 1.2D explosives. However, when 1.5D explosives (blasting agents) are packed together with 1.2D explosives (Class A explosives), the whole package must be treated as 1.1D explosives.

(3) Explosives of compatibility group S may be packed with explosives of all other compatibility group except A and L.

(4) Explosives of compatibility group L shall only be packed with an identical explosive.

(5) Explosives articles of compatibility groups C, D, or E may be packed together and the entire package shall be treated as belonging to compatibility group E.

(6) Explosives articles of compatibility groups C, D, E, or N may be packed together and the entire package shall be treated as belonging to compatibility group D.

(7) Explosives substances of compatibility groups C and D may be packaged together and the entire package shall be treated as belonging to compatibility group D.

§ 173.62 Specific packaging requirements.

(a) When the Hazardous Materials Table in § 172.101 of this subchapter, specifies that an explosive must be packaged in accordance with this section, only non-bulk packagings which conform to the provisions of this section, and the applicable requirements in §§ 173.60 and 173.61 of this subchapter, may be used.

(b) Explosives Table. The Explosives Table specifies, by a two-step process, which packing methods must be utilized for a particular explosive. Explosives are identified in the first column of the Explosives by their identification number, which are listed in Column 6 of the § 172.101 Table, of this subchapter. The second column of the Explosives Table specifies the packing method or methods (e.g., E-2) which must be used to pack a particular explosive. The table of packing methods in paragraph (c) of this section defines the packing methods. The packing methods are prefixed either by the letter "E" (E-2) or "US" (US001). The packing methods prefixed by the letter "E" are those based on the UN Recommendations. The packing methods prefixed by the letters "US" are those that are particular to the United States and are not found in any applicable International Regulations. The packing methods are listed in appropriate alpha-numerical sequence.

EXPLOSIVES TABLE

Identification No.	Packing methods
UN0004	E-2
UN0005	US005
UN0006	US005
UN0007	US005
UN0009	E-102
UN0010	E-102
UN0012	US005
UN0014	US005
UN0015	E-102
UN0016	E-102
UN0018	E-102
UN0019	E-102
UN0020	E-102
UN0021	E-102
UN0027	E-4(a),(b)
UN0028	E-5
UN0029	US003
UN0030	US002
UN0033	E-106
UN0034	E-106
UN0035	E-106
UN0037	E-106
UN0038	E-106
UN0039	E-106
UN0042	E-107(a),(b)
UN0043	E-109
UN0044	E-142
UN0048	E-117
UN0049	E-115
UN0050	E-115
UN0054	E-115
UN0055	E-116
UN0056	E-106
UN0059	E-120
UN0060	E-122
UN0065	E-124
UN0066	E-126
UN0070	E-127
UN0072	E-6(a)(i),(ii)
UN0073	E-128
UN0074	E-3
UN0075	US001
UN0076	E-2
UN0077	E-2
UN0078	E-2
UN0079	E-11
UN0081	E-8
UN0082	E-8
UN0083	E-10
UN0084	E-11
UN0092	E-133
UN0093	E-133
UN0094	E-20
UN0099	E-134
UN0101	E-135
UN0102	E-125
UN0103	E-135
UN0104	E-125
UN0105	E-136
UN0106	E-137
UN0107	E-137
UN0110	E-138
UN0113	E-3
UN0114	E-3
UN0118	E-13(a),(b)
UN0121	E-139
UN0124	US006
UN0129	E-3
UN0130	E-3
UN0131	E-141
UN0132	E-2
UN0135	E-3
UN0136	E-106
UN0137	E-106
UN0138	E-106
UN0143	US001
UN0144	E-17
UN0145	E-19(a),(b)
UN0147	E-2
UN0151	E-13(a),(b)

EXPLOSIVES TABLE—Continued

Identification No.	Packing methods
UN0153	E-2
UN0154	E-2
UN0155	E-2
UN0158	E-21
UN0159	E-19(a),(b)
UN0160	E-22(a),(b),(c)
UN0161	E-22(a),(b),(c)
UN0167	E-106
UN0168	E-106
UN0169	E-106
UN0171	E-102
UN0173	E-145
UN0174	E-145
UN0190	E-146(a)
UN0181	E-146(a)
UN0182	E-146(a)
UN0183	E-146(a)
UN0186	E-146(b)
UN0191	E-150
UN0192	E-151
UN0193	E-151
UN0194	E-150
UN0195	E-150
UN0196	E-150
UN0197	E-150
UN0203	E-21
UN0204	E-153
UN0207	E-2
UN0208	E-11
UN0209	E-26
UN0212	E-156
UN0213	E-2
UN0214	E-2
UN0215	E-11
UN0216	E-2
UN0217	E-2
UN0218	E-2
UN0219	E-2
UN0220	E-2
UN0221	E-106
UN0222	E-1(a),(b)
UN0224	E-3
UN0225	E-108
UN0226	E-6(a)(i),(ii)
UN0234	E-2
UN0235	E-2
UN0236	E-2
UN0237	E-121
UN0239	E-147
UN0240	E-147
UN0241	E-8
UN0242	E-119
UN0243	E-102
UN0244	E-102
UN0245	E-102
UN0246	E-102
UN0247	E-102
UN0248	E-123
UN0249	E-123
UN0250	E-149
UN0254	E-102
UN0255	US002
UN0257	E-137
UN0266	E-13(a),(b)
UN0267	US003
UN0268	E-108
UN0271	E-158(a),(b),(c)
UN0272	E-158(a),(b),(c)
UN0273	E-158(a),(b),(c)
UN0274	E-158(a) (b),(c)
UN0275	E-114
UN0276	E-114
UN0277	E-113
UN0278	E-113
UN0279	E-119
UN0280	E-146(b)
UN0281	E-146(b)
UN0282	E-18
UN0283	E-107(a),(b)
UN0284	E-138

EXPLOSIVES TABLE—Continued

Identification No.	Packing methods
UN0285	E-138
UN0286	E-106
UN0287	E-106
UN0288	E-121
UN0289	E-124
UN0290	E-125
UN0291	E-106
UN0292	E-138
UN0293	E-138
UN0294	E-106
UN0295	E-146(a)
UN0296	E-153
UN0297	E-102
UN0299	E-106
UN0300	E-102
UN0301	E-102
UN0303	E-102
UN0305	E-20
UN0306	E-156
UN0312	E-115
UN0313	E-150
UN0314	E-139
UN0315	E-139
UN0316	E-137
UN0317	E-137
UN0318	E-138
UN0319	E-143
UN0320	E-143
UN0321	US005
UN0322	E-149
UN0323	E-114
UN0324	E-106
UN0325	E-141
UN0326	US005
UN0327	US005
UN0328	US005
UN0329	E-146(c)
UN0330	E-146(c)
UN0331	E-8, E-9
UN0332	E-12
UN0333	E-129
UN0334	E-130
UN0335	E-130
UN0336	E-130
UN0337	E-146(a)
UN0338	US005
UN0339	US005
UN0340	E-103
UN0341	E-103
UN0342	E-15(a),(b)
UN0343	E-15(a),(b)
UN0344	E-106
UN0345	E-106
UN0346	E-106
UN0347	E-106
UN0348	US005
UN0349	E-103
UN0350	E-103
UN0351	E-103
UN0352	E-103
UN0353	E-103
UN0354	E-103
UN0355	E-103
UN0356	E-103
UN0357	E-103
UN0358	E-103
UN0359	E-103
UN0360	US004
UN0361	US004
UN0362	E-102
UN0363	E-102
UN0364	E-128
UN0365	E-128
UN0366	E-128
UN0367	E-137
UN0368	E-137
UN0369	E-106
UN0370	E-106
UN0371	E-106
UN0372	E-138

EXPLOSIVES TABLE—Continued

Identification No.	Packing methods
UN0373	E-150
UN0374	E-153
UN0375	E-153
UN0376	E-143
UN0377	E-142
UN0378	E-142
UN0379	E-116
UN0380	E-103
UN0381	E-114
UN0382	E-103
UN0383	E-103
UN0384	E-103
UN0385	E-2
UN0386	E-2
UN0387	E-2
UN0388	E-2
UN0389	E-2
UN0390	E-2
UN0391	E-6(a),(b)
UN0392	E-11
UN0393	E-13(a),(b)
UN0394	E-24(a),(b)
UN0395	E-103
UN0396	E-103
UN0397	E-103
UN0398	E-103
UN0399	E-103
UN0400	E-103
UN0401	E-2
UN0402	E-2
UN0403	E-133
UN0404	E-133
UN0405	E-115
UN0406	E-25
UN0408	E-137
UN0409	E-137
UN0410	E-137
UN0411E-22(a)	E-22(a)
UN0412	US005
UN0413	US005
UN0414	E-119
UN0415	E-158(a),(b),(c)
UN0416	E-158(a),(b),(c)
UN0417	US005
UN0418	E-133
UN0419	E-133
UN0420	E-133
UN0421	E-133
UN0424	E-106
UN0425	E-106
UN0426	E-106
UN0427	E-106
UN0428	E-109
UN0429	E-109
UN0430	E-134
UN0431	E-134
UN0432	E-134
UN0433	E-2
UN0434	E-106
UN0435	E-106
UN0436	E-146(a)
UN0437	E-146(a)
UN0438	E-146(a)
UN0439	E-120
UN0440	E-120
UN0441	E-120
UN0442	E-156
UN0443	E-156
UN0444	E-156
UN0445	E-156
UN0446	E-116
UN0447	E-116
UN0449	E-146(c)
UN0450	E-146(c)
UN0451	E-146(c)
UN0452	E-138
UN0453	E-147
UN0454	E-141
UN0455	US003
UN0456	US002

EXPLOSIVES TABLE—Continued

Identification No.	Packing methods
UN0457	E-157
UN0458	E-157
UN0459	E-157
UN0460	E-157
UN0461	E-103
UN0462	E-103
UN0463	E-103
UN0464	E-103
UN0465	E-103
UN0466	E-103
UN0467	E-103
UN0468	E-103
UN0469	E-103
UN0470	E-103
UN0471	E-103
UN0472	E-103
UN0473	E-103
UN0474	E-103
UN0475	E-103
UN0476	E-103
UN0477	E-103
UN0478	E-103
UN0482	E-103
UN0483	E-6(a),(b)
UN0484	E-6(a),(b)
UN0486	E-106
UN0487	E-150
UN0488	E-102
UN0489	E-2
UN0490	E-2
NA0006	US005
NA0124	US006
NA0133	E-3
NA0150	E-3
NA0273	E-22(a),(b),(c)
NA0274	E-22(a),(b),(c)
NA0331	E-12
NA0349	E-142
NA0350	E-108
NA0412	US005
NA0473	E-3
NA0474	E-103
NA0477	E-103

(c) Table of packing methods: Packing methods must be utilized in accordance with the following table.

(1) The first column lists, in alphanumeric sequence, the packing methods prescribed for explosives in the Explosives Table of paragraph (b) of this section. If more than one set of packagings is authorized for a packing method, it is noted with a designation (a), (b), (i), (ii), etc.

(2) The second column specifies the inner packagings that are required. If inner packagings are not required, a notation of "Not necessary" or "Optional" appears in the column. The terms "Optional" and "Not necessary" mean that a suitable inner packaging may be used but is not required. If intermediate packagings are required, it is so noted in this column. In addition, any special requirements regarding the inner packagings are specified with a "Note".

(3) The third column specifies the outer packagings which are required. If inner packagings and/or intermediate packagings are specified in the second

column, then the packaging specified in the third column must be used as the outer packaging of a combination packaging; otherwise it may be used as a single packaging. Any special requirements regarding the outer packagings are specified with a "Note".

(4) The fourth column specifies, by a numerical and alpha numerical (ex: D1) sequence, applicable particular packaging requirements or exceptions. The exception or requirement associated with a particular number is explained in paragraph (d) of this section. Those particular packaging requirements or exceptions that are not found in international regulations are noted with a "D".

TABLE OF PACKING METHODS

Packing methods	Inner packagings	Outer packagings	Particular packaging exception/ requirement
E-1(a)	Not necessary	Bags: Paper, multiwall, water resistant (5M2), Textile, sift-proof (5L2), Textile, water resistant (5L3), Plastic, woven, sift-proof (5H2), Plastic, woven, water resistant (5H3), Plastic, film (5H4).	
E-1(b)	Bags: Paper, Kraft, Plastic	Barrels: Wood, removable head (2C2)	
	Sheets: Plastic	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
		Drums: Steel, removable head (1A2)	
E-2	Receptacles: Metal, Paper, Plastic	Barrels: Wood, removable head (2C2)	1 for all entries, 2 for all entries except UN 0402.
	Sheets: Plastic	Boxes: Fiberboard (4G), wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
		Drums: Fiber (1G). Note: Removable head plastic drums (1H2) are authorized for UN 0219.	
E-3	Bags: Plastic, Rubber, Textile, Rubberized textile	Barrels: Wood, removable head (2C2)	3, 4, D1.
		Drums: Plastic, removable head (1H2), Steel, removable head (1A2). Note: Coatings other than lead are authorized for steel drums (1A2).	
	Intermediate: Bags: Plastic, Rubber, Textile, Rubberized textile Barrels: Wood Receptacles: Plastic		
E-4(a)	Receptacles: Fiberboard, Metal, Paper, Plastic, Rubberized textile	Barrels: Wood, removable head (2C2)	
		Boxes: Fiberboard (4G), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F).	
E-4(b)	Optional	Drums: Aluminum, removable head (1B2), Fiber (1G), Steel, removable head (1A2). Note: Steel drums (1A2) must be dust tight.	
E-5	Bags: Plastic	Boxes: Fiberboard (4G), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F).	
	Sheets: Paper, Kraft, Paper, waxed.		
E-6 (a)(i)	*For wetted explosives:*	Barrels: Wood, removable head (2C2)	
	Bags: Plastic, Rubberized, textile	Boxes: Fiberboard (4G), Wood, ordinary (4C1) Plywood (4D), Reconstituted wood (4F).	
		Drums: Steel, removable head (1A2), Fiber (1G)	
E-6 (a)(ii)	*For wetted explosives:*	Barrels: Wood, removable head (2C2)	
	Bags: Rubber, Textile, Rubberized textile	Drums: Steel, removable head (1A2), Fiber (1G)	
	Intermediate: Bags: Rubber, Rubberized textile		
E-6(b)	*For desensitized explosives:* Same as for wetted explosives except that any fiberboard boxes may be used as inner packaging and any textile bags as intermediate packaging.	*For desensitized explosives:* Same as for wetted explosives except that any fiberboard boxes may be used as inner packagings and any textile bags as intermediate packaging.	
E-8	Receptacles: Waterproof material	Barrels: Wood, removable head (2C2)	D15, D13.
	Sheets: Waterproof	Boxes: Fiberboard (4G1), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
		Drums: Fiber (1G)	
E-9	Bags: Oil-resistant	Bags: Paper, multiwall water resistant (5M2), Textile, sift-proof (5L2), Textile, water resistant (5L3), Woven plastic, without inner lining or coating (5H1), Woven plastic, sift-proof (5H2), Woven plastic, water resistant (5H3), Plastic film (5H4).	D13.
	Sheets: Plastic	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D)	
	Cans: Metal	Drums: Fiber (1G), Steel, removable head (1A2). Note: If bags of 5H2, 5H3, 5H4, or 5M2 are used, no inner packaging necessary.	
E-10	Bags: Waxed paper, Plastic, Rubberized textile	Barrels: Wood, removable head (2C2)	
	Sheets: Waxed paper, Plastics, rubberized textile	Boxes: Wood, ordinary (4C1), Plywood (4D), reconstituted wood (4F).	
E-11	Bags: Waxed paper, Plastic, Rubberized textile	Barrels: Wood, removable head (2C2)	
	Sheets: Waxed paper, Plastic, Textile, Rubberized textile	Boxes: Wood, ordinary (4C1), Fiberboard (4G), Plywood (4D), reconstituted wood (4F).	
		Drums: Fiber (1G)	
E-12	Bags: Oil-resistant Sheets: Plastics	Bags: Paper, multiwall, water resistant (5M2), Woven plastic, without inner lining or coating (5H1), Woven plastic, sift-proof (5H2), Woven plastic, water resistant (5H3), Plastic film (5H4), Textile, sift-proof (5L2), Textile, water resistant (5L3).	D14.

TABLE OF PACKING METHODS—Continued

Packing methods	Inner packagings	Outer packagings	Particular packaging exception/ requirement
		Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
		Drums: Fiber (1G), Steel, removable head (1A2). *Note:* If bags of 5H2 or 5H3 are used, no inner packaging is necessary.	
E-13(a)	*For wetted explosives:*	Barrels: Wood, removable head (2C2)	
	Bags: Plastic	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood, (4F).	
	Sheets: Plastic	Drums: Fiber (1G)	
E-13(b)	*For dry explosives:*	Barrels: Wood, removable head (2C2)	
	Bags: Paper, Plastic	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted Wood (4F).	
	Boxes: Fiberboard	Drums: fiber (1G)	
	Sheets: Plastic.		
E-15(a)	Not necessary	Drums: Aluminum, removable head (1B2), Steel, removable head (1A2).	
E-15(b)	Bags: Waterproof paper, Plastic, Rubberized textile	Barrels: Wood, removable head (2C2)	
	Sheets: Plastic, Rubberized textile	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Fiberboard (4G).	
		Drums: Fiber (1G)	
E-17	Cans: Metal	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
	Receptacles: Glass, Plastic.		
E-18	Bags: Paper, Plastic	Barrels: Wood, removable head (2C2)	
	Sheets: Plastic	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
		Drums: Fiber (1G), Plywood (1D), Steel, removable head (1A2)	
E-19(a)	Not necessary	Drums: Aluminum, removable head (1B2), Steel, removable head (1A2), Plastic, removable head (1H2).	7.
E-19(b)	Bags: Plastic	Barrels: Wood, removable head (2C2)	
	Sheets: PLastic	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
		Drums: Fiber (1G)	
E-20	Receptacles: Metal, Plastic, Wood	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with innerliner or coating (4A2).	55.
		Drums: Fiber (1G)	
E-21	Boxes: Fiberboard	Boxes: Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F).	2.
	Cans: Metal.		
	Receptacles: Waterproof paper, Plastic. Note: Plastic used must not be liable to generate static electricity by contained substances.		
E-22(a)	Bags: Paper, Kraft, Plastic, Textile, Rubberized Textile	Barrels: Wood, removable head (2C2)	11 for UN 0411.
		Boxes: Fiberboard (4G), Wood, ordinary (4C1), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F).	
		Drums: Fiber (1G), Plywood (1D)	
E-22(b)	Receptacles: Fiberboard, Metal, Plastic	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F).	10.
E-22(c)	Not Necessary	Drums: Steel, removable head (1A2), Fiber (1G), Plywood (1D)	8, 9, 10.
		Jericans: Steel (3A1), Steel, removable head (3A2)	
E-24(a)	Bags: Rubber, Rubberized textile, Plastic	Boxes: Fiberboard (4G)	
E-24(b)	Bags: Rubber, Rubberized textile, Plastic	Drums: Steel, removable head (1A2) with coating other than lead	
	Intermediate:		
	Bags: Rubber, Rubberized textile, Plastic.		
E-25	Bags: Plastic	Drums: Fiber (1G)	
E-26	Bags: Plastic	Barrels: Wood, removable head (2C2)	53.
	Sheets: Plastic	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
	Receptacles: Metal, Paper, Plastic	Drums: Fiber (1G)	
		Bags: Plastic, sift-proof (5H2)	
E-102	Optional	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1), Steel, with inner liner or coating (4A2), Fiberboard (4G).	
		Crates: (For large articles)	
E-103	Must be specifically authorized by the Associate Administrator for Hazardous Materials Safety prior to transportation. See §§ 173.57 and 173.58 of the subchapter. For an international shipment, the package must be marked with "Packaging authorized by competent authority of the United States of America (USA).".	Drums: Steel, removable head (1A), Fiber (1G)	
E-106	Not necessary	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	49 for all entries except UN 0434 and UN 0435.

TABLE OF PACKING METHODS—Continued

Packing methods	Inner packagings	Outer packagings	Particular packaging exception/ requirement
E-107(a)	Not necessary. Note: This packaging method is to be used for boosters which are finished articles consisting of closed metal, plastic, or fiberboard receptacles that contain a detonating explosive, or consisting of a plastic-bonded detonating explosive..	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4). Note: This packaging method is to be used for boosters which are finished articles consisting of closed metal, plastic, or fiberboard receptacles that contain a detonating explosive, or consisting of a plastic-bonded, detonating explosive.	
E-107 (b)	Receptacles: Fiberboard, Metal, Plastic Sheets: Plastic, Paper. **Note:** This packaging method is to be used for cast or pressed boosters in tube or capsules without end closures.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F). **Note:** This packaging method is to be used for cast or pressed boosters in tube or capsules without end closures.	
E-108	Receptacles: Metal, Plastic, Wooded. Note: Dividing partitions in the outer packaging may be used in place of inner packagings.	Boxes: Wooden, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	23.
E-109	Receptacles: Metal, Plastic, Wood	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	28.
E-113	Receptacles: Fiberboard, Plastic, Metal	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
E-114	Receptacles: Fiberboard, Plastic, Metal, Wood	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-115	Receptacles: Fiberboard, Metal, Paper, Kraft (for cartridge of 1.4G and 1.4S), Plastic, Wood.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-116	Bags: Plastic, Textile Boxes: Fiberboard, Plastic, Wood. **Note:** (1) Bags are authorized for small cases only. (2) Dividing partitions in the outer packaging may be used in place of inner packagings.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	
E-117	Boxes: Fiberboard, Metal, Plastic, Wood Cans: Metal.	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-119	Not necessary	Boxes: Wood, ordinary (4C1), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F), Steel, (4A1), Steel, with inner liner or coating (4A2). Drums: Steel, removable head (1A2). Note: Packaging 4C1 is authorized for cased charges only.	
E-120	Tubes: Fiberboard, Other materials. Note: Dividing partitions in the outer packaging may be used in place of inner packagings.	Boxes: fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	30, 31.
E-121	Not necessary	Boxes: Fiberboard (4G1), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	32
E-122	Boxes: Metal, Plastic, Wood, Fiberboard	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-123	Receptacles: Fiberboard, Metal. Note: Dividing partitions in the outer packaging may be used in place of inner packagings.	Boxes: Wood, ordinary (4C1), with metal liner, Plywood (4D) Reconstituted wood (4F), Steel (4A1).	35, 49.
E-124	Reels	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	33.
E-125	Bags: Plastic Sheets: Paper, Kraft, Plastic. Note: Reels may be used in place of inner packagings.	Boxes: Fiberboard (4G) Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	34.
E-126	Receptacles: Fiberboard. Note: Reels may be used in place of inner packagings.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
E-127	Receptacles: Fiberboard	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-128	Boxes: Fiberboard, Plastic, Wood Trays: Fiberboard, Plastic, Wood. Cans: Metal. Note: All inner packagings must be fitted with dividing partitions.	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	23, 36.
E-129	Receptacles: Fiberboard, Plastic Sheets: Paper	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F). Drums: Fiber (1G)	
E-130	Receptacles: Fiberboard, Plastic Sheets: Paper	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F). Drums: Fiber (1G), Plastic, removable head (1H2)	
E-133	Receptacles: Fiberboard, Metal, Plastic Sheets: Paper, Kraft. **Note:** Dividing partitions in the outer package may be used in place of inner packagings..	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1), Solid plastics (4H2). Drums: Fiber (1G), Plastic, removable head (1H2)	
E-13[illegible]	Receptacles: Fiberboard, Metal, Plastic, Wood	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	
E-135	Bags: Plastic Reels. Sheets: Paper, Kraft, Plastic.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	

TABLE OF PACKING METHODS—Continued

Packing methods	Inner packagings	Outer packagings	Particular packaging exception/ requirement
E-135	Not necessary	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2). Drums: Fiber (1G).	32.
E-137	Receptacles: Fiberboard, Metal, Plastic, Wood Trays: Plastic, Wood. **Note:** Dividing partitions in the outer packaging may be used in place of inner packagings.	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	38 for UN 0106, 0107, 0257, 0367, 0408, 0409 and 0410 only.
E-138	Optional	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	
E-139	Receptacles: Metal, Plastic, Wood	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel with inner liner or coating (4A2).	28 for UN 0121 only.
E-141	Receptacles: Fiberboard, Metal, Wood Sheets: Paper. Trays: Plastic.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-142	Boxes: Fiberboard, Metal, Plastic, Wood Cans: Metal. Trays: Fiberboard, sleeved, Plastic, sleeved. Intermediate: (Optional with inner boxes but mandatory with trays.) Boxes: Fiberboard.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	43, D11, D39.
E-143	Boxes: Fiberboard, Metal, Wood Tubes: Fiberboard. Trays: Plastic.	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	
E-145	Receptacles: Fiberboard, Metal (for rivets, explosives), Plastic, Wood.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	
E-146(a)	Not necessary	Boxes: Fiberboard (4G), Plywood (4D), Reconstituted wood (4F), Steel (4A1), Wood, ordinary (4C1).	
E-146(b)	Not necessary	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D),Reconstituted wood (4F).	
E-146(c)	Not necessary	Boxes: Steel (4A1), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F).	
E-147	Receptacles: Fiberboard, Metal	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F). Drums: Fiber (1G).	
E-149	Optional	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Solid Plastics (4H2), Steel (4A1).	42, 50.
E-150	Boxes: Fiberboard Receptacles: Metal, Plastic Sheets: Paper, Kraft.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1). Drums: Fiber (1G).	12.
E-151	Receptacles: Metal, Plastic, Wood, Fiberboard	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1). Drums: Fiber (1G).	43, 44, 45.
E-153	Sheets: Fiberboard, corrugated Tubes: Fiberboard. *Intermediate:* Receptacles: Fiberboard, Metal, Plastic.	Boxes: Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1).	46.
E-156	Bags: Plastic Boxes: Fiberboard. Tubes: Fiberboard, Plastic, Metal. **Note:** Dividing partitions in the outer packaging may be used in place of inner packaging.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1), Steel, with inner liner or coating (4A2).	
E-157	Not necessary	Boxes: Wood, ordinary (4C1), Plywood, (4D), Reconstituted wood (4F), Steel (4A1).	
E-158(a)	Bags: Paper, Kraft, Plastics, Textile, Rubberized textile	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F), Solid plastics (4H2). Drums: Steel, removable head (1A2), Fiber (1G), Plywood (1D)	8, 10, 54.
E-158(b)	Receptacles: Fiberboard, Metal, Plastics	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Wood, sift-proof (4C2), Plywood (4D), Reconstituted wood (4F), Solid plastics (4H2).	10, 54
E-158(c)		Composite packagings: Plastic receptacle with outer solid plastic box (6HH2).	54.
US001	Cans: Metal Receptacles: Glass, Plastic.	Boxes: Wood, ordinary (4C1) Note: DOT Spec. MC-200, motor vehicle container may be used as the outer packaging.	
US002	Receptacles: Fiberboard, Metal, Paper	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	D2, D3.

TABLE OF PACKING METHODS—Continued

Packing methods	Inner packagings	Outer packagings	Particular packaging exception/ requirement
US003	Receptacles: Fiberboard, Metal, Plastic. Intermediate: Boxes: Fiberboard, Wood. Sheet: Paper, Kraft, Plastic.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	D2, D3, D4, D10, 54.
US004	Receptacles: Fiberboard, Metal, Paper	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel, with inner liner or coating (4A2).	D2, D5, D6, D7, D8.
US005	Boxes: Fiberboard Metal, Plastic, Wood. Note: Metal clips or dividing partitions in the outer packaging may be used in place of inner packagings.	Boxes: Fiberboard (4G), Wood, ordinary (4C1), Plywood (4D), Reconstituted wood (4F), Steel (4A1), Steel, with inner liner or coating (4A2). Drums: Steel, removable head (1A2)	13.

US006 Jet perforating guns, charged, oil well may be transported under the following conditions:

a. No initiation devices (detonator, blasting cap, electric or non-electric) may be affixed to or installed in guns

b. Initiation devices carried on the same motor vehicle or offshore supply vessel must be segregated; each kind from every other kind, and from the guns, tools or other supplies. Initiation devices shall be carried in a container having individual pockets for each such device or in a fully enclosed steel container lined with a non-sparking material. No more than two initiation devices per gun shall be carried on the same motor vehicle.

c. Each shaped charge affixed to the gun may not contain more than 112 g (4 ounces) of explosives.

d. Each shaped charge if not completely enclosed in glass or metal, must be fully protected by a metal cover after installation in the gun.

e. Jet perforating guns classed as 1.1D or 1.4D may be transported by highway by private carriers engaged in oil well operations

1. Motor vehicles must have specially built racks or carrying cases designed and constructed so that guns are securely held in place during transportation and are not subject to damage by contact, one to the other or other articles or materials carried in the vehicle; and;

2. The assembled gun or guns packed on the vehicle may not extend beyond the body of the motor vehicle.

f. Jet perforating guns classed as 1.4D may be transported by private offshore supply vessels only when the guns are carried in motor vehicles as specified in paragraph (e) of this packing method or on offshore down-hole tool pallets provided that:

1. All the conditions specified in paragraphs (a), (b), (c), and (d) of this packing method are met;

2. The total explosive contents does not exceed 9.1 kg (20 pounds) per pallet;

3. Each cargo vessel compartment may contain up to 90.6 kg (200 pounds) of explosive content if the segregation requirements in § 176.83(b)(3) of this subchapter are met; and

4. When more one vehicle or pallet is stowed "on deck" a minimum horizontal separation of 3 m (9.8 feet) must be provided.

(d) *Table of particular packaging requirements or exceptions.*

No. identifying packaging requirement or exception	Explanation of packaging requirement or exception
1	Water soluble substances must be packed in waterproof receptacles.
2	Packages must be lead-free.
3	The barrels and drums must have a watertight seal.
4	The intermediate and outer packagings must be filled with water or an appropriate water saturated material when the intermediate packaging is a rubber or rubberized textile bag.
7	Metal drums used for powder paste must be so constructed that explosion is not possible by reason of increase in internal pressure from internal or external causes.
8	The inside of drums and jerricans must be galvanized, painted or otherwise protected. Bare steel must not come into contact with smokeless powder.
9	Drums or jerricans of steel must be constructed without pockets or crevices in which smokeless powder could be trapped or nipped.
10	Metal receptacles must be so constructed that the risk of explosion, by reason of increase in internal pressure from internal or external causes, is reduced.
11	The inner packagings must be sealed.
12	Outer boxes of natural wood may be provided with tin-plate liner having a sealed lid.
13	Open ends of inner packagings must be fitted with padded end caps or the outer packaging must be padded.
22	The inner packagings must be separated from the outer packaging by a gap of not less than 25 mm (1 inch) of cushioning material, e.g., sawdust, wood wool.
28	Metal inner packagings must be padded with cushioning material.
30	The shaped charges must be packed so that contact between them is prevented.
31	The conical cavities of the shaped charges must face inward in pairs or groups to minimize the shaped charge (jetting) effect in the event of accidental initiation.
32	The ends of the articles must be sealed or the use of bags, plastics, as inner packaging is mandatory.
33	The ends of the detonating cord must be sealed and tied fast.
34	The ends of the detonating cord must be sealed. Spaces must be filled with packing material.
35	Packagings must be sealed against the ingress of water.
36	The detonators must be cushioned to prevent significant movement and contact between them.
38	The detonating fuses must be separated from each other in the inner packaging.
41	The primers must be packed with shock absorbent layers of felt, paper or plastic to prevent propagation within the outer packaging.
42	The outer plastic packagings must be reinforced with metal at corners and edge.
43	The signals must be separated to prevent contact with one another and kept apart from the bottom, walls, and lid of the outer packaging, e.g., by cushioning material.
44	Where the signals are contained in magazines for fitting into automatic units, the magazine may replace the inner packaging provided adequate cushioning material is used.
45	Tin-plate inner packagings must be sealed.
46	The sounding device must be wrapped individually in corrugated fiberboard sheets or inserted in fiberboard tubes.
47	Absorbent cushioning material must be inserted.
48	Large articles without propelling charge and without means of ignition or initiation may be carried unpacked.

No. identifying packaging requirement or exception	Explanation of packaging requirement or exception
49	Large articles without their means of initiation, or with their means of initiation containing at least two effective protective features, may be carried unpackaged.
50	Large articles without their means of ignition may be carried unpackaged.
53	Bags, sift-proof (5H2) recommended only for flake or prilled TNT in the dry state and a maximum net mass of 30 kg (66 pounds).
54	Plastic inner packagings must not be liable to generate sufficient static electricity that a discharge could cause the packaged articles to function.
55	Not more than 50 g (1.8 ounces) of a substance shall be packed in an inner packaging.
D1	The intermediate packaging must be entirely surrounded by wetted cushioning material within the outer packaging.
D2	Quantity limitations for all detonators are as follows unless specifically defined for each type of detonator: (a) For detonators containing no more than 10 g of explosive (excluding ignition and delay charges): (1) No more than 50 detonators may be packed in one inner packaging. (ii) No more than 500 detonators may be packed in one outer packaging. (b) For detonators containing no more than 3 g of explosive (excluding ignition and delay charges): (i) No more than 100 detonators may be packed in one inner packaging. (ii) No more than 1000 detonators may be packed in one outer packaging. (c) There are no quantity limitations for detonators classed as 1.4B or 1.4S. The number of detonators that may be packed in each inner or outer (if inner packaging is not required) packaging is determined by: (i) The ability for the package to pass certain tests (see § 173.57 of this subchapter) that qualify the detonators to be classed as 1.4B or 1.4S; or (ii) The gross weight limitations of the packaging used.
D3	Inner packaging is not required for electric blasting caps when packed in pasteboard tubes, or when their leg wires are wound on spools with the caps either placed inside the spool or securely taped to the wire on the spool, so as to restrict freedom of movement of the caps and to protect them from impact forces. No more than 500 electric blasting caps shall be contained in one outer packaging.
D4	Intermediate packagings are required only for non-electric detonators that are blasting caps or delay connectors in metal tubes.
D5	Blasting caps are not required to be attached to the safety fuse, metal clad mild detonating cord, detonating cord, or shock tube.
D6	Inner packagings are not required if the packing configuration restricts freedom of movement of the caps and protects them from impact forces.
D7	Quantity limitations for detonator assemblies with detonating cord are: (a) No more than 50 detonator assemblies shall be packed in one inner packaging. (b) No more than 500 detonator assemblies shall be packed in one outer packaging.
D8	Quantity limitations for detonator assemblies with safety fuse or shock tube are: (a) No more than 50 detonator assemblies shall be packed in one inner packaging. (b) No more than 1,000 detonator assemblies shall be packed in one outer packaging.
D9	Primers fitted with anvil, composition not covered with a disc of metal foil or other material (varnished only). (a) The primers must be packed in rows in single layers in trays of fiberboard or plastic. (b) Not more than 500 primers shall be packed in an inner packaging.
D10	Detonators that are blasting caps (including percussion activated) or delay connectors in metal tubes must be packed as follows: (a) The detonators must be packed in an inner packaging with the open end of any detonator covered with appropriate cushioning material; (b) Inner packagings must be snugly packed in an intermediate packaging; (c) Intermediate packagings must be separated from the outside packaging by at least 25 mm (1 inch) of cushioning material; (d) Detonators containing no more than 10 g of explosive (excluding ignition and delay charges) must be packed as follows: (i) No more than 50 detonators in one inner packaging. *(ii) No more than 500 detonators in one outer packaging.* (e) Detonators containing no more than 3 g of explosive (excluding ignition and delay charges) must be packed as follows: (i) No more than 110 detonators in one inner packaging. (ii) No more than 5,000 detonators in one outer packaging.
D11	Primers not fitted with an anvil, composition covered, not more than 5,000 primers shall be packed in an inner packaging.
D12	Large articles may be carried unpackaged.
D13	No inner packaging required for drums, fiber (1G).
D14	Inner packaging is not required with fiberboard boxes (4G) for packaging UN 0332.
D15	*Sheets, waterproof, when used, must also be impervious to any liquid explosive ingredients of the substance.*

§ 173.63 Packaging exceptions.

(a) Cord, detonating (UN 0065), having an explosive content not exceeding 6.5 g (0.23 ounces) per 30 centimeter length (one linear foot) may be offered for transportation domestically and transported as Division 1.4 Compatibility Group D (1.4D) explosives, if the gross weight of all packages containing Cord, detonating (UN 0065), does not exceed 45 kg (99 pounds) per:

(1) transport vehicle, freight container, or cargo-only aircraft;

(2) off-shore down-hole tool pallet carried on an off-shore supply vessel;

(3) cargo compartment of a cargo vessel; or

(4) passenger-carrying aircraft used to transport personnel to remote work sites, such as offshore drilling units.

(b) Detonating fuzes or ignition devices may not be assembled in the articles or included in the same outside package with the articles unless shipped by or for DOD and in accordance with established practices and procedures specified by DOD.

(c) [Reserved]

(d) Rocket motors may be shipped in a propulsive state or with igniters assembled therein only under conditions approved by the Department of Defense (DOD) or the National Aeronautics and Space Administration (NASA).

(e) Rocket motors, liquid fueled or cartridges, power devices (other than in Division 1.4) may not be shipped with igniters assembled therein unless shipped by or for DOD or NASA in accordance with established practices and procedures specified by DOD or NASA.

(f) Detonators containing no more than 1 g explosive (excluding ignition and delay charges) that are electric blasting caps with leg wires 4 feet long or longer, delay connectors in plastic sheaths, or blasting caps with empty plastic tubing 12 feet long or longer may be packed as follows in which case they are excepted from the packaging requirements of § 173.62:

(1) No more than 50 detonators in one inner packaging;

(2) IME Standard 22 container or compartment is used as the outer packaging;

(3) No more than 1000 detonators in one outer packaging; and

(4) No material may be loaded on top of the IME Standard 22 container and no material may be loaded against the outside door of the IME Standard 22 compartment.

(g) Detonators that are classed as 1.4B or 1.4S and contain no more than 1 g of

explosive (excluding ignition and delay charges) may be packed as follows in which case they are excepted from the packaging requirements of § 173.62:

(1) No more than 50 detonators in one inner packaging;

(2) IME Standard 22 container is used as the outer packaging;

(3) No more than 1000 detonators in one outer packaging; and

(4) Each inner packaging is marked "1.4B Detonators" or "1.4S Detonators", as appropriate.

Subpart D—Definitions Classification, Packing Group Assignments and Exceptions for Hazardous Materials other than Class 1 and Class 7

§ 173.115 Class 2, Divisions 2.1, 2.2, and 2.3—Definitions.

(a) *Division 2.1 (Flammable gas).* (1) For the purpose of this subchapter, a "flammable gas" (Division 2.1) means any material which is a gas at 20 °C (68 °F) or less and 101.3 kPa (14.7 psi) of pressure (a material which has a boiling point of 20 °C (68 °F) or less at 101.3 kPa (14.7 psi) which—

(i) Is ignitable at 101.3 kPa (14.7 psi) when in a mixture of 13 percent or less by volume with air; or

(ii) Has a flammable range at 101.3 kPa (14.7 psi) with air of at least 12 percent regardless of the lower limit.

(2) The limits specified in paragraph (a) (1) of this section shall be determined at 101.3 kPa (14.7 psi) of pressure and a temperature of 20 °C (68 °F) in accordance with ASTM E681–85 Standard Test Method for Concentration Limits of Flammability of Chemicals.

(b) *Division 2.2 (non-flammable, non-poisonous compressed gas—including compressed gas, liquefied gas, pressurized cryogenic gas and compressed gas in solution).* For the purpose of this subchapter, a "non-flammable, non-poisonous compressed gas" (Division 2.2) means any material (or mixture) which—

(1) Exerts in the packaging an absolute pressure of 280 kPa (41 psia) at 20 °C (68 °F), and

(2) Does not meet the definition of Division 2.1 or 2.3.

(c) *Division 2.3 (Poisonous gas).* For the purpose of this subchapter, "poisonous gas" (Division 2.3) means a material which is a gas at 20 °C (68 °F) or less and a pressure of 101.3 kPa (one atm) (a material which has a boiling point of 20 °C (68 °F) or less at 101.3 kPa (14.7 psi) and which—

(1) Is known to be so toxic to humans as to pose a hazard to health during transportation, or

(2) In the absence of adequate data on human toxicity, is presumed to be toxic to humans because when tested on laboratory animals it has an LC50 value not more than 5000 ppm (see § 173.132(b) (3)).

(d) *Non-liquefied compressed gas.* A "non-liquefied compressed gas" means a gas, other than in solution, which in a packaging under the charged pressure is entirely gaseous at a temperature of 20 °C (68 °F).

(e) *Liquefied compressed gas.* A "liquefied compressed gas" means a gas which in a packaging under the charged pressure, is partially liquid at a temperature of 20 °C (68 °F).

(f) *Compressed gas in solution.* A "compressed gas in solution" is a non-liquefied compressed gas which is dissolved in a solvent.

(g) *Cryogenic liquid.* A "cryogenic liquid" means a refrigerated liquefied gas having a boiling point colder than −90 °C (−130 °F) at 101.3 kPa (14.7 psi) absolute. A material meeting this definition is subject to requirements of this subchapter without regard to whether it meets the definition of a non-flammable, non-poisonous compressed gas in paragraph (b) of this section.

(h) *Flammable range.* The term "flammable range" means the difference between the minimum and maximum volume percentages of the material in air that forms a flammable mixture.

(i) *Service pressure.* The term "service pressure" means the authorized pressure marking on the packaging. For example, for a cylinder marked "DOT 3A1800", the service pressure is 12410 kPa (1800 psi).

(j) *Refrigerant gas or Dispersant gas.* The terms "Refrigerant gas" or "Dispersant gas" apply to all non-poisonous refrigerant gases, dispersant gases (fluorocarbons) listed in §§ 172.101, 173.304(a)(2), 173.314(c), 173.315(a)(1) and 173.315(h), and mixtures thereof, or any other compressed gas having a vapor pressure not exceeding 1792 kPa (260 psi) at 54 °C (130 °F), and restricted for use as a refrigerant, dispersant or blowing agent.

§ 173.116 Class 2—Assignment of hazard zone.

(a) The hazard zone of a Class 2, Division 2.3 material is assigned in Column 5 of the § 172.101 Table. There are no hazard zones for Divisions 2.1 and 2.2. When the § 172.101 Table provides more than one hazard zone for a Division 2.3 material, or indicates that the hazard zone be determined on the basis of the grouping criteria for Division 2.3, the hazard zone shall be determined by applying the following criteria:

Hazard zone	Inhalation toxicity
A	LC50 less than or equal to 200 ppm.
B	LC50 greater than 200 ppm and less than or equal to 1000 ppm.
C	LC50 greater than 1000 ppm and less than or equal to 3000 ppm.
D	LC50 greater than 3000 ppm or less than or equal to 5000 ppm.

(b) The criteria specified in paragraph (a) of this section are represented graphically in § 173.133, Figure 1.

§§ 173.117–173.119 [Reserved]

§ 173.120 Class 3—Definitions.

(a) Flammable liquid. (1) For the purpose of this subchapter, a "flammable liquid" (Class 3) means any liquid having a flash point of not more than 60 °C (140 °F) with the following exceptions:

(i) Any liquid meeting one of the definitions specified in § 173.115 of this part.

(ii) Any mixture having one or more components with a flash point greater than 60 °C (140 °F) or higher, that makes up at least 99 percent of the total volume of the mixture.

(2) For the purposes of this subchapter, a distilled spirit of 140 proof or lower is considered to have a flash point no lower than 23 °C (73 °F).

(b) Combustible liquid. (1) For the purpose of this subchapter, a "combustible liquid" means any liquid that does not meet the definition of any other hazard class specified in this subchapter and has a flash point above 60 °C (140 °F) and below 93 °C (200 °F).

(2) Except when offered or intended for transportation by vessel or aircraft, a flammable liquid with a flash point at or above 38 °C (100 °F) that does not meet the definition of any other hazard class may be reclassed as a combustible liquid.

(c) Flash point. (1) "Flash point" means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. It shall be determined as follows:

(i) For a homogeneous, single-phase, liquid having a viscosity less than 45 S.U.S. at 38 °C (100 °F) that does not form a surface film while under test, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Tag Closed Tester, (ASTM D56–79); or

(B) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester, (ASTM D3278–78).

(ii) For a liquid other than one meeting all of the criteria of paragraph (c)(1)(i) of this section, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Pensky—Martens Closed Tester, (ASTM D93–80). For cutback asphalt, use Method B of ASTM D93–80 or alternate tests authorized in this standard; or

(B) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester (ASTM D3278–78).

(2) For a liquid that is a mixture of compounds that have different volatility and flash points, its flash point shall be determined as specified in paragraph (c)(1) of this section, on the material in the form in which it is to be shipped. If it is determined by this test that the flash point is higher than −7 °C (20 °F) a second test shall be made as follows: a portion of the mixture shall be placed in an open beaker (or similar container) of such dimensions that the height of the liquid can be adjusted so that the ratio of the volume of the liquid to the exposed surface area is 6 to one. The liquid shall be allowed to evaporate under ambient pressure and temperature (20 to 25 °C (68 to 77 °F)) for a period of 4 hours or until 10 percent by volume has evaporated, whichever comes first. A flash point is then run on a portion of the liquid remaining in the evaporation container and the lower of the two flash points shall be the flash point of the material.

(3) For flash point determinations by Setaflash closed tester, the glass syringe specified need not be used as the method of measurement of the test sample if a minimum quantity of 2 ml (0.1 ounce) is assured in the test cup.

(d) If experience or other data indicate that the hazard of a material is greater or less than indicated by the criteria specified in paragraphs (a) and (b) of this section, the Associate Administrator for Hazardous Materials Safety may revise the classification or make the material subject or not subject to the requirements of parts 170–189 of this subchapter.

§ 173.121 Class 3—Assignment of packing group.

(a) The packing group of a Class 3 material is as assigned in Column 5 of the § 172.101 Table. When the § 172.101 Table provides more than one packing group for a hazardous material, or indicates that the packing group is to be determined on the basis of the grouping criteria for Class 3, the packing group shall be determined by applying the following criteria:

Packing group	Flash point (closed-cup)	Initial boiling point
I		<35 °C (95 °F)
II	<23 °C (73 °F)	>35 °C (95 °F)
III	>23 °C, <60 °C (140 °F)	>35 °C (95 °F)

(b) *Criteria for inclusion of viscous Class 3 materials in Packing Group III.*

(1) Viscous Class 3 materials in Packing Group II with a flash point of less than 23 °C (73 °F) may be grouped in Packing Group III provided that—

(i) Less than 3 percent of the clear solvent layer separates in the solvent separation test;

(ii) The mixture contains not more than 5 percent of substances in Packing Group I or II of Division 6.1 or Class 8, or not more than 5 percent of substances in Packing Group I of Class 3 requiring a POISON or CORROSIVE subsidiary label;

(iii) The capacity of the packaging is not more than 30 L (7.9 gallons); and

(iv) The viscosity and flash point are in accordance with the following table:

Flowtime in seconds		Flash point in degrees C
4 mm cup	8 mm cup	
Over 20		Over 17.
Over 60		Over 10.
Over 100		Over −5.
Over 160		Over −1.
Over 220	Over 17	Over −5.
	Over 40	No lower limit.

(2) The methods by which the tests referred to in paragraph (b)(1) of this section shall be performed are as follows:

(i) *Viscosity Test.* The flowtime in seconds is determined at 23 °C (73 °F) using the ISO Standard cup with a 4.0 mm (0.2 inch) jet (ISO–2431–72). Where the flowtime exceeds 200 seconds, a second test is carried out using the ISO standard cup but modified to take a jet of 8 mm (0.3 inch) diameter.

(ii) *Solvent Separation Test.* This test is carried out at 23 °C (73 °F) using a 100.0 ml (3 ounces) measuring cylinder of the stoppered type of approximately 25.0 cm (9.8 inches) total height and of a uniform internal diameter of approximately 30 mm (1.2 inches) over the calibrated section. The sample should be stirred to obtain a uniform consistency, and poured in up to the 100 ml (3 ounces) mark. The stopper should be inserted and the cylinder left standing undisturbed for 24 hours. After 24 hours, the height of the upper separated layer should be measured and the percentage of this layer as compared with the total height of the sample calculated.

§ 173.124 Class 4 Divisions 4.1, 4.2 and 4.3—Definitions.

(a) *Division 4.1 (Flammable Solid).* For the purposes of this subchapter, "flammable solid" (Division 4.1) means any of the following three types of materials:

(1) Wetted explosives that—

(i) When dry are Explosives of Class 1 other than those of compatibility group A, which are wetted with sufficient water, alcohol, or plasticizer to suppress explosive properties; and

(ii) Are specifically authorized by name either in the § 172.101 Table or have been assigned a shipping name and hazard class by the Associate Administrator for Hazardous Materials Safety under the provisions of—

(A) An exemption issued under subchapter B of this chapter; or

(B) An approval issued under § 173.56(i) of this part.

(2) Self-reactive materials are materials that are liable to undergo, at normal or elevated temperatures, a strongly exothermal decomposition caused by excessively high transport temperatures or by contamination; and

(3) Readily combustible solids are materials that—

(i) Are solids which may cause a fire through friction, such as matches;

(ii) Show a burning rate faster than 2.2 mm (0.087 inches) per second when tested in accordance with paragraph 2.3 of appendix E to this part; or

(iii) Any metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less, when tested in accordance with paragraph 2.3.2 of appendix E to this part.

(b) *Division 4.2 (Spontaneously Combustible Material).* For the purposes of this subchapter, "spontaneously combustible material" (Division 4.2) means—

(1) A pyrophoric material. A pyrophoric material is a liquid or solid that, even in small quantities and without an external ignition source, can ignite within five (5) minutes after coming in contact with air when tested according to paragraph 3.1.1 or 3.1.2, as appropriate, of appendix E to this part.

(2) A self-heating material. A self-heating material is a material that, when in contact with air and without an energy supply, is liable to self-heat. A material of this type which exhibits spontaneous ignition or if the temperature of the sample exceeds 200 °C (392 °F) during the 24=hour test period when tested in accordance with paragraph 3.2.1 of appendix E to this

part, is classed as a Division 4.2 material.

(c) *Division 4.3 (Dangerous when wet material).* For the purposes of this chapter, "dangerous when wet material" (Division 4.3) means a material that, by contact with water, is liable to become spontaneously flammable or to give off flammable or toxic gas at a rate greater than 1 liter per kilogram of the material, per hour, when tested in accordance with paragraph 4 of appendix E to this part.

§ 173.125 Class 4—Assignment of packing group.

(a) The packing group of a Class 4 material is as assigned in Column 5 of the 172.101 Table. When the 172.101 Table indicates that the packing group of a hazardous material is to be determined on the basis of test results following test methods given in appendix E of this part, the packing group shall be determined by applying the appropriate criteria given in this section.

(b) Packing group criteria for readily combustible materials of Division 4.1 is as follows:

(1) For materials other than metal powders, a material is assigned to—

(i) Packing Group II, if the burning rate is greater than 2.2 mm/s and the flame passes the wetted zone; or

(ii) Packing Group III, if the burning rate is greater than 2.2 mm/s and the wetted zone stops the flame.

(2) For metal powders, a material is assigned to—

(i) Packing Group II, if the zone of reaction spreads over the whole length of the sample in 5 minutes or less; or

(ii) Packing Group III, if the zone of reaction spreads over the whole length of the sample in more than 5 but not more than 10 minutes.

(3) Solids which may cause a fire through friction are assigned to packing groups by analogy with existing entries in the § 172.101 Table.

(c) Packing group criteria for Division 4.2 materials is as follows:

(1) Pyrophoric liquids and solids of Division 4.2 are assigned to Packing Group I.

(2) A self-heating material is assigned to—

(i) Packing Group II, if the material gives a positive test result when tested with the 2.5-cm cube size sample; or

(ii) Packing Group III, if the material gives a positive test result when tested with the 10-cm cube size sample but a negative test result with the 2.5-cm cube size sample.

(d) A Division 4.3 dangerous when wet material is assigned to—

(1) Packing Group I, if spontaneous ignition occurs, or demonstrates a tendency of spontaneous ignition, or the rate of evolution of flammable gases is equal or greater than 10 liters per kilogram of material over any one minute; or

(2) Packing Group II, if the rate of evolution of flammable gases is equal to or greater than 20 liters per kilogram of material per hour, and which does not meet the criteria for Packing Group I; or

(3) Packing Group III, if the rate of evolution of flammable gases is greater than 1 liter per kilogram of material per hour, and which does not meet the criteria for Packing Group I or II.

§ 173.127 Class 5, Division 5.1—Definition and assignment of packing groups.

(a) *Definition.* For the purpose of this subchapter, "oxidizer" (Division 5.1) means a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials. A solid material is classed as a Division 5.1 material if, when tested in accordance with Appendix F to this part, in either concentration tested, the mean burning time of the test mixture, is equal to or less than that of the average of the three tests with ammonium persulfate mixture. A liquid is classed as a Division 5.1 material by analogy to existing entries in the § 172.101 Table.

(b) *Assignment of packing groups.* (1) The packing group of a Division 5.1 material shall be as assigned in Column 5 of the § 172.101 Table.

(2) When the § 172.101 Table indicates that the packing group of a solid oxidizer is to be determined on the basis of the test results following test method given in Appendix F to this part, the packing group shall be assigned by the following criteria:

(i) Packing Group I, for a material which, in either concentration tested, exhibits a burning time equal to or less than that of potassium bromate;

(ii) Packing Group II, for a material which, in either concentration tested, exhibits a burning time between that of potassium bromate and that of potassium perchlorate; or

(iii) Packing Group III, for a material which, in either concentration tested, exhibits a burning time between that of potassium perchlorate and that of ammonium persulphate.

(3) Liquid oxidizers are assigned to packing groups by analogy with existing entries in the § 172.101 Table.

§ 173.128 Class 5, Division 5.2—Definitions and types.

(a) *Definitions.* For the purposes of this subchapter, "organic peroxide" (Division 5.2) means any organic compound containing oxygen (O) in the bivalent -O-O- structure and which may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals, unless any of the following paragraphs apply:

(1) The material meets the definition of an explosive as prescribed in subpart C of this part, in which case it must be classed as an explosive;

(2) The material is forbidden from being offered for transportation according to § 172.101 of this subchapter or § 173.21;

(3) The Associate Administrator for Hazardous Materials Safety has determined that the material does not present a hazard which is associated with a Division 5.2 material; or

(4) The material meets one of the following conditions:

(i) For materials containing no more than 1.0 percent hydrogen peroxide, the available oxygen, as calculated using the equation in paragraph (a)(4)(ii) of this section, is not more than 1.0 percent, or

(ii) For materials containing more than 1.0 percent but not more than 7.0 percent hydrogen peroxide, the available oxygen, content (O_a) is not more than 0.5 percent, when determined using the equation:

$$O_a = 16 \times \sum_{i=1}^{k} \frac{n_i c_i}{m_i}$$

where, for a material containing k species of organic peroxides:

n_i = number of -O-O- groups per molecule of the ith species

c_i = concentration (mass percent) of the ith species

m_i = molecular mass of the ith species

(b) *Generic types.* Division 5.2 organic peroxides are assigned to a generic system which consists of seven types. An organic peroxide identified by technical name in the Organic Peroxides Table in § 173.225 is assigned to a generic type in accordance with that Table. Organic peroxides not identified in the Organic Peroxides Table are assigned to generic types under the procedures of paragraph (c) of this section.

(1) *Type A.* Organic peroxide type A is an organic peroxide which can detonate or deflagrate rapidly as packaged for

transport. Transportation of type A organic peroxides is forbidden.

(2) *Type B.* Organic peroxide type B is an organic peroxide which, as packaged for transport, neither detonates nor deflagrates rapidly, but can undergo a thermal explosion.

(3) *Type C.* Organic peroxide type C is an organic peroxide which, as packaged for transport, neither detonates nor deflagrates rapidly and cannot undergo a thermal explosion.

(4) *Type D.* Organic peroxide type D is an organic peroxide which—

(i) Detonates only partially, but does not deflagrate rapidly and is not affected by heat when confined;

(ii) Does not detonate, deflagrates slowly, and shows no violent effect if heated when confined; or

(iii) Does not detonate or deflagrate, and shows a medium effect when heated under confinement.

(5) *Type E.* Organic peroxide type E is an organic peroxide which neither detonates nor deflagrates and shows low, or no, effect when heated under confinement.

(6) *Type F.* Organic peroxide type F is an organic peroxide which will not detonate in a cavitated state, does not deflagrate, shows only a low, or no, effect if heated when confined, and has low, or no, explosive power.

(7) *Type G.* Organic peroxide type G is an organic peroxide which will not detonate in a cavitated state, will not deflagrate, shows no effect when heated under confinement, has no explosive power, is thermally stable (self-accelerating decomposition temperature above 60 °C (140 °F)), and, for desensitized liquid formulations, is desensitized with a compatible organic liquid which boils above 150 °C (300 °F) (diluent type A, see § 173.225(b)).

(c) *Procedure for assigning an organic peroxide to a generic type.* An organic peroxide shall be assigned to a generic type based on—

(1) Its physical state (i.e., liquid or solid), in accordance with the definitions for liquid and solid in § 171.8 of this subchapter;

(2) A determination as to its control temperature and emergency temperature, if any, under the provisions of § 173.223;

(3) Performance of the organic peroxide under the test procedures specified in the United Nations Recommendations on the Transport of Dangerous Goods, Tests and Criteria, part III, and the provisions of paragraph (d) of this section; and

(4) Except for an organic peroxide which is identified by technical name in the Organic Peroxides Table in § 173.225(b) or an organic peroxide which may be shipped as a sample under the provisions of § 173.225(c), the organic peroxide is approved, in writing, by the Associate Administrator for Hazardous Materials Safety, including assignment of a generic type and shipping description. The person requesting approval shall submit: (i) all relevant data concerning physical state, temperature controls, and test results or (ii) an approval issued for the organic peroxide by the competent authority of a foreign government, to the Associate Administrator for Hazardous Materials Safety.

(d) *Tests.* The generic type for an organic peroxide shall be determined using the testing protocol from Figure 1.1 (Classification and Flow Chart Scheme for Organic Peroxides) from the UN Recommendations, Tests and Criteria, part III.

§ 173.129 Class 5, Division 5.2—Assignment of packing group.

All Division 5.2 materials are assigned to Packing Group II in Column 5 of the § 172.101 Table.

§ 173.132 Class 6, Division 6.1—Definitions.

(a) For the purpose of this subchapter, "poisonous material" (Division 6.1) means a material, other than a gas, which is known to be so toxic to humans as to afford a hazard to health during transportation, or which, in the absence of adequate data on human toxicity:

(1) Is presumed to be toxic to humans because it falls within any one of the following categories when tested on laboratory animals:

(i) *Oral Toxicity.* A liquid with an LD_{50} for acute oral toxicity of not more than 500 mg/kg or a solid with an LD_{50} for acute oral toxicity of not more than 200 mg/kg.

(ii) *Dermal Toxicity.* A material with an LD_{50} for acute dermal toxicity of not more than 1000 mg/kg.

(iii) *Inhalation Toxicity.* (A) A dust or mist with an LC_{50} for acute toxicity on inhalation of not more than 10 mg/L; or

(B) A material with a saturated vapor concentration in air at 20 °C (68 °F) of more than one-fifth of the LC_{50} for acute toxicity on inhalation of vapors and with an LC_{50} for acute toxicity on inhalation of vapors of not more than 5000 ml/ms; or

(2) Is an irritating material, with properties similar to tear gas, which causes extreme irritation, especially in confined spaces.

(b) For the purposes of this subchapter—

(1) LD_{50} for acute toxicity means that dose of the material administered which to both male and female young albino rats which causes death within 14 days in half the animals tested. The number of animals tested must be sufficient to give statistically valid results and be in conformity with good pharmacological practices. The result is expressed in mg/kg body mass.

(2) LD_{50} for acute dermal toxicity means that dose of the material which, administered by continuous contact for 24 hours with the shaved intact skin (avoiding braiding) of an albino rabbit, causes death within 14 days in half of the animals tested. The number of animals tested must be sufficient to give statistically valid results and be in conformity with good pharmacological practices. The result is expressed in mg/kg body mass.

(3) LC_{50} for acute toxicity on inhalation means that concentration of vapor, mist, or dust which, administered by continuous inhalation for one hour to both male and female young adult albino rats, causes death within 14 days in half of the animals tested. If the material is administered to the animals as a dust or mist, more than 90 percent of the particles available for inhalation in the test must have a diameter of 10 microns or less if it is reasonably foreseeable that such concentrations could be encountered by a human during transport. The result is expressed in mg/L of air for dusts and mists or in mL/m^3 of air (parts per million) for vapors. See § 173.133(b) for LC_{50} determination for mixtures and for limit tests.

(i) When provisions of this subchapter require the use of the LC_{50} for acute toxicity on inhalation of dusts and mists based on a one-hour exposure and such data is not available, the LC_{50} for acute toxicity on inhalation based on a four-hour exposure may be multiplied by four and the product substituted for the one-hour LC_{50} for acute toxicity on inhalation.

(ii) When the provisions of this subchapter require the use of the LC_{50} for acute toxicity on inhalation of vapors based on a one-hour exposure and such data is not available, the LC_{50} for acute toxicity on inhalation based on a four-hour exposure may be multiplied by two and the product substituted for the one-hour LC_{50} for acute toxicity on inhalation.

(c) The foregoing categories shall not apply if the Associate Administrator for Hazardous Materials Safety has determined that the physical characteristics of the material or its probable hazards to humans as shown by documented experience indicate that the material will not cause serious sickness or death.

§ 173.133 Division 6.1—Assignment of packing group and hazard zones.

(a) The packing group of Division 6.1 materials shall be as assigned in Column 5 of the § 172.101 Table. When the § 172.101 Table provides more than one packing group and hazard zone for a hazardous material, the packing group and hazard zone shall be determined by applying the following criteria:

(1) The packing group assignment for routes of administration other than inhalation of vapors shall be in accordance with the following table:

Packing Group	Oral toxicity LD_{50} (mg/kg)	Dermal toxicity LD_{50} (mg/kg)	Inhalation toxicity by dusts and mists LC_{50} (mg/L)
I	≤ 5	≤ 40	≤ 0.5
II	> 5, ≤ 50	> 40, ≤ 200	> 0.5, ≤ 2
III	solids: > 50, ≤ 200; liquids: > 50, ≤ 500	> 200, ≤ 1000	> 2, ≤ 10

(2) The packing group and hazard zone assignments based on inhalation of vapors shall be in accordance with the following Table:

Packing Group (Hazard Zone)	Vapor concentration and toxicity
I (Hazard Zone A)	V ≥ 500 LC_{50} and LC_{50} ≤ 200 mL/M ^{3}.
I (Hazard Zone B)	V ≥ 10 LC_{50}; LC_{50} ≤ 1000 mL/m ^{3}; and the criteria for Packing Group I, Hazard Zone A are not met.
II (Hazard Zone C)	V ≥ LC_{50}; LC_{50} ≤ 3000 mL/m ^{3}; and the criteria for Packing Group I, Hazard Zones A and B are not met.
III (Hazard Zone D)	V ≥ .2 LC_{50}; LC_{50} ≤ 5000 mL/m ^{3}; and the criteria for Packing Groups I and II, Hazard Zones A, B and C are not met.

Note: V is the saturated vapor concentration in air of the material in mL/m ^{3} at 20 °C and standard atmospheric pressure.

These criteria are represented graphically in Figure 1:

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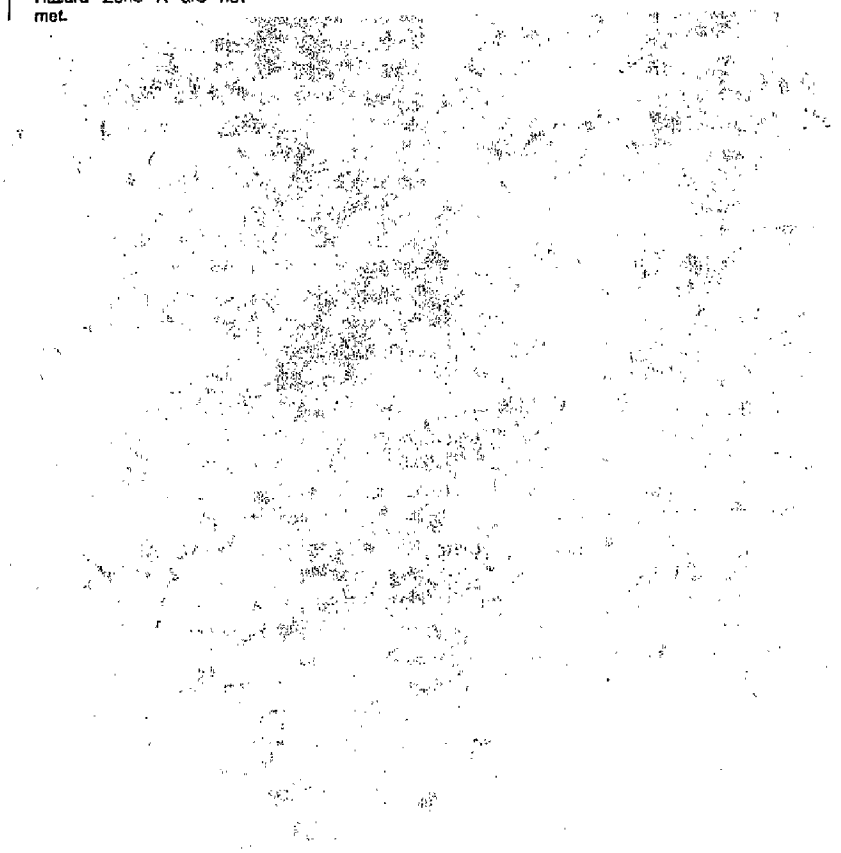
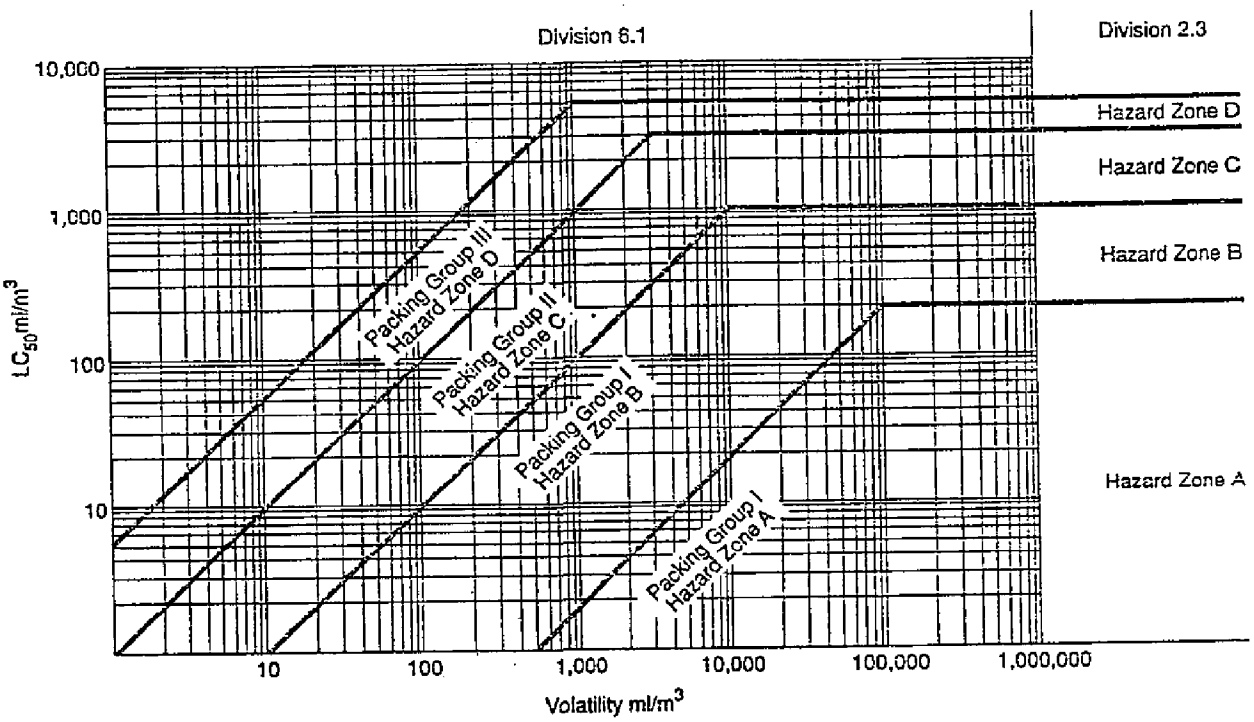


Figure 1
Inhalation Toxicity: Packing Group and Hazard Zone Borderlines



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(3) When the packing group determined by applying these criteria is different for two or more (oral, dermal or inhalation) routes of administration, the packing group assigned to the material shall be that indicated for the highest degree of toxicity for any of the routes of administration.

(4) Notwithstanding the provisions of this paragraph, the packing group and hazard zone of a tear gas substance is as assigned in Column 5 of the §172.101 Table.

(b) The packing group and hazard zone for Division 6.1 mixtures that are poisonous (toxic) by inhalation may be determined by one of the following methods:

(1) Where LC_{50} data is available on each of the poisonous (toxic) substances comprising the mixture—

(i) The LC_{50} of the mixture is estimated using the formula:

$$LC_{50}\ (\text{mixture}) = \frac{1}{\sum_{i=1}^{n} \frac{f_i}{LC_{50\,i}}}$$

where f_i = mole fraction of the i^{th} component substance of the liquid.

$LC50_i$ = mean lethal concentration of the i^{th} component substance in ml/m³

(ii) The volatility of each component substance is estimated using the formula:

$$V_i = P_i \times \frac{10^6}{760}\ ml/m^3$$

where:

P_i = partial pressure may be calculated according to Raoult's Law using appropriate activity coefficients. Where activity coefficients are not available, the coefficient may be assumed to be 1.0.

(iii) The ratio of the volatility to the LC_{50} is calculated using the formula:

$$R = \sum_{i=1}^{n} \frac{V_i}{LC_{50i}}$$

(iv) Using the calculated values LC50 (mixture) and R, the packing group for the mixture is determined as follows:

Packaging group (hazard zone)	Ratio of volatility and LC_{50}
I (Hazard Zone A).	R > 500 and LC_{50} (mixture) < 200 ml/m³.
I (Hazard Zone B).	R > 10 and LC_{50} (mixture) < 1000 ml/m³; and the criteria for Packing Group I, Hazard Zone A, are not met.
II (Hazard Zone C).	R > 1 and LC_{50} (mixture) < 3000 ml/m³; and the criteria for Packing Group I, Hazard Zones A and B are not met.
III (Hazard Zone D).	R > 1/5 and LC_{50} (mixture) < 5000 ml/m³; and the criteria for Packing Groups I and II, Hazard Zones A, B and C are not met.

(2) In the absence of LC50 data on the poisonous (toxic) constituent substances, the mixture may be assigned a packing group and hazard zone based on the following simplified threshold toxicity tests. When these threshold tests are used, the most restrictive packing group and hazard zone must be determined and used for the transportation of the mixture.

(i) A mixture is assigned to Packing Group I, Hazard Zone A only if both the following criteria are met:

(A) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 200 ml/m³ vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere as determined by an analytical method appropriate for the material being classified for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have an LC50 equal to or less than 200 ml/m³.

(B) A sample of the vapor in equilibrium with the liquid mixture is diluted with 499 equal volumes of air to form a test atmosphere. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have a volatility equal to or greater than 500 times the mixture LC50.

(ii) A mixture is assigned to Packing Group I, Hazard Zone B only if both the following criteria are met, and the mixture does not meet the criteria for Packing Group I, Hazard Zone A:

(A) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 1000 ml/m³ vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have an LC50 equal to or less than 1000 ml/m³.

(B) A sample of the vapor in equilibrium with the liquid mixture is diluted with 9 equal volumes of air to form a test atmosphere. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have a volatility equal to or greater than 10 times the mixture LC50.

(iii) A mixture is assigned to Packing Group II only if both the following criteria are met, and the mixture does not meet the criteria for Packing Group I (Hazard Zones A or B):

(A) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 3000 ml/m³ vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have an LC50 equal to or less than 3000 ml/m³.

(B) A sample of the vapor in equilibrium with the liquid mixture is used to form a test atmosphere. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have a volatility equal to or greater than the mixture LC50.

(iv) A mixture is assigned to Packing Group III only if both the following criteria are met, and the mixture does not meet the criteria for Packing Groups I (Hazard Zones A or B) or Packing Group II (Hazard Zone C):

(A) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 5000 ml/m³ vaporized mixture in air. Ten albino rats (five male and five female) are exposed to the test atmosphere for one hour and observed for fourteen days. If five or more of the animals die within the fourteen-day observation period, the mixture is presumed to have an LC50 equal to or less than 5000 ml/m³.

(B) The vapor pressure of the liquid mixture is measured and if the vapor concentration is equal to or greater than 1000 ml/m³, the mixture is presumed to have a volatility equal to or greater than ⅕ the mixture LC50.

§ 173.134 Class 6, Division 6.2—Definitions.

(a) For the purpose of this subchapter—

(1) An "infectious substance" (Division 6.2) means a viable microorganism, or its toxin, which causes or may cause disease in humans or animals, and includes those agents listed in 42 CFR 72.3 of the regulations of the Department of Health and Human Services or any other agent that has the potential to cause severe, disabling or fatal disease. The terms "infectious substances" and "etiologic agent" are synonymous.

(2) A "diagnostic specimen" means any human or animal material including, but not limited to, excreta, secreta, blood, and its components, tissue, and tissue fluids, being shipped for purposes of diagnosis.

(3) A "biological product" means a material prepared and manufactured in accordance with the provisions of 9 CFR part 102 (Licenses for biological products), 9 CFR part 103 (Biological products for experimental treatment of animals), 9 CFR part 104 (Permits for biological products), 21 CFR part 312 (Investigational new drug application), or 21 CFR parts 600 to 680 (Biologics), and which, in accordance with these provisions, may be shipped in interstate commerce.

(b) The requirements of this subpart supplement the requirements of the Department of Health and Human Services contained in 42 CFR part 72.

(c) Packing groups are not assigned to Division 6.2 materials.

§ 173.136 Class 8—Definitions.

(a) For the purpose of this subchapter, "corrosive material" (Class 8) means a liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum, in accordance with the following criteria:

(1) A material is considered to be destructive or to cause irreversible alteration in human skin tissue if, when tested on the intact skin of an albino rabbit by the technique described in Appendix A to this part, the structure of the tissue at the site of contact is destroyed or changed irreversibly after an exposure period of 4 hours or less.

(2) A liquid is considered to have a severe corrosion rate if its corrosion rate exceeds 6.25 mm (0.246 inches) a year on steel (SAE 1020) or aluminum (nonclad 7075–T6) at a test temperature of 55 °C (131 °F). An acceptable test is described in NACE Standard TM–01–69.

(b) If human experience or other data indicate that the hazard of a material is greater or less than indicated by the results of the tests specified in paragraph (a) of this section, RSPA may revise its classification or make the material subject to the requirements of this subchapter.

§ 173.137 Class 8—Assignment of packing group.

The packing group of Class 8 material is indicated in Column 5 of the § 172.101 Table. When the § 172.101 Table provides more than one packing group for a hazardous material, the packing group shall be determined by applying the following criteria:

(a) *Packing Group I.* Substances that cause visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of not more than 3 minutes.

(b) *Packing Group II.* Substances, other than those meeting Packing Group I criteria, that cause visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of not more than 60 minutes.

(c) *Packing Group III.* Substances, other than those meeting Packing Group I or II criteria—

(1) That cause visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of not more than 4 hours; or

(2) Which have a corrosion rate on steel or aluminum surfaces exceeding 6.25 mm (0.246 inch) a year at a test temperature of 55 °C (131 °F).

§ 173.140 Class 9—Definitions.

For the purpose of this subchapter, "miscellaneous hazardous material" (Class 9) means a material which presents a hazard during transport, but which is not included in any other hazard class. This class includes:

(a) Any material which has an anesthetic, noxious or other similar property which could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties; and

(b) Any material that is not included in any other hazard class, but is subject to the requirements of this subchapter because it meets the definition in § 171.8 of this subchapter for a hazardous substance or a hazardous waste.

§ 173.141 Class 9—Assignment of packing group.

The packing group of a Class 9 material is as indicated in Column 5 of the § 172.101 Table.

§ 173.144 Other Regulated Materials (ORM)—Definitions.

For the purpose of this subchapter, "ORM–D material" means a material such as a consumer commodity, which, although otherwise subject to the regulations of this subchapter, presents a limited hazard during transportation due to its form, quantity and packaging. It must be a material for which exceptions are provided in the § 172.101 Table. Each ORM–D material and category of ORM–D material is listed in the § 172.101 Table.

§ 173.145 Other Regulated Materials—Assignment of packing group.

Packing groups are not assigned to ORM–D materials.

§ 173.150 Exceptions for Class 3 (flammable and combustible liquids).

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table of this subchapter and the material does not meet the definition of another hazard class, except Class 9.

(b) *Limited quantities.* Limited quantities of flammable liquids (Class 3) are excepted from labeling requirements, unless offered for transportation or transported by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of limited quantities are not subject to subpart F (Placarding) of part 172 of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For flammable liquids in Packing Group I, inner packagings not over 0.5 L (0.1 gallon) net capacity each, packed in strong outer packagings;

(2) For flammable liquids in Packing Group II, inner packagings not over 1.0 L (0.3 gallon) net capacity each, packed in strong outer packaging; and

(3) For flammable liquids in Packing Group III, inner packagings not over 4.0 L (1 gallon) net capacity each, packed in strong outer packagings.

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section and is a "consumer commodity" as defined in § 171.8 of this subchapter, may be renamed "Consumer commodity" and reclassed as ORM–D material. In addition to the exceptions provided by paragraph (b) of this section, shipments of ORM–D materials are not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered for transportation or transported

by aircraft, and are eligible for the exceptions provided in § 173.156.

(d) *Alcoholic beverages.* Alcoholic beverages (wine and distilled spirits as defined in 27 CFR 4.10 and 5.11) in packagings of four liters or less are not subject to the requirements of this subchapter.

(e) *Aqueous solutions of alcohol.* An aqueous solution containing 24 percent or less alcohol by volume and no other hazardous material—

(1) May be reclassed as a combustible liquid; and

(2) Is not subject to the requirements of this subchapter if it contains no less than 50 percent water.

(f) *Combustible liquids.* (1) Except for transportation by vessel or aircraft, a flammable liquid with a flash point at or above 38 °C (100 °F) and below 60 °C (140 °F) may be reclassed as a combustible liquid.

(2) The requirements in this subchapter do not apply to a material classed as a combustible liquid in a non-bulk packaging unless the combustible liquid is a hazardous substance or a hazardous waste.

(3) A combustible liquid that is in a bulk packaging or a combustible liquid that is a hazardous substance or a hazardous waste is not subject to the requirements of this subchapter except those pertaining to:

(i) Shipping papers, waybills, switching orders, and hazardous waste manifests;

(ii) Marking of packages;

(iii) Display of identification numbers on bulk packages;

(iv) Placarding of bulk packagings;

(v) Carriage aboard aircraft and vessels (for packaging requirements for transport by vessel, see § 176.340 of this subchapter);

(vi) Reporting incidents as prescribed by § 171.15, 171.16 and 171.17 of this subchapter;

(vii) Packaging requirements of subpart B of this part; and

(viii) The requirements of §§ 173.1, 173.21, 173.24, 173.24a, 173.24b, 174.1, 177.804, 177.817, and 177.834 of this subchapter.

(4) A combustible liquid that is not a hazardous substance or a hazardous waste is not subject to the requirements of this subchapter if it is a mixture of one or more components that—

(i) Has a flash point at or above 93 °C (200 °F),

(ii) Comprises at least 99 percent of the volume of the mixture, and

(iii) Is not offered for transportation or transported as a liquid at a temperature at or above its flash point.

§ 173.151 Exceptions for Division 4.1 (flammable solids).

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table of this subchapter.

(b) *Limited quantities of Division 4.1 flammable solids.* Limited quantities of flammable solids (Division 4.1) in Packing Groups II and III are excepted from labeling, unless offered for transportation or transported by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of limited quantities are not subject to subpart F (Placarding) of part 172 of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For flammable solids in Packing Group II, inner packagings not over 1.0 kg (2.2 pounds) net capacity each, packed in strong outer packagings; and

(2) For flammable solids in Packing Group III, inner packagings not over 5.0 kg (11 pounds) net capacity each, packed in strong outer packagings

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section, and charcoal briquettes in packagings not exceeding 30 kg (66 pounds) gross weight, may be renamed "Consumer commodity" and reclassed as ORM–D material, if the material is a "consumer commodity" as defined in § 171.8 of this subchapter. In addition to the exceptions provided by paragraph (b) of this section, shipments are not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered for transportation or transported by aircraft, and are eligible for the exceptions provided in § 173.156.

§ 173.152 Exceptions for Division 5.1 (oxidizers) and Division 5.2 (organic peroxides).

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table of this subchapter.

(b) *Limited quantities.* Limited quantities of oxidizers (Division 5.1) in Packing Groups II and III and organic peroxides (Division 5.2) are excepted from labeling, unless offered or intended for transportation by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of these limited quantities are not subject to subpart F of part 172 (Placarding) of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For oxidizers in Packing Group II, inner packagings not over 1.0 L (0.3 gallon) net capacity each for liquids or not over 1.0 kg (2.2 pounds) net capacity each for solids, packed in strong outer packagings.

(2) For oxidizers in Packing Group III, inner packagings not over 4.0 L (1 gallon) net capacity each for liquids or not over 5.0 kg (11 pounds) net capacity each for solids, packed in strong outer packagings.

(3) For organic peroxides, inner packagings not over 30 ml (1.0 ounce) net capacity for liquids or 30 g (1.1 ounces) net capacity for solids, packed in strong outer packagings.

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section and is a "consumer commodity" as defined in § 171.8 of this subchapter, may be renamed "Consumer commodity" and reclassed as ORM–D material. In addition to the exceptions provided by paragraph (b) of this section, shipments are not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered for transportation or transported by aircraft, and are eligible for the exceptions provided in § 173.156.

§ 173.153 Exceptions for Division 6.1 (poisonous materials).

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table of this subchapter.

(b) *Limited quantities of Division 6.1 materials.* Limited quantities of poisonous materials (Division 6.1) in Packing Group III are excepted from the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of these limited quantities are not subject to subpart F of part 172 (Placarding) of this subchapter. Each package must

conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For poisonous liquids, inner packagings not over 4.0 L (1 gallon) net capacity each, packed in strong outer packagings; and

(2) For poisonous solids, inner packagings not over 5.0 kg (11 pounds) net capacity each, packed in strong outer packagings.

(c) *Consumer commodities.* The following provisions apply to consumer commodities:

(1) A limited quantity which conforms to the provisions of paragraph (b) of this section and is a "consumer commodity" as defined in § 171.8 of this subchapter, may be renamed "Consumer commodity" and reclassed as ORM–D material.

(2) A poisonous material which is a drug or medicine and is a "consumer commodity" as defined in § 171.8 of this subchapter, may be renamed "Consumer commodity" and reclassed as ORM–D material if packaged in a combination packaging not exceeding 30 kg (66 pounds) with inner packagings not over 250 ml (8 ounces) net capacity for liquids or 250 g (8.8 ounces) net capacity for solids packed in strong outer packagings. Each package must conform to the packaging requirements of subpart B of this part.

(3) Packages of ORM–D material are excepted from the specification packaging requirements of this subchapter and from the labeling requirements of subpart E of part 172 of this subchapter. Shipments of ORM–D material are eligible for the exceptions provided in § 173.156 and in paragraph (b) of this section and are not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered for transportation or transported by aircraft.

§ 173.154 Exceptions for Class 8 (corrosive materials).

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table of this subchapter.

(b) *Limited quantities.* Limited quantities of corrosive materials (Class 8) in Packing Groups II and III are excepted from labeling, unless offered or intended for transportation by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of these limited quantities are not subject to subpart F (Placarding) of part 172 of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For corrosive materials in Packing Group II, in inner packagings not over 1.0 L (0.3 gallon) net capacity each for liquids or not over 1.0 kg (2.2 pounds) net capacity each for solids, packed in strong outer packagings.

(2) For corrosive materials in Packing Group III, in inner packagings not over 4.0 L (1 gallon) net capacity each for liquids or not over 5.0 kg (11 pounds) net capacity each for solids, packed in strong outer packagings.

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section and is a "consumer commodity" as defined in § 171.8 of this subchapter may be renamed "Consumer commodity" and reclassed as ORM–D material. In addition to the exceptions provided by paragraph (b) of this section, shipments of ORM–D materials are not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered or intended for transportation by aircraft, and are eligible for the exceptions provided in § 173.156.

(d) *Materials corrosive to aluminum or steel only.* Except for a hazardous substance or a hazardous waste, a material classed as a Class 8, Packing Group III, material solely because of its corrosive effect on aluminum or on steel, is not subject to any other requirements of this subchapter when offered for transportation in, or transported by, motor vehicle or rail car in a packaging constructed of materials that will not react dangerously with or be degraded by the corrosive material.

§ 173.155 Exceptions for Class 9 (miscellaneous hazardous materials).

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table of this subchapter.

(b) *Limited quantities.* Limited quantities of miscellaneous hazardous materials (Class 9) are excepted from the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of these limited quantities are not subject to subpart F (Placarding) of part 172 of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For liquids, inner packagings not over 4.0 L (1 gallon) net capacity each, packed in strong outer packagings.

(2) For solids, inner packagings not over 5.0 kg (11 pounds) net capacity each, packed in strong outer packagings.

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section and is a "consumer commodity" as defined in § 171.8 of this subchapter, may be renamed "Consumer commodity" and reclassed as ORM–D material. In addition to the exceptions provided by paragraph (b) of this section, shipments of ORM–D materials are not subject to the shipping paper requirements of Subpart C of Part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered for transportation or transported by aircraft, and are eligible for the exceptions provided in § 173.156.

§ 173.156 Exceptions for ORM materials.

(a) Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the § 172.101 Table or in a packaging section in this part.

(b) *ORM–D.* Packagings for ORM–D materials are specified according to hazard class in §§ 173.150 through 173.155 and in § 173.306. In addition to other exceptions specified for ORM–D materials in this part, strong outer packagings as specified in this part and the marking requirements specified in § 172.316 of this subchapter are not required for materials classed as ORM–D when unitized in cages, carts or similar overpacks and when offered for transportation, or transported, by a private or contract motor carrier from a distribution center to a retail outlet.

Subpart E—Non-bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

§ 173.158 Nitric Acid

(a) Nitric acid exceeding 40 percent concentration may not be packaged with any other material.

(b) Nitric acid in any concentration which does not contain sulfuric acid or hydrochloric acid as impurities, when

offered for transportation or transported by rail, highway, or water shall be packaged in specification containers as follows:

(1) 1A1 stainless steel drums are authorized, subject to the following limitations:

(i) Stainless steel used in drums must conform to the following thicknesses:

Nominal (marked) capacity (in liters) of 1A1 drum	Minimum thickness (in millimeters) of stainless steel
55	0.9
115	1.2
210	1.5
450	2.0

(ii) Drums weighing less than 85 percent of their original tare weight may not be used.

(iii) Type 304 or other grades of equivalent corrosion-resistant steels in the as-welded condition are permissible for nitric acid concentrations up to and including 78 percent.

(iv) For all concentrations of nitric acid, the following are permissible:

(A) Type 304 heat-treated (quenched in water at 1040 °C (1900 °F)),

(B) Stabilized Type 347 in the as-welded condition,

(C) Stabilized Type 347 stress-relieved (345–900 °C (1550–1650 °F)),

(D) Stabilized Type 347 heat-treated (quenched in water at 1040 °C (1900 °F)), or

(E) Other grades of equivalent corrosion resistance.

(v) All parts of drum exposed to lading must be capable of withstanding the corrosive effect of nitric acid to the extent that 65 percent boiling nitric acid does not penetrate the metal more than 0.0361 mm (0.002 inches) per month. (ASTM A 262–66 may be used for a suitable corrosion test procedure.)

(vi) In addition to marking required by § 178.503 of this subchapter, the following marks, in lettering of at least 12.7 mm (0.5 inch) height, must be placed on drums used to transport nitric acid:

(A) The type of steel used in body and head sheets as identified by American Iron and Steel Institute type number, and, in addition, the letters "HT" following the steel designation on containers subject to stress relieving or heat treatment during manufacture.

(B) The thickness in millimeters of metal in thinnest part. When the thickness of metal in the body differs from that in the head, both must be indicated with slanting line between and with the gauge of the body indicated first.

(C) Original tare weight in kilograms, preceded by the letters "TW."

An example of the markings required by paragraphs (b)(1)(vi) (A), (B), and (C) of this section is "304HT/1.9/2.7/TW55."

(2) 4H1 expanded plastics outer packagings with glass inner receptacles of not greater than 2.5 L (0.66 gallon) capacity each. No more than four 2.5 L (0.66 gallon) inner receptacles may be packed in one outer packaging.

(c) Nitric acid of 80 percent or greater concentration which does not contain sulfuric acid or hydrochloric acid as impurities, when offered for transportation or transported by rail, highway, or water may be packaged in 1B1 aluminum drums.

(d) Nitric acid of 90 percent or greater concentration, when offered for transportation or transported by rail, highway, or water may be packaged in 4C1, 4C2, 4D or 4F wooden boxes with inner packagings consisting of glass bottles further individually overpacked in tightly closed metal packagings. Glass bottles must be of 2.5 L (0.66 gallon) or less capacity and cushioned within the metal packagings.

(e) Nitric acid of less than 90 percent concentration, when offered for transportation or transported by rail, highway, or water may be packaged in 4C1, 4C2, 4D or 4F wooden boxes with inside glass packagings of not over 2.5 L (0.66 gallon) capacity each.

(f) Nitric acid of 70 percent or less concentration, when offered for transportation or transported by rail, highway, or water, may be packaged as follows:

(1) In composite packagings 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PH1, or 6PH2.

(2) In 4H1 expanded plastic boxes with inner glass packagings of not over 2.5 L (0.66 gallon) each.

(g) Nitric acid of more than 70 percent concentration, when offered for transportation or transported by cargo aircraft only, must be packaged in combination packagings with 1A2, 1B2, 1D, 1G, 1H2, 3H2, 4C1, 4C2, 4D, 4F or 4G outer packagings with glass or earthenware inner packagings of not over 1 L (0.3 gallon) or glass ampoules of not over 0.5 L (0.1 gallon).

(h) Nitric acid of less than 70 percent concentration, when offered for transportation in cargo aircraft only must be packaged in combination packagings with 1A2, 1B2, 1D, 1G, 1H2, 3H2, 4C1, 4C2, 4D, 4F or 4G outer packagings with inner packagings of—

(1) Glass or earthenware not over 2.5 L (0.66 gallon) capacity;

(2) Plastic not over 2.5 L (0.66 gallon) capacity; or

(3) Glass ampoule not over 0.5 L (0.1 gallon) capacity.

§ 173.159 Batteries, wet.

(a) Electric storage batteries, containing electrolyte acid or alkaline corrosive battery fluid, must be completely protected so that short circuits will be prevented; they may not be packed with other materials except as provided in §§ 173.220 and 173.222 of this part and paragraph (h) of this section.

(b) The following specification packagings are authorized for batteries packed without other materials:

(1) 4C1, 4C2, 4D, or 4F wooden boxes.

(2) 4G fiberboard boxes.

(c) The following non-specification packagings are authorized for batteries packed without other articles:

(1) Electric storage batteries protected against short circuits and firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation, are authorized for transportation by rail, highway, or water. The height of the completed unit must not exceed 1½ times the width of the skid or pallet. The unit must be capable of withstanding, without damage, a superimposed weight equal to two times the weight of the unit or, if the weight of the unit exceeds 907 kg (2000 pounds), a superimposed weight of 1814 kg (4000 pounds). Battery terminals must not be relied upon to support any part of the superimposed weight.

(2) Electric storage batteries weighing 225 kg (500 pounds) or more, consisting of carriers' equipment, may be shipped by rail when mounted on suitable skids and protected against short circuits. Such shipments may not be offered in interchange service.

(3) One to three batteries not over 11.3 kg (25 pounds) each packed in outer boxes. The maximum authorized gross weight is 34 kg (75 pounds)

(4) Not more than four batteries not over 7 kg (15 pounds) each, packed in strong outer fiberboard or wooden boxes. Batteries must be securely cushioned and packed to prevent short circuits. The maximum authorized gross weight is 30 kg (65 pounds).

(5) Not more than five batteries not over 4.5 kg (10 pounds) each, packed in strong outer fiberboard or wooden boxes. Batteries must be securely cushioned and packed to prevent short circuits. The maximum authorized gross weight is 30 kg (65 pounds).

(6) Single batteries not exceeding 34 kg (75 pounds) each, packed in 5-sided slip covers or in completely closed fiberboard boxes. Slip covers and boxes must be of solid or double-faced corrugated fiberboard of at least 91 kg (200 pounds) Mullen test strength. The

slip cover or fiberboard box must fit snugly and provide inside top clearance of at least 1.3 cm (0.5 inch) above battery terminals and filler caps with reinforcement in place. Assembled for shipment, the bottom edges of the slipcover must come to within 2.5 cm (1 inch) of the bottom of the battery. The completed package (battery and box or slip cover) must be capable of withstanding a top-to-bottom compression test of at least 225 kg (500 pounds) without damage to battery terminals, cell covers or filler caps.

(7) Single batteries exceeding 34 kg (75 pounds) each may be packed in completely closed fiberboard boxes. Boxes must be of double-wall corrugated fiberboard of at least 181 kg (400 pounds) test, or solid fiberboard testing at least 181 kg (400 pounds); a box may have hand holes in its ends provided that the handholes will not materially weaken the box. Sides and ends of the box must have cushioning between the battery and walls of the box; combined thickness of cushioning material and walls of the box must not be less than 1.3 cm (0.5 inch); and cushioning must be excelsior pads, corrugated fiberboard, or other suitable cushioning material. The bottom of the battery must be protected by a minimum of one excelsior or double-wall corrugated fiberboard pad. The top of the battery must be protected by a wood frame, corrugated trays or scored sheets of corrugated fiberboard having minimum test of 91 kg (200 pounds), or other equally effective cushioning material. Top protection must bear evenly on connectors and/or edges of the battery cover to facilitate stacking of batteries. No more than one battery may be placed in one box. The maximum authorized gross weight is 91 kg (200 pounds).

(d) Nonspillable wet electric storage batteries capable of withstanding the following two tests without leakage of battery fluid are excepted from all other requirements of this subchapter when protected against short circuits and securely packaged:

(1) *Vibration test.* The battery must be rigidly clamped to the platform of a vibration machine, and a simple harmonic motion having an amplitude of 0.8 mm (0.03 inches), with a 1.6 mm (0.063 mm) maximum total excursion must be applied. The frequency must be varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return must be traversed in 95±5 minutes for each mounting position (direction of vibrator) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

(2) *Pressure differential test.* Following the vibration test, the battery must be stored for six hours at 24 °C±4 °C (75 °F±7 °F) while subjected to a pressure differential of at least 88 kPa (13 psi). The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

(e) Electric storage batteries containing electrolyte or corrosive battery fluid are not subject to the requirements of this subchapter for transportation by highway or rail if all of the following requirements are met:

(1) No other hazardous materials may be transported in the same vehicle;

(2) The batteries must be loaded or braced so as to prevent damage and short circuits in transit;

(3) Any other material loaded in the same vehicle must be blocked, braced, or otherwise secured to prevent contact with or damage to the batteries; and

(4) The transport vehicle may not carry material shipped by any person other than the shipper of the batteries.

(f) Electric storage batteries, containing electrolyte or corrosive battery fluid in a coil from which it is injected into the battery cells by a gas generator and initiator assembled with the battery, and which are nonspillable under the criteria of paragraph (d) of this section, are excepted from other requirements of this subchapter when examined by the Bureau of Explosives and approved by the Associate Administrator for Hazardous Materials Safety.

(g) Electrolyte, acid, or alkaline corrosive battery fluid, packed with storage batteries wet or dry, must be packed in one of the following specification packagings:

(1) In 4C1, 4C2, 4D, or 4F wooden boxes with inner receptacles of glass, not over 4.0 L (1 gallon) each with not over 8.0 L (2 gallons) total in each outside container. Inside containers must be well-cushioned and separated from batteries by a strong solid wooden partition. The completed package must conform to Packing Group III requirements.

(2) Electrolyte, acid, or alkaline corrosive battery fluid included with storage batteries and filling kits may be packed in strong plywood or wooden boxes when shipments are made by, for, or to the Departments of the Army, Navy, or Air Force of the United States. Packagings must conform to military specifications. The electrolyte, acid, or alkaline corrosive battery fluid must be packed in polyethylene bottles of not over 1.0 L (0.3 gallon) capacity each. Not more than 24 bottles, securely separated from storage batteries and kits, may be offered for transportation or transported in each package.

(3) In 4G fiberboard boxes with not more than 12 inside packagings of polyethylene or other material resistant to the lading, each not over 2.0 L (0.5 gallon) capacity each. Completed packages must conform to Packing Group III requirements. Inner packagings must be adequately separated from the storage battery. The maximum authorized gross weight is 29 kg (64 pounds). These packages are not authorized for transportation by aircraft.

(h) Dry storage batteries or battery charger devices may be packaged in 4G fiberboard boxes with inner receptacles containing battery fluid. Completed packagings must conform to Packing Group III requirements. Not more than 12 inner receptacles may be packed in one outer box. The maximum authorized gross weight is 34 kg (75 pounds).

§ 173.160 Bombs, smoke, non-explosive (corrosive).

Bombs, smoke, non-explosive may be shipped provided they are without ignition elements, bursting charges, detonating fuses or other explosive components. They must be packaged in wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes, or plywood drums (1D), which meet Packing Group II requirements.

§ 173.161 Chemical kits.

(a) Except as otherwise provided, chemical kits must be packed, marked, and labeled as prescribed by this subchapter for the specific corrosive materials contained therein.

(b) Chemical kits containing limited quantities of corrosive liquids in inner receptacles of not over 177 ml (6 fluid ounces) capacity each are excepted from labeling (except when offered for transportation or transported by air) and the specification packaging requirements of this subchapter if all of the following requirements are met:

(1) The kit may contain only corrosive liquids for which packaging exceptions are provided in the § 172.101 Table.

(2) This kit must be a strong wooden or metal outer packaging, or must be packed in a strong wooden or metal packaging.

(3) The corrosive liquids must be cushioned with sufficient absorbent material to completely absorb the contents of the individual containers.

and must be protected from damage by other materials in the kit.

(4) The contents of the kit must be of a nature and packed so there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

In addition, chemical kits meeting these requirements are not subject to subpart F of part 172 of this subchapter (Placarding), to part 174 (Carriage by rail) of this subchapter except § 174.24 (Shipping papers), and to part 177 (Carriage by highway) of this subchapter except § 177.817 (Shipping papers).

(c) Except as provided in paragraph (b) of this section, chemical kits must be packed in 4G fiberboard boxes with inner glass receptacles of not over 1 L (0.3 gallon) capacity each, securely cushioned and separated from other inside containers. The contents of the kit must be of such a nature and so packed that there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

§ 173.162 Gallium.

Gallium metal must be packaged in packagings intended to contain liquids consisting of semi-rigid plastic inner packagings of not more than 2.5 kg (5.5 pounds) net capacity each, individually enclosed in a sealed leak-tight bag of strong puncture-resistant material. The sealed bags must be packed in wooden (4C1, 4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G) or plastic (4H1, 4H2) boxes or in fiber (1G) or steel (1A2) drums, which are lined with leak-tight, puncture-resistant material. Bags and liner material must be chemically resistant to gallium. In order to maintain the gallium in a completely solid state, the above packaging may be overpacked in a strong, water-resistant outer packaging which contains dry ice or other means of refrigeration. If a refrigerant is used, all of the above materials used in the packaging of gallium must be chemically and physically resistant to the refrigerant and must have impact resistance at the low temperatures of the refrigerant employed. If dry ice is used, the outer packaging must permit the release of carbon dioxide gas. Completed packaging must meet Packing Group I requirements for transportation by aircraft and Packing Group III requirements for transportation by vessel.

§ 173.163 Hydrogen fluoride.

Hydrogen fluoride (hydrofluoric acid, anhydrous) must be offered for transportation or transported in Specification 3, 3A, 3AA, 3B, 3C, 3E, 4, 4A, 25, or 38 cylinders; or Specification 4B, 4BA, 4BW or 4C cylinders, if they are not brazed. Filling density must not exceed 85 percent of the water weight capacity of the cylinder. Cylinders used exclusively in this service may, in lieu of the periodic hydrostatic retest required by § 173.34(e), be given a complete external visual inspection as described in CGA Pamphlet C-6, at the time such periodic retest becomes due. Such inspections shall be made on cylinders cleaned to bare metal. The results shall be recorded on a data sheet, completed copies of which shall be kept as prescribed in § 173.34(e)(5). Items which must be checked and recorded on these data sheets are: Date of inspection (month and year); DOT specification number; cylinder identification (registered symbol and serial number, date of manufacture, and if needed for adequate identification, ownership symbol); tare weight; physical condition (record specifically any leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged footring or protective ring or fire damage); disposition of cylinders (returned to service, to cylinder manufacturer for repairs, or scrapped). A cylinder which passes the inspection prescribed must have the data recorded in the manner presently prescribed for the recording of the retest date except that an "E" is to follow the date (month and year) indicating requalification by the external inspection method. Cylinders removed from this service for any reason must be rendered unfit for any other regulated service.

§ 173.164 Mercury (metallic and articles containing mercury).

(a) For transportation by aircraft, mercury must be packaged in packagings which meet the requirements of part 178 of this subchapter at the Packing Group I performance level, as follows:

(1) Earthenware or glass or suitable plastic inner packagings of not more than 250 ml (8 ounces) capacity each, packed in steel drums (1A2), steel jericans (3A2), wooden (4C1, 4C2), plywood (4D), fiberboard (4G) or reconstituted wood (4F) boxes, plywood drums (1D) or fiber drums (1G) with sufficient cushioning material to prevent breakage. Either the inner packagings or the outer packagings must have inner linings or bags of strong leakproof and puncture-resistant material impervious to mercury, completely surrounding the contents, which will prevent the escape of mercury from the package irrespective of its position.

(2) Iron or steel "quicksilver flasks" packaged in steel drums (1A2), steel jericans (3A2), wooden (4C1, 4C2), plywood (4D), fiberboard (4G) or reconstituted wood (4F) boxes, plywood drums (1D) or fiber drums (1G) with leakproof linings as in paragraph (a)(1) of this section.

(3) Welded steel bottles with inner vaulted bottoms as single packagings. The closure must be a bolt with a conical thread, and the opening must not exceed 20 mm (0.79 inches). The maximum net mass must not exceed 35 kg (77 pounds).

(b) Manufactured articles or apparatuses containing mercury are excepted from the specification packaging requirements of this subchapter when packaged as follows:

(1) Manufactured articles or apparatuses of which metallic mercury is a component part, such as manometers, pumps, thermometers, switches, etc. (for electron tubes, mercury vapor tubes and similar tubes, see paragraph (b)(2) of this section), must be in strong outer packagings, having sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position. Mercury switches and relays are excepted from these requirements, if they are of the totally enclosed leakproof type in sealed metal or plastic units. Thermometers, switches and relays, each containing a total quantity of not more than 15 g (0.53 ounces) of mercury, are also excepted if installed as an integral part of a machine or apparatus and so fitted that shock of impact damage, leading to leakage of mercury, is unlikely to occur under conditions normally incident to transport:

(2) Electron tubes, mercury vapor tubes and similar tubes must be packaged as follows:

(i) Tubes which are packed in strong outer packagings with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the package, are authorized up to a total net quantity of 450 g (15.9 ounces) of mercury per package;

(ii) Tubes with more than 450 g (15.9 ounces) of mercury are authorized only when packed in strong outer packagings, having sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury which will prevent escape of mercury from the package irrespective of its position;

(iii) Tubes which do not contain more than 5 g (0.2 ounce) of mercury each and which are packed in the manufacturer's original packagings, are authorized up to

a total net quantity of 30 g (1.1 ounces) of mercury per package;

(iv) Tubes which are completely jacketed in sealed leakproof metal cases are authorized in the manufacturer's original packagings;

(3) A person offering for transportation electron tubes, mercury vapor tubes, and similar tubes shall indicate the quantity of mercury therein on the shipping paper.

(4) Mercurial barometers conforming to paragraph (b)(1) of this section, which are loaded and unloaded from an aircraft under the supervision of, and accompanied in flight by, a National Weather Service official or similar United States agency official, are excepted from any other requirements of this subchapter.

(c) For transportation by other than aircraft, mercury must be packaged—

(1) In any packaging which meets the requirements of part 178 of this subchapter at the Packing Group III performance level; or

(2) In non-specification reusable metal packagings.

(d) Except for a hazardous substance or a hazardous waste or for transportation by aircraft or vessel, packages containing less than 0.45 kg (1.0 pound) net weight of mercury are not subject to the requirements of this subchapter.

§ 173.171 Smokeless powder for small arms.

Smokeless powder for small arms may be classed as a flammable solid, for transportation by highway and rail only, subject to the following conditions:

(a) The smokeless powder must be examined for this classification as required by § 173.56;

(b) The total quantity of smokeless powder in one rail car or motor vehicle may not exceed 45.4 kg (100 pounds) net mass; and

(c) Only combination packagings with inner packagings not exceeding 3.6 kg (8 pounds) net mass are authorized. Inner packagings must be arranged and protected so as to prevent simultaneous ignition of the contents. The complete package must be a type which has been examined as required in § 173.56 of this part.

§ 173.172 Aircraft hydraulic power unit fuel tank.

Aircraft hydraulic power unit fuel tanks containing a mixture of anhydrous hydrazine and monomethyl hydrazine (M86 fuel) and designed for installation as complete units in aircraft are excepted from the specification packaging requirements of this subchapter when they conform to either of the following conditions:

(a) The unit must consist of an aluminum pressure vessel made from tubing and having welded heads. Primary containment of the fuel within this vessel must consist of a welded aluminum bladder having a maximum internal volume of 46 L (12 gallons). The outer vessel must have a minimum design gauge pressure of 1,275 kPa (185 psi) and a minimum burst gauge pressure of 2,755 kPa (400 psi). Each vessel must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 L (11 gallons); or

(b) The unit must consist of an aluminum pressure vessel. Primary containment of the fuel within this vessel must consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 L (12 gallons). The pressure vessel must have a minimum design gauge pressure of 5,170 kPa (750 psi). Each vessel must be leak-checked during manufacture and before shipment and must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 L (11 gallons).

§ 173.173 Paint, paint-related material, adhesives and ink.

(a) When the § 172.101 Table specifies that a hazardous material be packaged under this section, the following requirements apply. Except as otherwise provided in this part, the description "Paint" is the proper shipping name for paint, lacquer, enamel, stain, shellac, varnish, liquid aluminum, liquid bronze, liquid gold, liquid wood filler, and liquid lacquer base. The description "Paint-related material" is the proper shipping name for a paint thinning, reducing or removing compound. However, if a more specific description is listed in the § 172.101 Table of this subchapter, that description must be used.

(b) Paint, paint-related material, adhesives and ink must be packaged as follows:

(1) As prescribed in § 173.202 of this part if it is a Packing Group II material or § 173.203 of this part if it is a Packing Group III material; or

(2) In inner glass packagings of not over 1 L (0.3 gallon) capacity each or inner metal packagings of not over 5 L (1 gallon) each, packed in a strong outer packaging. Packages must conform to the packaging requirements of subpart B of this part but need not conform to the requirements of part 178 of this subchapter.

§ 173.174 Refrigerating machines.

A refrigerating machine assembled for shipment and containing 7 kg (15 pounds) or less of a flammable liquid for its operation in a strong, tight receptacle is excepted from labeling (except when offered for transportation or transported by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to subpart F of part 172 of this subchapter (Placarding), to part 174 of this subchapter (Carriage by rail) except § 174.24 (Shipping papers) and to part 177 (Carriage by highway) of this subchapter except § 177.817 (Shipping papers).

§ 173.181 Pyrophoric materials (liquids).

When the § 172.101 Table specifies that a hazardous material be packaged under this section, only the following non-bulk packagings are authorized:

(a) Specification steel or nickel cylinders prescribed for any compressed gas except acetylene having a minimum design pressure of 1206 kPa (175 psi). Cylinders with valves must be:

(1) Equipped with steel valve protection caps or collars, unless overpacked; or

(2) Overpacked in a wooden box (4C1, 4C2, 4D or 4F); fiberboard box (4G), or plastic box (4H1 or 4H2). Cylinders must be secured to prevent movement in the box and, when offered for transportation or transported, must be so loaded that pressure relief devices remain in the vapor space of the cylinder. (See §§ 173.34(d)(7), 174.430 and 177.838(h) of this subchapter.)

(b) Wooden boxes (4C1, 4C2, 4D, or 4F) or fiberboard boxes (4G) enclosing not more than four strong, tight metal cans with inner receptacles of glass or metal, not over 1 L (0.3 gallon) capacity each, having positive screwcap closures adequately gasketed. Inner packagings must be cushioned on all sides with dry, absorbent, incombustible material in a quantity sufficient to absorb the entire contents. The strong, tight metal cans must be closed by positive means, not by friction.

(c) Steel drums (1A2) not exceeding 220 L (58 gallons) capacity each with inner metal cans not over 4.0 L (1 gallon) capacity each, constructed of not less than 0.379 mm (0.015 inch) nominal

thickness electro-coated tin plate closed by positive means, not friction.

(1) Inner packagings must have no opening exceeding 25 mm (1 inch) diameter and must be surrounded with noncombustible cushioning material.

(2) Net quantity of pyrophoric liquids may not exceed two-thirds of the rated capacity of the outer drum. For example, a 220 L (58 gallons) outer drum may contain no more than 147 L (39 gallons) of pyrophoric liquids.

(3) Each layer of inner containers must be separated by a tin plate separator in addition to cushioning material.

§ 173.182 Barium azide—50 percent or more water wet.

Barium azide—50 percent or more water wet, must be packed in wooden boxes (4C1, 4C2, 4D, or 4F) or fiber drums (1G) with inner glass packagings not over 0.5 kg (1.1 pounds) capacity each. Packagings must have rubber stoppers wire tied for securement. If transportation is to take place when and where freezing weather is possible, a suitable antifreeze solution must be used to prevent freezing. Each packaging must conform to the requirements of part 178 of this subchapter at the Packing Group I performance level.

§ 173.183 Nitrocellulose base film.

Films, nitrocellulose base, must be packaged in packagings conforming to the requirements of part 178 of this subchapter at the Packing Group III performance level, as follows:

(a) In steel drums (1A2), aluminum drums (1B2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes or plywood drums (1D) with each reel in a tightly closed metal can or strong cardboard or fiberboard inner packaging with cover held in place by adhesive tape or paper; or

(b) In fiberboard (4G) boxes or fiber drums (1G) with a single tightly closed metal can or strong cardboard or fiberboard inner packaging with cover held in place by adhesive tape or paper; authorized only for not over 600 m (1969 feet) of film.

§ 173.184 Highway or rail fusee.

(a) A fusee is a device designed to burn at a controlled rate and to produce visual effects for signaling purposes. The composition of the fusee must be such that the fusee will not ignite spontaneously or undergo marked decomposition when subjected to a temperature of 75 °C (167 °F) for 48 consecutive hours.

(b) Fusees (highway and railway) must be packaged in steel drums (1A2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes or in fiberboard boxes (4G), plywood (1D) or fiber (1G) drums. If the fusees are equipped with spikes packagings must have reinforced ends to prevent penetration of spikes through the outer packagings; packages must be capable of passing drop test requirements (§ 178.603 of this subchapter), including at least one drop with spike in a downward position, and other requirements of part 178 of this subchapter, at the Packing Group II performance level.

§ 173.185 Lithium batteries and cells.

(a) Except as otherwise provided in this subpart, lithium batteries and cells described in this section are authorized for transportation by highway, rail, vessel and cargo-only aircraft. Rechargeable lithium batteries and cells and devices containing regulated lithium batteries and cells may not be transported except as approved by the Associate Administrator for Hazardous Materials Safety.

(b) No cell may contain more than 12 g (0.42 ounce) of lithium or lithium alloy.

(c) Each cell and battery must be equipped with an effective means of preventing external short circuits.

(d) Each cell and battery must incorporate a safety venting device or be designed in a manner that will preclude a violent rupture when subject to an incident in transportation, such as a dead short.

(e) Batteries containing cells or series of cells connected in parallel must be equipped with diodes to prevent reverse current flow.

(f) Except as provided in paragraph (j) of this section, cells or batteries may not be offered for transportation or transported if any cell has been discharged to the extent that the open circuit voltage is less than two volts or is less than ⅔ of the voltage of the fully charged cell, whichever is less.

(g) Lithium cells and batteries must be packaged in packagings conforming to the requirements of part 178 of this subchapter at the Packing Group II performance level, as follows:

(1) In strong inner fiberboard packagings containing not more than 500 g (17.6 ounces) of lithium per inner packaging.

(2) For transportation by water, rail or highway, inner packagings must be packed within a wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), fiber drum (1G), or metal drum (1A2 or 1B2).

(3) Except as provided in paragraph (h)(3) of this section, for transportation by cargo-only aircraft, the inner packaging must be packed in a steel drum (1A2) with a gas tight gasket. The maximum gross weight of the package must not exceed 35 kg (77 pounds).

(4) When the outer packaging is a metal drum, inner packagings must be separated from each other and from the outer packaging by at least 25 mm (1 inch) of non-combustible cushioning material.

(h) Lithium batteries and cells must be tested as follows:

(1) The cell or battery must be subjected to a thermal stability test at 75 °C (167 °F) for 48 hours and must show no evidence of distortion, leakage or internal heating. This test must be performed on at least 10 cells and 1 battery of each type taken from each week's production, or as otherwise approved by the Associate Administrator for Hazardous Materials Safety.

(2) Under application of a direct short, the cell or battery must be rendered inert, preferably without venting (through the use of internal fusing devices). If venting does occur, an open flame must be applied to the venting fumes to prove that an explosive condition does not exist. This test must be performed on at least 3 cells and 1 battery of each type taken from each week's production, or as otherwise approved by the Associate Administrator for Hazardous Materials Safety.

(3) Cells containing no more than 12 g (0.42 ounce) of lithium metal which are hermetically sealed, and batteries constructed of such cells, are excepted from the tests in paragraphs (h) (1) and (2) of this section and the requirement to use a 1A2 steel drum for transportation by cargo aircraft only as an outer packaging provided that:

(i) The outer packaging conforms to paragraph (g)(2) of this section; and

(ii) Prior to the first shipment, 10 cells or 4 batteries of each type to be offered for transportation, or as otherwise approved by the Associate Administrator for Hazardous Materials Safety must be tested as follows, without showing any evidence of outgassing, leakage, loss of weight or distortion:

(A) The cells or batteries must be stored for 6 hours at an absolute pressure of 11.6 kPa (1.68 psi) and a temperature of 24 °C±4 °C; (75 °F±7 °F).

(B) The cells or batteries must then be subjected to the thermal stability test at 75 °C (167 °F) for 48 hours as required in paragraph (h)(1) of this section;

(C) The cells or batteries must be rigidly clamped to the platform of a vibration machine. A simple harmonic motion having an amplitude of 0.7 mm

(0.03 inch) (1.4 mm (0.06 inch) maximum total excursion) must be applied. The frequency must be varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return must be traversed in 95±5 minutes for each of three mutually perpendicular mounting positions of the battery and two perpendicular positions of the cells. One of the directions of vibration must be perpendicular to the terminal face of the battery or cell. Open circuit voltage must be observed for 30 seconds during the last quarter of each vibration period. Periodic retesting is not required;

(D) The battery must be secured to a shock testing machine by means of a rigid mount which will support all mounting surfaces of the battery. Each battery must be subjected to a total of three shocks of equal magnitude. The shocks must be applied in each of three mutually perpendicular directions. Each shock must be applied in a direction normal to a face of the battery. For each shock, the battery must be accelerated in such a manner that during the first 3 milliseconds the minimum average acceleration is 75 g (where g is the local acceleration due to gravity). The peak acceleration must be between 125 g and 175 g.

(i) Lithium batteries and cells are not subject to this subpart, if they meet the following requirements:

(1) Each cell with a liquid cathode may contain no more than 0.5 g (0.02 ounce) of lithium or lithium alloy, and each cell with a solid cathode may contain no more than 1.0 g (0.04 ounce) lithium or lithium alloy.

(2) Each battery with a solid cathode may contain an aggregate quantity of no more than 2.0 g (0.07 ounce) of lithium or lithium alloy, and each battery with a liquid cathode may contain an aggregate quantity of no more than 1.0 g (0.04 ounce) lithium or lithium alloy.

(3) Each cell must be hermetically sealed.

(4) Cells must be separated so as to prevent short circuits.

(5) Batteries must be separated so as to prevent short circuits and must be packed in strong packagings, except when installed in electronic devices.

(6) If a liquid cathode battery contains more than 0.5 g (0.02 ounce) of lithium or lithium alloy or a solid cathode battery contains more than 1.0 g (0.04 ounce) lithium or lithium alloy, it may not contain a liquid or gas that is a hazardous material according to this subchapter unless the liquid or gas, if free, would be completely absorbed or neutralized by other materials in the battery.

(j) Lithium batteries, for disposal, comprised of one or more cells, may be offered for transportation or transported to a permitted storage facility and disposal site by motor vehicle only, if the battery—

(1) When new, contained not more than 12.0 g (0.42 ounces) of lithium per cell;

(2) Is equipped with an effective means of preventing external short circuits; and

(3) Is packed in a strong outer packaging conforming to the requirements of §§ 173.24 and 173.24a. The packaging need not conform to performance requirements of part 178 of this subchapter.

§ 173.186 Matches.

(a) Matches must be of a type which will not ignite spontaneously or undergo marked decomposition when subjected for 8 consecutive hours to a temperature of 93 °C (200 °F).

(b) *Definitions.* (1) "Fusee matches" are matches the heads of which are prepared with a friction-sensitive igniter composition and a pyrotechnic composition which burns with little or no flame, but with intense heat.

(2) *Safety matches* are matches combined with or attached to the box, book or card that can be ignited by friction only on a prepared surface.

(3) *Strike anywhere* matches are matches that can be ignited by friction on a solid surface.

(4) *Wax "Vesta"* matches are matches that can be ignited by friction either on a prepared surface or on a solid surface.

(c) Safety matches and wax 'Vesta' matches must be tightly packed in securely closed inner packagings to prevent accidental ignition under conditions normally incident to transportation, and further packed in outer fiberboard, wooden, or other equivalent-type packagings. These matches in outer packagings not exceeding 23 kg (50 pounds) gross weight are not subject to any other requirement (except marking) of this subchapter. These matches may be packed in the same outer packaging with materials not subject to this subchapter.

(d) Strike-anywhere matches may not be packed in the same outer packaging with any material other than safety matches or wax 'Vesta' matches, which must be packed in separate inner packagings.

(e) Packagings. Strike-anywhere matches must be tightly packed in securely closed chipboard, fiberboard, wooden, or metal inner packagings to prevent accidental ignition under conditions normally incident to transportation. Each inner packaging may contain no more than 700 strike-anywhere matches and must be packed in outer steel drums (1A2), aluminum drums (1B2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D), reconstituted wood (4F) or fiberboard (4G) boxes, plywood (1D) or fiber (1G) drums. Gross weight of fiberboard boxes (4G) must not exceed 27 kg (60 pounds). Gross weight of other outer packagings must not exceed 45 kg (100 pounds).

§ 173.187 Pyrophoric solids, metals or alloys, n.o.s.

Packagings for pyrophoric solids, metals, or alloys, n.o.s. must conform to the requirements of part 178 of this subchapter at the packing group performance level specified in the § 172.101 Table. These materials must be packaged as follows:

(a) In wooden boxes (4C1, 4C2, 4D, or 4F) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 15 kg (33 pounds) each.

(b) In steel drums (1A1 or 1A2) with a gross mass not exceeding 150 kg (331 pounds) per drum.

(c) In fiberboard boxes (4G) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 7.5 kg (17 pounds) each.

(d) In fiber drums (1G) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 15 kg (33 pounds) each.

(e) In plywood drums (1D) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 15 kg (33 pounds) each.

§ 173.188 White or yellow phosphorus.

Phosphorus, white or yellow, when offered for transportation or transported by rail, highway, or water, must be packaged in water or dry in packagings conforming to the requirements of part 178 of this subchapter at the Packing Group I performance level, as follows:

(a) When placed in water, it must be packaged in specification packagings as follows:

(1) Wooden boxes (4C1, 4C2, 4D, or 4F) with:

(i) inner hermetically sealed (soldered) metal cans, enclosed in other hermetically sealed (soldered) metal cans, or

(ii) inner water-tight metal cans containing not over 0.5 kg (1 pound) of phosphorus with screw-top closures; or

(2) Steel drums (1A1 or 1A2) not over 115 L (30 gallons) capacity each.

(b) When dry, it must be cast solid and shipped in packagings as follows:

(1) Steel drums (1A2) not over 115 L (30 gallons) capacity each, or

(2) In projectiles or bombs when shipped by, for, or to the Departments of the Army, Navy, or Air Force of the United States Government, without bursting elements.

§ 173.192 Packaging for certain Packing Group I poisonous materials.

When § 173.101 of this subchapter specifies that a poisonous material be packaged under this section, only specification cylinders are authorized, as follows:

(a) Specification 3A1800, 3AA1800, 3AL1800, 3D, 3E1800, or 33 cylinders, under the following conditions:

(1) Specification 3A, 3AA and 3AL cylinders may not exceed 57 kg (125 pounds) water capacity (nominal).

(2) Specification 3D and 33 cylinders may not exceed 127 kg (280 pounds) water capacity (nominal).

(3) Specification 3AL cylinders containing arsine or phosphine may only be offered for transportation or transported by highway and rail.

(b) Packagings must conform to the requirements of § 173.40 of this part.

(c) For cylinders used for phosgene,

(1) The filling density may not exceed 125 percent;

(2) A cylinder may not contain more than 68 kg (150 pounds) of phosgene; and

(3) Each filled cylinder must be tested for leakage before it is offered for transportation or transported and must show absolutely no leakage; this test must consist of immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 66 °C (150 °F) for at least 30 minutes, during which time frequent examinations must be made to note any escape of gas. The valve of the cylinder must not be loosened after this test and before the cylinder is offered for transportation or transported.

§ 173.193 Bromoacetone, methyl bromide, chloropicrin and methyl bromide or methyl chloride mixtures, etc.

(a) Bromoacetone must be packaged as follows in wooden boxes (4C1, 4C2, 4D or 4F) with inner glass receptacles or tubes in hermetically sealed metal receptacles in corrugated fiberboard cartons. Bottles may not contain over 500 g (17.6 ounces) of liquid each and must be cushioned in cans with at least 12.7 mm (0.5 inch) of absorbent material. Total amount of liquid in the outer box must not exceed 11 kg (24 pounds). Packagings must conform to the requirements of part 178 of this subchapter at the Packing Group I performance level.

(b) Bromoacetone, methyl bromide, chloropicrin and methyl bromide mixtures, chloropicrin and methyl chloride mixtures, and chloropicrin mixtures charged with non-flammable, non-liquefied compressed gas must be packed in Specification 3A, 3AA, 3B, 3C, 3E, 4A, 4B, 4BA, 4BW, or 4C cylinders having not over 113 kg (250 pounds) water capacity (nominal).

(c) Cylinders must conform to § 173.40.

§ 173.194 Gas identification sets.

Gas identification sets containing poisonous material must be packaged in packagings conforming to the requirements of part 178 of this subchapter at the Packing Group I performance level, as follows:

(a) In glass inner receptacles, hermetically sealed, of not over 40 ml (1.4 fluid ounces) each. Each glass inner receptacle must in turn be placed in a sealed fiberboard receptacle, cushioned with absorbent material. Not more than 12 fiberboard receptacles must in turn be placed in a 4G fiberboard box. No more than four boxes, well-cushioned, may in turn be placed in a steel cylinder. The cylinder must have a wall thickness of at least 3.7 mm (0.146 inch) and must have a hermetically sealed steel closure.

(b) When the poisonous material is absorbed in a medium such as activated charcoal or silical gel, gas identification sets may be shipped as follows:

(1) If the poisonous material does not exceed 5 ml (0.2 fluid ounce) if a liquid or 5 g (0.2 ounce) if a solid, it may be packed in glass inner receptacles of not over 120 ml (4.1 fluid ounces) each. Each glass receptacle, cushioned with absorbent material must be packed in a hermetically sealed metal can of not less than 0.30-mm (0.012 inch) wall thickness. Metal cans, surrounded on all sides by at least 25 mm (1 inch) of dry sawdust, must be packed in 4C1, 4C2, 4D or 4F wooden boxes. Not more than 100 ml (3.4 fluid ounces) or 100 g (3.5 ounces) of poisonous materials may be packed in one outer wooden box.

(2) If the poisonous material does not exceed 5 ml (0.2 fluid ounce) if a liquid or 20 g (0.7 ounce) if a solid, it may be packed in glass inner receptacles with screw-top closures of not less than 60 ml (2 ounces), hermetically sealed. Twelve bottles containing poisonous material, not to exceed 100 ml (3.4 ounces) or 100 g (3.5 ounces), or both, may be placed in a plastic carrying case, each glass receptacle surrounded by absorbent cushioning and each separated from the other by sponge rubber partitions. The plastic carrying case must be placed in a tightly fitting fiberboard box which in turn must be placed in a tightly fitting 4C1, 4C2, 4D or 4F wooden box.

§ 173.195 Hydrogen cyanide, anhydrous, stabilized.

(a) Hydrogen cyanide, anhydrous, stabilized, must be packed in specification cylinders as follows:

(1) As prescribed in § 173.192, or

(2) Specification 3A480, 3A480X, 3AA480, or 3A1800 metal cylinders of not over 126 kg (278 pounds) water capacity (nominal). Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(b) Cylinders may not be charged with more than 0.27 kg (0.6 pound) of liquid per 0.45 kg (1 pound) water capacity of cylinder. Each filled cylinder must be tested for leakage before being offered for transportation or transported and must show absolutely no leakage; this test must consist of passing a piece of Guignard's sodium picrate paper over the closure of the cylinder, without the protection cap attached, to detect any escape of hydrogen cyanide from the cylinder. Other equally efficient test methods may be used in place of sodium picrate paper.

(c) Packagings for hydrogen cyanide must conform to § 173.40.

§ 173.196 Infectious substances (etiologic agents).

(a) Authorized packagings and components are as follows:

(1) Inner packagings comprising:

(i) A watertight primary receptacle;

(ii) A watertight secondary packaging; and

(iii) An absorbent material must be placed between the primary receptacle and the secondary packaging. If multiple-primary receptacles are placed in a single secondary packaging they must be wrapped individually to ensure that contact between them is prevented. The absorbent material, such as cotton wool, must be sufficient to absorb the entire contents of all primary receptacles.

(2) An outer packaging must be of adequate strength for its capacity, mass and intended use.

(b) Each package for infectious substances must be capable of passing the tests specified in § 178.609 of this subchapter.

(c) Packages consigned as freight must be at least 100 mm (3.9 inches) in the smallest overall external dimensions.

(d) For all packages containing infectious substances, an itemized list of contents must be enclosed between the

secondary packaging and the outer packaging.

(e) Although exceptional cases, such as whole organs, may require special packaging, the great majority of infectious substances can and must be packaged according to the following guidelines.

(1) *Lypholized substances.* Primary receptacles include flame-sealed glass ampoules or rubber-stopped glass vials fitted with metal seals.

(2) *Liquid or solid substances*—(i) *Substances shipped at ambient temperatures or higher.* Primary receptacles include those of glass, metal or plastic. Positive means of ensuring a leakproof seal, such as heat seal, skirted stopper or metal crimp seal must be provided. If screw caps are used, they must be reinforced with adhesive tape.

(ii) *Substances shipped refrigerated or frozen (ice, pre-frozen packs, dry ice).* Ice or dry ice must be placed outside the secondary packagings. Interior supports must be provided to secure the secondary packagings in the original position after the ice or dry ice has dissipated. If ice is used, the packaging must be leakproof. If dry ice is used, the outer packaging must permit the release of carbon dioxide gas.

(iii) *Substances shipped in liquid nitrogen.* Plastic primary receptacles capable of withstanding very low temperatures must be used. Secondary packaging must also withstand very low temperatures and in most cases will need to be fitted over individual primary receptacles. Requirements for shipment of liquid nitrogen must also be observed.

(f) Whatever the intended temperature of shipment, the primary receptacle and secondary packaging used for infectious substances must be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than 95 kPa (14 psi) and temperatures in the range of −40 °C to +55 °C (−40 °F to +131 °F).

(g) The requirements of this section supplement the requirements of the Department of Health and Human Services contained in 42 CFR part 72.

(h) *Exceptions.* The following substances are not subject to any requirements of this subchapter if the items as packaged do not contain any material otherwise subject to the requirements of this subchapter.

(1) Diagnostic specimens.

(2) Biological products.

§ 173.198 Nickel carbonyl.

(a) Nickel carbonyl must be packed in specification steel or nickel cylinders as prescribed for any compressed gas except acetylene. A cylinder used exclusively for nickel carbonyl may be given a complete external visual inspection in lieu of the interior hydrostatic pressure test required by § 173.34(e). Visual inspection must be in accordance with CGA Pamphlet C–6.

(b) Packagings for nickel carbonyl must conform to § 173.40.

§ 173.201 Non-bulk packagings for liquid hazardous materials in Packing Group I.

(a) When § 172.101 of this subchapter specifies that a liquid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each packaging must conform to the general packaging requirements of subpart B of part 173, to the requirements of part 178 of this subchapter at the Packing Group I performance level, and to the requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) The following combination packagings are authorized:

Outer packagings:
Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1 or 4A2
Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Expanded plastic box: 4H1
Solid plastic box: 4H2
Inner packagings:
Class or earthenware receptacles
Plastic receptacles
Metal receptacles
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel, or aluminum: 1N1 or 1N2
Plastic drum: 1H1 or 1H2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Plastic receptacle in steel, aluminum, fiber or plastic drum: 6HA1, 6HB1, 6HG1, 6HH
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2
Glass, porcelain or stoneware in steel' aluminum or fiber drum: 6PA1, 6PB1 or 6PG1
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2
Glass, porcelain or stoneware in solid or expanded plastic packaging: 6PH1 or 6PH2
Cylinders, specification, as prescribed for any compressed gas, except for Specifications 8 and 3HT

§ 173.202 Non-bulk packagings for liquid hazardous materials in Packing Group II.

(a) When § 172.101 of this subchapter specifies that a liquid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each packaging must conform to the general packaging requirements of subpart B of part 173, to the requirements of part 178 of this subchapter at the Packing Group I or II performance level (unless otherwise excepted), and to the particular requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) The following combination packagings are authorized:

Outer packagings:
Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1 or 4A2
Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Expanded plastic box: 4H1
Solid plastic box: 4H2
Inner packagings:
Glass or earthenware receptacles
Plastic receptacles
Metal receptacles
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C1
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Plastic receptacle in steel, aluminum, fiber or plastic drum: 6HA1, 6HB1, 6HG1 or 6HH
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2
Glass, porcelain or stoneware in steel, aluminum or fiber drum: 6PA1, 6PB1 or 6PG1
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2
Glass, porcelain or stoneware in solid or expanded plastic packaging: 6PH1 or 6PH2
Plastic receptacle in plywood drum: 6HD1

Class, porcelain or stoneware in plywood drum or wickerwork hamper: 6PD1 or 6PD2
Cylinders, specification, as prescribed for any compressed gas, except for Specifications 8 and 3HT

§ 173.203 Non-bulk packagings for liquid hazardous materials in Packing Group III.

(a) When § 172.101 of this subchapter specifies that a liquid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each packaging must conform to the general packaging requirements of subpart B of part 173, to the requirements of part 178 of this subchapter at the Packing Group I, II or III performance level, and to the requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) The following combination packagings are authorized:

Outer packagings:
Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1 or 4A2
Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Expanded plastic box: 4H1
Solid plastic box: 4H2
Inner packagings:
Glass or earthenware receptacles
Plastic receptacles
Metal receptacles
Glass ampoules

(c) The following single packagings are authorized:

Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C1
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Plastic receptacle in steel, aluminum, fiber or plastic drum: 6HA1, 6HB1, 6HG1 or 6HH
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2
Glass, porcelain or stoneware in steel, aluminum or fiber drum: 6PA1, 6PB1 or 6PC1
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2
Glass, porcelain or stoneware in solid or expanded plastic packaging: 6PH1 or 6PH2
Plastic receptacle in plywood drum: 6HD1
Glass, porcelain or stoneware in plywood drum or wickerwork hamper: 6PD1 or 6PD2
Cylinders, as prescribed for any compressed gas, except for Specifications 8 and 3HT

§ 173.204 Non-bulk, non-specification packagings for certain hazardous materials.

When § 172.101 of this subchapter specifies that a liquid or solid hazardous material be packaged under this section, any appropriate non-bulk packaging which conforms to the general packaging requirements of subpart B of part 173 may be used for its transportation. Packagings need not conform to the requirements of part 178 of this subchapter.

§ 173.205 Specification cylinders for liquid hazardous materials.

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, any specification cylinder, except those specified for acetylene, is authorized. Cylinders used for poisonous materials (Division 6.1 or 2.3) must conform to the requirements of § 173.40.

§ 173.211 Non-bulk packagings for solid hazardous materials in Packing Group I.

(a) When § 172.101 of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of subpart B of part 173, to the requirements of part 178 of this subchapter at the Packing Group I performance level, and to the requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) The following combination packagings are authorized:

Outer packagings:
Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1 or 4A2
Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Solid plastic box: 4H2
Inner packagings:
Glass or earthenware receptacles
Plastic receptacles
Metal receptacles
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plastic drum: 1H1 or 1H2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box with liner: 4A2
Aluminum box with liner: 4B2
Natural wood box, sift proof: 4C2
Plastic receptacle in steel, aluminum, plywood, fiber or plastic drum: 6HA2, 6HB1, 6HD1, 6HG1 or 6HH
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA1, 6HB2, 6HC, 6HD2 or 6HG2
Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2
Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2

§ 173.212 Non-bulk packagings for solid hazardous materials in Packing Group II.

(a) When § 172.101 of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of subpart B of part 173, to the requirements of part 178 of this subchapter at the Packing Group I or II performance level, and to the requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) The following combination packagings are authorized:

Outer packagings:
Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1 or 4A2
Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Solid plastic box: 4H2
Inner packagings:
Glass or earthenware receptacles
Plastic receptacles
Metal receptacles
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Plywood drum: 1D
Plastic drum: 1H1 or 1H2
Fiber drum: 1G

Metal drum other than steel or aluminum: 1N1 or 1N2
Wooden barrel: 2C1 or 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1
Steel box with liner: 4A2
Aluminum box: 4B1
Aluminum box with liner: 4B2
Natural wood box: 4C1
Natural wood box, sift proof: 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Expanded plastic box: 4H1
Solid plastic box: 4H2
Bag, woven plastic: 5H1, 5H2 or 5H3
Bag, plastic film: 5H4
Bag, textile: 5L1, 5L2 or 5L3
Bag, paper, multiwall, water resistant: 5M2
Plastic receptacle in steel, aluminum, plywood fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH
Plastic receptacle in steel aluminum, wood, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2
Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2
Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2

§ 173.213 Non-bulk packagings for solid hazardous materials in Packing Group III.

(a) When § 172.101 of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of subpart B of part 173, to the requirements of part 178 of this subchapter at the Packing Group I, II or III performance level, and to the requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) The following combination packagings are authorized:

Outer packagings:
Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Metal drum other than steel or aluminum: 1N1 or 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Wooden barrel: 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box: 4A1 or 4A2
Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Solid plastic box: 4H2
Inner packagings:
Glass or earthenware receptacles
Plastic receptacles
Metal receptacles
Glass ampoules

(c) The following single packagings are authorized:

Steel drum: 1A1 or 1A2
Aluminum drum: 1B1 or 1B2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H1 or 1H2
Metal drum other than steel or aluminum: 1N1 or 1N2
Wooden barrel: 2C1 or 2C2
Steel jerrican: 3A1 or 3A2
Plastic jerrican: 3H1 or 3H2
Steel box with liner: 4A2
Steel box: 4A1
Aluminum box with liner: 4B2
Natural wood box: 4C1
Natural wood box, sift proof: 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Expanded plastic box: 4H1
Solid plastic box: 4H2
Bag, woven plastic: 5H1, 5H2 or 5H3
Bag, plastic film: 5H4
Bag, textile: 5L1, 5L2 or 5L3
Bag, paper, multiwall, water resistant: 5M2
Plastic receptacle in steel, aluminum, plywood, fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2
Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2
Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2

§ 173.214 Packagings which require approval by the Associate Administrator for Hazardous Materials Safety.

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, packagings and method of shipment must be approved by the Associate Administrator for Hazardous Materials Safety prior to the first shipment.

§ 173.216 Asbestos, blue, brown or white.

(a) Asbestos, blue, brown or white, includes each of the following hydrated mineral silicates: chrysolite, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, actinolite asbestos, and every product containing any of these materials.

(b) Asbestos which is immersed or fixed in a natural or artificial binder material (such as cement, plastic, asphalt, resins or mineral ore), and manufactured products containing asbestos are not subject to the requirements of this subchapter.

(c) Packagings for asbestos must conform to the general packaging requirements of subpart B of this part but need not conform to the requirements of part 178 of this subchapter. Asbestos must be offered for transportation and transported in—

(1) Rigid, leaktight packagings, such as metal, plastic or fiber drums, portable tanks, hopper-type rail cars, or hopper-type motor vehicles;

(2) Bags or other non-rigid packagings in closed freight containers, motor vehicles, or rail cars that are loaded by and for the exclusive use of the consignor and unloaded by the consignee;

(3) Bags or other non-rigid packagings which are dust and sift-proof. When transported by other than private carrier by highway, such packagings containing asbestos must be palletized and unitized by methods such as shrink-wrapping in plastic film or wrapping in fiberboard secured by strapping. Pallets need not be used during transportation by vessel for loads with slings that are unitized by methods such as shrink-wrapping, if the slings adequately and evenly support the loads and the unitizing method prevents shifting of the bags or other non-rigid packagings during conditions normally incident to transportation; or

(4) Bags or other non-rigid packagings which are dust and sift-proof in strong outside fiberboard or wooden boxes.

§ 173.217 Carbon dioxide, solid (dry ice).

(a) Carbon dioxide, solid (dry ice), when offered for transportation or transported by aircraft or water, must be packed in packagings designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packagings. Packagings must conform to the general packaging requirements of subpart B of this part but need not conform to the requirements of part 178 of this subchapter. For each shipment by air exceeding 2-3 kg (5 lbs) per package, advance arrangements must be made between the shipper and each carrier.

(b) Railroad cars and motor vehicles containing solid carbon dioxide, when accepted for transportation on board ocean vessels, must be conspicuously marked on two sides "WARNING CO_2 SOLID (DRY ICE)."

(c) Other packagings containing solid carbon dioxide, when offered or accepted for transportation on board ocean vessels, must be marked "CARBON DIOXIDE, SOLID—DO NOT STOW BELOW DECKS."

(d) Not more than 200 kg (441 pounds) of solid carbon dioxide may be transported in any one cargo compartment or bin on any aircraft except by specific and special written arrangement between the shipper and the aircraft operator.

(e) Carbon dioxide, solid (dry ice) is excepted from the shipping paper and certification requirements of this subchapter if the requirements of paragraphs (a) and (d) of this section are complied with and the package is marked "Carbon dioxide, solid" or "Dry ice" and marked with an indication that the material being refrigerated is used for diagnostic or treatment purposes (e.g., frozen medical specimens).

§ 173.218 Fish meal or fish scrap.

(a) Except as provided in paragraph (b) of this section, fish meal or fish scrap, containing at least 6 percent but not more than 12 percent water, is authorized for transportation by water only when packaged as follows:

(1) Burlap (jute) bag;

(2) Multi-wall paper bag;

(3) Polyethylene-lined burlap or paper bag;

(4) Cargo tank;

(5) Portable tank;

(6) Rail car; or

(7) Freight container.

(b) Fish meal or fish scrap may not be offered for transportation if the temperature of the material exceeds 49 °C (120 °F).

(c) When fish scrap or fish meal is offered for transportation by vessel in bulk in freight containers, the fish meal must contain at least 100 ppm of anti-oxident (ethoxyquin) at the time of shipment.

§ 173.219 Life-saving appliances.

(a) A life-saving appliance, self-inflating or non-self-inflating, containing small quantities of hazardous materials which are required as part of the life-saving appliance must conform to the requirements of this section. Packagings must conform to the general packaging requirements of subpart B of this part but need not conform to the requirements of part 178 of this subchapter.

(b) Hazardous materials therein must be packaged as follows:

(1) Nonflammable compressed gases must be packaged in cylinders in accordance with the requirements of this subchapter;

(2) Smoke and illumination signal flares must be in plastic or fiberboard receptacles;

(3) Strike-anywhere matches must be cushioned to prevent movement or friction in a cylindrical metal or composition receptacle with a screw-type closure;

(4) Flammable liquids must be in strong inner packagings in a repair kit; and

(5) Limited quantities of other hazardous materials are permitted if packaged in accordance with the requirements of this subchapter.

(c) Materials therein not subject to the requirements of this subchapter which are an integral part of the life-saving appliance must be packaged in a strong fiberglass kit case which is overpacked in a waterproof fiberboard packaging, or be packaged in other strong outer packagings.

§ 173.220 Internal combustion engines, self-propelled vehicles, and mechanical equipment containing internal combustion engines or wet batteries.

(a) *Applicability.* An internal combustion engine, self-propelled vehicle, or mechanized equipment is subject to the requirements of this subchapter when transported as cargo on a transport vehicle, vessel or aircraft, if—

(1) The engine or fuel tank contains a flammable liquid or gaseous fuel;

(2) It is equipped with a wet electric storage battery other than a nonspillable battery; or

(3) It contains other hazardous materials subject to the requirements of this subchapter.

(b) *Flammable liquid fuel.* Except as provided in this paragraph, flammable liquid fuel tanks must be completely drained and securely closed. Up to 500 ml (17 ounces) of fuel may be left in engine components and fuel lines provided the lines are securely closed to prevent leakage of fuel. Fuel may remain in engines and tanks installed in self-propelled vehicles and mechanical equipment under the following conditions:

(1) For transportation by motor vehicle or rail car, the fuel tanks must be securely closed.

(2) For transportation by vessel, the shipment must conform to § 176.905 of this subchapter; and

(3) For transportation by aircraft, the shipment must conform to § 175.305 of this subchapter.

(c) *Wet batteries.* Wet batteries must either be installed, securely fastened in an upright position, and protected against short circuits and leakage or be removed and packaged separately under § 173.159. In addition—

(1) For transportation by vessel, the shipment must conform to § 176.905 of this subchapter; and

(2) For transportation by passenger-carrying aircraft, a wheelchair equipped with a wet battery must conform to § 173.222.

(d) *Truck bodies or trailers on cars.* Truck bodies or trailers with automatic heating or refrigerating equipment of the flammable liquid type may be shipped with fuel tanks filled and equipment operating or inoperative, when used for the transportation of other freight and loaded on flat cars as part of a joint rail and highway movement, provided the equipment and fuel supply conform to the requirements of § 177.834(l) of this subchapter and are of a type which has been examined by the Bureau of Explosives and approved by the Associate Administrator for Hazardous Materials Safety.

(e) *Gases.* Compressed gas tanks and cylinders, containing gases, which are component parts of vehicles or mechanical equipment must conform to § 173.306.

(f) *Other hazardous materials.* Other hazardous materials must be packaged and transported in accordance with the requirements of this subchapter.

(g) *Exceptions.* Except as provided in paragraph (f) of this section, shipments made under the provisions of this section—

(1) Are not subject to any other requirements of this subchapter, for transportation by motor vehicle or rail car; and

(2) Are not subject to the requirements of subparts D, E, and F (marking, labeling, and placarding, respectively) of part 172 of this subchapter, for transportation by vessel or aircraft.

§ 173.221 Polystyrene beads, expandable.

Polystyrene beads or granules, expandable, impregnated with flammable gas or liquid as a blowing agent and plastic moulding materials in dough, sheet or extruded rope form must be packed in wooden (4C1 or 4C2), plywood (4D), fiberboard (4G) or reconstituted wood (4F) boxes with sealed inner plastic liners, plywood drums (1D), fiber drums (1G) with sealed inner plastic liner or in metal (1A1, 1A2, 1B1 or 1B2) packagings.

§ 173.222 Wheelchairs equipped with wet electric storage batteries.

Wheelchairs equipped with wet storage batteries are not subject to the requirements of this subchapter other than the provisions of § 175.10(a) (19) and (20) of this subchapter.

§ 173.224 Packaging and control and emergency temperatures for self-reactive materials.

(a) When the § 172.101 Table specifies that a Division 4.1 material be packaged in accordance with this section, only non-bulk packagings which conform to the provisions of this section may be used. Each packaging must conform to the general packaging requirements of subpart B, part 173, and to the requirements of part 178 of this subchapter at the Packing Group II

performance level. Packing Group I and Packing Group III non-bulk packagings are not authorized. Self-reactive materials which require temperature control are subject to the provisions of § 173.21(f).

(b) *Self-reactive materials table.* The self-reactive materials table specifies, by identification (ID) number the packing method that must be used, the control temperature, and the emergency temperature, as follows:

(1) *ID numbers.* The first column of the table gives the identification numbers for self-reactive materials as assigned in Column 4 of the § 172.101 Table.

(2) *Packing methods.* The second column of the table designates the packing method or methods that are authorized to package the self-reactive material. The table of packing methods in paragraph (c) of this section defines the packing methods.

(3) *Temperatures.* Column 3a specifies the control temperature. Column 3b specifies the emergency temperature. The letters "NR" means that temperature controls are not required.

§ 173.224(b)—SELF-REACTIVE MATERIALS TABLES

ID No.	Proper shipping name	Packing methods	Temperature, °C (°F)	
			Control	Emergency
(1)	(2)	(3)	(3a)	(3b)
UN2951	Diphenyloxide-4,4' disulfohydrazide	F1, F5a	NR	NR
UN2952	Azodiisobutyronitrile	F1, F2, F3, F5a	40 (104)	45 (113)
UN2953	2,2' -Azodi-(2,4 dimethylvaleronitrile)	F1, F2, F3, F5a	10 (50)	15 (59)
UN2954	1,1' -Azodi-(hexahydrobenzenitrile)	F1, F2, F3, F5a	NR	NR
UN2955	2,2' -Azodi-(2,4-dimethyl-4-methoxy valeronitrile)	F1, F2, F3, F5a	−5 (23)	5 (41)
UN2970	Benzene sulfohydrazide	F1, F2, F3, F5a	NR	NR
UN2971	Benzene-1,3-disulfohydrazide, [not more than 52% as a paste]	F1, F2, F3, F5a	NR	NR
UN2972	N,N' -Dinitrosopentamethylenetetramine [not more than 82% with phlegmatizer]	F1, F2, F3, F5a	NR	NR
UN2973	N,N' -Dinitroso-N,N'-dimethyl terephthalamide [not more than 72% as a paste]	F1, F5a	NR	NR
UN3030	2,2' -Azodi (2-methyl-butyronitrile)	F5b	40 (104)	45 (113)
UN3033	3-Chloro-4-diethylaminobenzene diazonium zinc chloride	F1, F6	NR	NR
UN3034	4-Dipropylaminobenzenediazonium zinc chloride	F1, F6	NR	NR
UN3035	3-(2-Hydroxyethoxy)-4-pyrrolidin-1-yl-benzenediazonium zinc chloride	F1, F6	40 (104)	45 (113)
UN3036	2,5-Diethoxy-4-morpholinobenzene-diazonium zinc chloride	F1, F6	35 (95)	40 (104)
UN3037	4-(Benzyl (ethyl) amino)-3-ethoxy-benzenediazonium zinc chloride	F1, F6	40 (104)	45 (113)
UN3038	4-(Benzyl (methyl) amino)3-ethoxy benzenediazonium zinc chloride	F1, F6	40 (104)	45 (113)
UN3039	4-Dimethylamino-6-(2-dimethyl) aminoethoxy) toluene-2-diazonium zinc chloride	F1, F6	40 (104)	45 (113)
UN3040	Sodium 2-diazo-1-naphthol-4-sulphonate	F1, F6	NR	NR
UN3041	Sodium 2-diazo-1-naphthol-5-sulphonate	F1, F6	NR	NR
UN3042	2-Diazo-1-naphthol-4-sulphochloride	F1	NR	NR
UN3043	2-Diazo-1-naphthol-5-sulphochloride	F1	NR	NR

(c) Table of packing methods for self-reactive materials. The table of packing methods for self-reactive materials specifies, by packing method, packaging quantity limits and the types of packagings that are authorized, as follows:

(1) *Packing method.* The first column of the table provides the packing method (e.g., F1).

(2) *Quantity limitations.* Column 2a specifies the maximum net mass per inner packaging, in kilograms and pounds, where inner packagings are required. If Column 2a is blank, inner packagings are not required. Column 2b specifies the maximum net mass per outer packaging, in kilograms and pounds.

(3) *Description of packaging.* Column 3a specifies the type of inner packaging that must be used. If Column 3a is blank, inner packagings are not required. Column 3b specifies the outer packaging that must be used.

§ 173.224(c)—PACKING METHODS FOR SELF-REACTIVE MATERIALS

Packing method (1)	Contents (2)		Description of packaging (3)	
	Maximum of inner packaging (2a)	Maximum of whole packaging (2b)	Inner packaging	Outer packaging
F1		110 lb (50 kg)		Fiber drum 1G, with plastic liner or internal coating.
F2	110 lb (50 kg)	110 lb (50 kg)	Plastic bag, packed singly	Fiberboard box 4G.
F3	11 lb (5 kg)	88 lb (40 kg)	Plastic boxes, plastic bottles or jars	Fiberboard box 4G.
F4	11 lb (5 kg)	55 lb (25 kg)	Plastic bottles or jars, plastic bags, plastic boxes.	Fiber drum 1G Fiberboard box 4G.
F5a		110 lb (55 kg)		Fiber drum, sift proof 1G.
F5b		55 lb (25 kg)		
F6	121 lb (55 kg)	121 lb (55 kg)	Plastic bags	Steel drum, removable head 1A2. Aluminum drum, removable head 1B2.

§ 173.225 Packaging requirements and other provisions for organic peroxides.

(a) *General.* When the § 172.101 Table specifies that an organic peroxide be packaged under this section, the organic peroxide must be packaged and offered for transportation in accordance with the provisions of this section. Each packaging must conform to the general requirements of subpart B of part 173 and to the applicable requirements of part 178 of this subchapter. Non-bulk packagings must meet Packing Group II performance levels. Packing Group I and Packing Group III non-bulk packagings are not authorized. Organic peroxides which require temperature control are subject to the provisions of § 173.21(f).

(b) *Organic peroxides table.* The following Organic Peroxides Table specifies, by technical name, those organic peroxides that are authorized for transportation and not subject to the approval provisions of § 173.128 of this part. An organic peroxide identified by technical name in the following table is authorized for transportation only if it conforms to all applicable provisions of the table. For an organic peroxide not identified in the table by technical name or a formulation of identified organic peroxides, the provisions of paragraph (c) of § 173.128 apply. The column headings of the Organic Peroxides table are as follows:

(1) *Technical name.* The first column specifies the technical name.

(2) *ID number.* The second column specifies the identification (ID) number which is used to identify the proper shipping name in the § 172.101 Table.

(3) *Concentration of organic peroxide.* The third column specifies concentration (mass percent) limitations, if any, in mixtures or solutions for the organic peroxide. Limitations are given as minimums, maximums, or a range, as appropriate. A range includes the lower and upper limits (i.e., "53–100" means from, and including, 53 percent to, and including 100 percent).

(4) *Concentration of diluents.* The fourth column specifies the type and concentration (mass percent) of diluent or inert solid, when required. Other types and concentrations of diluents may be authorized if approved by the Associate Administrator for Hazardous Materials Safety.

(i) The required mass percent of "Diluent type A" is specified in Column 4a. A diluent type A is an organic liquid that does not detrimentally affect the thermal stability or increase the hazard of the organic peroxide and with a boiling point not less than 150 °C at atmospheric pressure. Type A diluents may be used for desensitizing all organic peroxides.

(ii) The required mass percent of "Diluent type B" is specified in Column 4b. A diluent type B is an organic liquid that does not detrimentally affect the thermal stability or increase the hazard of the organic peroxide and which has a boiling point, at atmospheric pressure, of less than 150 °C but at least 60 °C, and a flash point greater than 5 °C. A Type B diluent may only be used for the desensitization of an organic peroxide for which it is specified in the table. The boiling point of a type B diluent must be at least 50 °C above the control temperature of the organic peroxide. A Type A diluent may be used to replace a Type B diluent in equal concentration.

(iii) The required mass percent of "Inert solid" is specified in column 4c. An inert solid is a solid that does not detrimentally affect the thermal stability or increase the hazard of the organic peroxide.

(5) *Concentration of water.* Column 5 specifies, in mass percent, the minimum amount of water, if any, which must be in formulation.

(6) *Packing method.* Column 6 specifies the highest packing method (largest packaging capacity) which is authorized for the organic peroxide. Lower numbered packing methods (smaller packaging capacities) are also authorized. For example, if OP3A is specified, then OP2A and OP1A are also authorized. The Table of Packing Methods in paragraph (d) of this section defines the packing methods.

(7) *Temperatures.* Column 7a specifies the control temperature. Column 7b specifies the emergency temperature. Temperatures are specified only when temperature controls are required. (See § 173.21(f)).

(8) *Notes.* Column 8 specifies other applicable provisions, as set forth in notes following the table.

ORGANIC PEROXIDES TABLE

Technical Name	ID Number	Concentration (Mass %)	Diluent (Mass %)			Water (Mass %)	Packing Method	Temperature(°C)		Notes
			A	B	I			Control	Emergency	
(1)	(2)	(3)	(4a)	(4b)	(4c)	(5)	(6)	(7a)	(7b)	(8)
Acetyl acetone peroxide	UN3105	≤ 42	≥ 48			≥ 8	OP7A			2
Acetyl acetone peroxide *as a paste*	UN3106	≤ 32					OP7B			21
Acetyl benzoyl peroxide	UN3105	≤ 45	≥ 55				OP7A			
Acetyl cyclohexanesulfonyl peroxide	UN3112	≤ 82				≥ 12	OP4B	−10	0	
Acetyl cyclohexanesulfonyl peroxide	UN3115	≤ 32		≥ 68			OP7A	−10	0	
tert-Amyl hydroperoxide	UN3107	≤ 88	≥ 6			≥ 6	OP6A			
tert-Amyl peroxybenzoate	UN3105	≤ 96	≥ 4				OP7A			
tert-Amyl peroxy-2-ethylhexanoate	UN3115	≤ 100					OP7A	20	25	
tert-Amyl peroxyneodecanoate	UN3115	≤ 77		≥ 23			OP7A	0	10	
tert-Amyl peroxypivalate	UN3113	≤ 77		≥ 23			OP5A	10	15	
tert-Amylperoxy-3,5,5-trimethylhexanoate	UN3101	≤ 100					OP5A			
tert-Butyl cumyl peroxide	UN3105	≤ 100					OP7A			1,9
n-Butyl-4,4-di-(tertbutylperoxy)-valerate	UN3103	>52, ≤ 100					OP5A			
n-Butyl-4,4-di-(tertbutylperoxy)-valerate	UN3106	≤ 52			≥ 48		OP7B			
tert-Butyl hydroperoxide	UN3103	73-90				≥ 10	OP5A			
tert-Butyl hydroperoxide	UN3105	≤ 80	≥ 20				OP7A			4
tert-Butyl hydroperoxide	UN3109	≤ 72				≥ 28	OP8A			14
tert-Butyl hydroperoxide *and*	UN3103	≤ 82				≥ 7	OP5A			
di-tert-Butyl peroxide		≥ 9								
tert-Butyl monoperoxymaleate	UN3102	>52, ≤ 100					OP5B			
tert-Butyl monoperoxymaleate	UN3103	≤ 52	≥ 48				OP6A			
tert-Butyl monoperoxymaleate *as a paste*	UN3108	≤ 42					OP8B			2
tert-Butyl monoperoxyphthate	UN3102	≤ 100					OP5B			
tert-Butyl peroxyacetate	UN3101	>52, ≤ 77	≥ 23				OP5A			
tert-Butyl peroxyacetate	UN3103	≤ 52	≥ 48				OP6A			
tert-Butyl peroxybenzoate	UN3103	78-100	≤ 22				OP5A			

ORGANIC PEROXIDES TABLE—Continued

Technical Name	ID Number	Concentration (Mass %)	Diluent (Mass %)			Water (Mass %)	Packing Method	Temperature(°C)		Notes
			A	B	I			Control	Emergency	
(1)	(2)	(3)	(4a)	(4b)	(4c)	(5)	(6)	(7a)	(7b)	(9)
tert-Butyl peroxybenzoate	UN3105	<52, ≤ 77	≥ 23				OP7A			1
tert-Butyl peroxybenzoate	UN3106	≤ 52			≥ 48		OP7B			
tert-Butyl peroxycrotonate	UN3105	≤ 77	≥ 23				OP7A			
tert-Butyl peroxydiethylacetate	UN3113	≤ 100					OP5A	20	25	
tert-Butyl peroxydiethylacetate *and*	UN3105	≤ 33	≥ 33				OP7A			
tert-Butyl peroxybenzoate		≤ 33								
tert-Butyl peroxy-2-ethylhexanoate	UN3113	53-100					OP6A	20	25	
tert-Butyl peroxy-2-ethylhexanoate	UN3117	≤ 52		≥ 48			OP8A	20	25	
tert-Butyl peroxy-2-ethylhexanoate *and*	UN3115	≤ 31		≥ 33			OP7A	35	40	
2,2-Di-(tert-butylperoxy)butane		≤ 36								
tert-Butyl peroxy-2-ethylhexanoate *and*	UN3106	≤ 12	≥ 14		≥ 60	≥ 60	OP7B			
2,2-Di-(tert-butylperoxy)butane		≤ 14								
tert-Butyl peroxyisobutyrate	UN3111	<52, ≤ 77		≥ 23			OP5A	15	20	
tert-Butyl peroxyisobutyrate	UN3115	≤ 52		≥ 48			OP7A	15	20	
tert-Butylperoxy isopropyl carbonate	UN3103	≤ 77	≥ 23				OP5A			
tert-Butyl peroxyneodecanoate	UN3115	<77, ≤ 100					OP7A	−5	5	
tert-Butyl peroxyneodecanoate	UN3115	≤ 77		≥ 23			OP7A	0	10	
3-tert-Butylperoxy-3-phenylphthalide	UN3106	≤ 100					OP7B			
tert-Butyl peroxypivalate	UN3113	<67, ≤ 77	≤ 23				OP5A	0	10	
tert-Butyl peroxypivalate	UN3115	≤ 67		≥ 33			OP7A	0	10	
tert-Butylperoxy stearylcarbonate	UN3106	≤ 100					OP7B			
tert-Butyl peroxy-3,5,5-trimethylhexanoate	UN3105	≤ 100					OP7A			
3-Chloroperoxybenzoic acid	UN3102	<57, ≤ 86				≥ 14	OP1B			
3-Chloroperoxybenzoic acid	UN3106	≤ 57			≥ 3	≥ 40	OP7B			
Cumyl hydroperoxide	UN3109	≤ 90	≥ 10				OP8A			14
Cumyl peroxyneodecanoate	UN3115	≤ 77		≥ 23			OP7A	−10	0	
Cumyl peroxypivalate	UN3115	≤ 77		≥ 23			OP7A	−5	5	
Cyclohexanone peroxide(s)	UN3104	≤ 91				≥ 9	OP6B			
Cyclohexanone peroxide(s) *as a paste*	UN3106	≤ 72					OP7B			5, 21
Cyclohexanone peroxide(s)	UN3105	≤ 72	≥ 28				OP7A			5
Cyclohexanone peroxide(s)	Exempt	≤ 32			≥ 68					
Diacetone alcohol peroxides	UN3115	≤ 57		≥ 26		≥ 8	OP7A	30	35	5
Diacetyl peroxide	UN3115	≤ 27		≥ 73			OP7A	20	25	8
Di-tert-amyl peroxide	UN3107	≤ 100					OP8A			
Dibenzoyl peroxide	UN3102	52-100			≤ 48					3
Dibenzoyl peroxide	UN3102	78-94				≥ 6				3
Dibenzoyl peroxide	UN3104	≤ 77				≥ 23	OP6B			
Dibenzoyl peroxide	UN3106	≤ 62			≥ 28	≥ 10	OP7B			
Dibenzoyl peroxide *as a paste*	UN3106	<52 ≤ 62					OP7B			21
Dibenzoyl peroxide *as a paste*	UN3108	≤ 52					OP8B			21
Dibenzoyl peroxide	UN3106	36-52			≥ 48		OP7B			
Dibenzoyl peroxide	Exempt	≤ 35			≥ 65					
Dibenzyl peroxydicarbonate	UN3112	≤ 87				≥ 13	OP5B	25	30	
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	UN3114	≤ 100					OP6B	30	35	
Di-(4-tert-butylcyclohexyl) peroxydicarbonate *as a stable dispersion in water.*	UN3119	≤ 42					OP8A	30	35	
Di-tert-butyl peroxide	UN3107	≤ 100					OP8A			
2,2-Di-(tert-butylperoxy)butane	UN3103	≤ 52	≥ 48				OP6A			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3101	81-100					OP5A			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3103	<52, ≤ 80	≥ 20				OP5A			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3105	≤ 52	≥ 48				OP7A			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3106	≤ 42	≥ 13		≥ 45		OP7B			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3107	≤ 27	≥ 36	≥ 36			OP8A			22
2,2-Di-(4,4-tert-butylperoxycyclo-hexyl)propane	UN3106	≤ 42			≥ 58		OP7B			
Di-n-butyl peroxydicarbonate	UN3115	<27, ≤ 52		≥ 48			OP7A	−15	−5	
Di-n-butyl peroxydicarbonate	UN3117	≤ 27		≥ 73			OP8A	−10	0	
Di-sec-butyl peroxydicarbonate	UN3113	<52, ≤ 100					OP4A	−20	−10	6
Di-sec-butyl peroxydicarbonate	UN3115	≤ 52		≥ 40			OP7A	−15	−5	
Di-(2-tert-butylperoxyisopropyl)-benzene(s)	UN3106	43-100			≤ 57		OP7B			1,9
Di-(2-tert-butylperoxyisopropyl)-benzene(s)	Exempt	≤ 42			≥ 58					
Di-(tert-butylperoxy)phthalate	UN3105	<42, ≤ 52	≥ 48				OP7A			
Di-(tert-butylperoxy)phthalate *as a paste*	UN3106	≤ 52					OP7B			21
Di-(tert-butylperoxy)phthalate	UN3107	≤ 42	≥ 58				OP8A			
2,2-Di-(tert-butylperoxy)propane	UN3105	≤ 52	≥ 48				OP7A			
2,2-Di-(tert-butylperoxy)propane	UN3106	≤ 42	≥ 13		≥ 45		OP7B			
1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane	UN3101	<57, ≤ 100					OP5A			
1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane	UN3106	≤ 57			≥ 43		OP7B			
1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane	UN3107	≤ 57	≥ 43				OP8A			
Dicetyl peroxydicarbonate	UN3116	≤ 100					OP7B	20	25	
Dicetyl peroxydicarbonate *as a stable dispersion in water.*	UN3119	≤ 42					OP8A	30	35	
Di-4-chlorobenzoyl peroxide	UN3102	≤ 77				≥ 23	OP5B			
Di-4-chlorobenzoyl peroxide *as a paste*	UN3106	≤ 52					OP7B			21
Di-4-chlorobenzoyl peroxide	Exempt	≤ 32			≥ 68					
Dicumyl peroxide	UN3110	<42, ≤ 100			≤ 57		OP8B			9
Dicumyl peroxide	Exempt	≤ 42			≥ 58					
Dicyclohexyl peroxydicarbonate	UN3112	<91, ≤ 100					OP5B	5	10	

ORGANIC PEROXIDES TABLE—Continued

Technical Name	ID Number	Concentration (Mass %)	Diluent (Mass %)			Water (Mass %)	Packing Method	Temperature(°C)		Notes
			A	B	?			Control	Emergency	
(1)	(2)	(3)	(4a)	(4b)	(4c)	(5)	(6)	(7a)	(7b)	(8)
Dicyclohexyl peroxydicarbonate	UN3114	≤ 91				≥ 9	OP3B	5	10	
Didecanoyl peroxide	UN3102	≤ 100					OP6B	15	20	
Di-2,4-dichlorobenzoyl peroxide	UN3102	≤ 77				≥ 23	OP5B			
Di-2,4-dichlorobenzoyl peroxide *as a paste with silicon oil.*	UN3106	≤ 52					OP7B			
Di-(2-ethylhexyl) peroxydicarbonate	UN3113	<77, ≤ 100					OP5A	−20	−10	
Di-(2-ethylhexyl) peroxydicarbonate	UN3115	≤ 77					OP7A	−15	−5	
Di-(2-ethylhexyl) peroxydicarbonate *as a stable dispersion in water.*	UN3117	≤ 42					OP8A	−15	−5	
Di-(2-ethylhexyl) peroxydicarbonate *as a stable dispersion in water (frozen).*	UN3117	≤ 42					OP8B	−15	−5	
Diethyl peroxydicarbonate	UN3115	≤ 27		≥ 73			OP7A	−10	0	
2,2-Dihydreperoxypropane	UN3102	≤ 27			≥ 73		OP5B			
Di-(1-hydroxycyclohexyl) peroxide	UN3106	≤ 100					OP7B			
Diisobutyryl peroxide	UN3111	<32, ≤ 52		≥ 48			OP5A	−20	−10	
Diisobutyryl peroxide	UN3115	≤ 32		≥ 68			OP7A	−20	−10	
Diisopropyl peroxydicarbonate	UN3112	<52, ≤ 100					OP2B	−15	−5	
Diisopropyl peroxydicarbonate	UN3115	≤ 52		≥ 48			OP7A	−10	0	
Diisotridecyl peroxydicarbonate	UN3115	≤ 100					OP7A	−10	0	
Dilauroyl peroxide	UN3106	≤ 100					OP7B			
Dilauroyl peroxide *as a stable dispersion in water*	UN3109	≤ 42					OP8A			
Di-(2-methylbenzoyl) peroxide	UN3112	≤ 87				≥ 13	OP5B	30	35	
2,5-Dimethyl-2,5-di-(benzoyl-peroxy) hexane	UN3102	<82, ≤ 100					OP5B			
2,5-Dimethyl-2,5-di-(benzoyl-peroxy) hexane	UN3106	≤ 82			≥ 18		OP7B			
2,5-Dimethyl-2,5-di-(benzoyl-peroxy) hexane	UN3104	≤ 82				≥ 18	OP5B			
2,5-Dimethyl-2,5-di-(tert-butyl-peroxy)hexane	UN3105	<52, ≤ 100					OP7A			
2,5-Dimethyl-2,5-di-(tert-butyl-peroxy)hexane	UN3106	≤ 52			≥ 48		OP7B			
2,5-Dimethyl-2,5-di-(tert-butyl-peroxy)hexyne-3	UN3103	<52, ≤ 100					OP5A			
2,5-Dimethyl-2,5-di-(tert-butyl-peroxy)hexyne-3	UN3106	≤ 52			≥ 48		OP7B			
2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy)hexane	UN3115	≤ 100					OP7A	20	25	
2,5-Dimethyl-2,5-dihydroperoxyhexane	UN3104	≤ 82				≥ 18	OP6B			
2,5-Dimethyl-2,5-di-(3,5,5-trimethylhexanoylperoxy)hexane.	UN3105	≤ 77	≥ 23				OP7A			
Dimyristyl peroxydicarbonate	UN3116	≤ 100					OP7B	20	25	
Dimyristyl peroxydicarbonate *as a stable dispersion in water.*	UN3119	≤ 42					OP8A, N	20	25	
Di-n-nonanoyl peroxide	UN3116	≤ 100					OP7B	0	10	
Di-n-octanoyl peroxide	UN3114	≤ 100					OP5B	10	15	
Diperoxy azelaic acid	UN3116	≤ 27			≥ 73		OP7B	35	40	
Diperoxy dodecane diacid	UN3116	<13, ≤ 42			≥ 58		OP7B	40	45	
Diperoxy dodecane diacid	Exempt	≤ 13								
Di-(2 Phenoxyethyl) peroxydicarbonate	UN3102	<85, ≤ 100					OP5B			
Di-(2 phenoxyethyl) peroxydicarbonate	UN3105	≤ 85				≥ 15	OP7B			
Dipropionyl peroxide	UN3117	≤ 27		≥ 73			OP8A	15	20	
Di-n-propyl peroxydicarbonate	UN3113	≤ 100					OP4A	−25	−15	
Distearyl peroxydicarbonate	UN3106	≤ 87			≥ 13		OP7B			
Disuccinic acid peroxide	UN3102	<72, ≤ 100					OP4B			18
Disuccinic acid peroxide	UN3116	≤ 72				≥ 28	OP7B	10	15	18
Di-(3,5,5-trimethyl-1,2-dioxo-lanyl-3) peroxide *as a paste.*	UN3116	≤ 52					OP7B	30	35	21
Di-(3,5,5-trimethyl-1,2-dioxolanyl-3) peroxide *as a paste.*	UN3116	≤ 52					OP7B	30	33	21
Di-(3,5,5-trimethylhexanoyl) peroxide	UN3115	≤ 82	≥ 18				OP7A			
Ethyl-3,3-di-(tert-amylperoxy)-butyrate	UN3105	≤ 67	≥ 33				OP7A			
Ethyl-3,3-di-(tert-butylperoxy)-butyrate	UN3103	<77, ≤ 100					OP5A			
Ethyl-3,3-di-(tert-butylperoxy)-butyrate	UN3105	≤ 77	≥ 23				OP7A			
Ethyl-3,3-di-(tert-butylperoxy)-butyrate	UN3106	≤ 52			≥ 48		OP7B			
3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane	UN3102	<52, ≤ 100					OP4B			
3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane	UN3105	≤ 52	≥ 48				OP7A			
3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononane	UN3106	≤ 52			≥ 48		OP7B			
Isopropylcumyl hydroperoxide	UN3109	≤ 72	≥ 28				OP8A			14
p-Menthyl hydroperoxide	UN3105	<55, ≤ 100					OP7A			
p-Menthyl hydroperoxide	UN3109	≤ 55	≥ 45				OP8A			14
Methylcyclohexanone peroxide(s)	UN3115	≤ 67		≥ 33			OP7A	35	40	
Methyl ethyl ketone peroxide(s)	UN3101	≤ 52	≥ 48				OP5A			5
Methyl ethyl ketone peroxide(s)	UN3105	≤ 45	≥ 55				OP7A			5
Methyl ethyl ketone peroxide(s)	UN3107	≤ 40	≥ 60				OP8A			5,23
Methyl isobutyl ketone peroxide(s)	UN3105	≤ 62	≥ 19	≥ 19			OP7A			5
Organic peroxide, solid, temperature controlled	UN3114						OP2B			12
Organic peroxide, liquid, sample	UN3103						OP2A			12
Organic peroxide, liquid, temperature controlled	UN3113						OP2A			12
Organic peroxide, solid, sample	UN3104						OP2B			12
Peroxyacetic acid, type D, stabilized	UN3105	≤ 43					OP7A			20
Peroxyacetic acid, type E, stabilized	UN3107	≤ 43					OP8A			20
Peroxyacetic acid, type F, stabilized	UN3109	≤ 43					OP8A			20
Pinanyl hydroperoxide	UN3105	<55, ≤ 100					OP7A			
Pinanyl hydroperoxide	UN3109	≤ 55	≥ 45				OP8A			14

ORGANIC PEROXIDES TABLE—Continued

Technical Name	ID Number	Concentration (Mass %)	Diluent (Mass %)			Water (Mass %)	Packing Method	Temperature(°C)		Notes
			A	B	I			Control	Emergency	
(1)	(2)	(3)	(4a)	(4b)	(4c)	(5)	(6)	(7a)	(7b)	(8)
Tetrahydronaphthyl hydroperoxide	UN3106	≤100					OP7B			
1,1,3,3-Tetramethylbutyl hydroperoxide	UN3105	≤100					OP7A			
1,1,3,3-Tetramethylbutylperoxy-2-ethylhexanoate	UN3115	≤100					OP7A	20	25	
2,4,4-Trimethylpentyl-2-peroxy phenoxyacetate	UN3115	≤37		≥63			OP7A	−10	0	

Notes:

1. For domestic shipments, OP8A is authorized.
2. Available oxygen must be <4.7 percent.
3. For concentrations <80 percent OP5B is allowed. For concentrations >80 percent but <85 percent, OP4B is allowed. For concentrations >85 percent, maximum package size is OP2B.
4. The diluent may be replaced by di-tert-butyl peroxide.
5. Available oxygen must be ≤9 percent.
6. For domestic shipments, OP5A is authorized.
7. [Reserved]
8. Only non-metallic packagings are authorized.
9. For domestic shipments, this material may be transported in bulk packagings under the provisions of § 173.225(e)(3)(v).
10. [Reserved]
11. [Reserved]
12. Samples may only be offered for transportation when all available data indicate that the sample is no more dangerous than an Organic Peroxide type C, and the sample is packaged using packaging method OP2A for liquids or OP2B for solids, as appropriate, in quantities less than 10 kg per shipment, employing any necessary temperature controls.
13. [Reserved]
14. This material may be transported in bulk packagings under the provisions of § 173.225(e).
15. [Reserved]
16. [Reserved]
17. [Reserved]
18. Addition of water to this organic peroxide will decrease its thermal stability.
19. [Reserved]
20. Mixtures with hydrogen peroxide, water and acid(s).
21. With diluent type A, with or without water.
22. With >3 percent, by mass, ethylbenzene.
23. With >19 percent, by mass, methyl isobutyl ketone.

(c) *New organic peroxides, formulations and samples.* (1) Except as provided for samples in paragraph (c)(4) of this section, no person may offer for transportation an organic peroxide which is not identified by technical name in the Organic Peroxides Table of this section, or a formulation of one or more organic peroxides which are identified by technical name in that table, unless the organic peroxide is assigned a generic type and shipping description and is approved by the Associate Administrator for Hazardous Materials Safety under the provisions of § 173.128(c) of this subchapter.

(2) Except as provided under the provisions of an approval under § 173.128(c) of this subchapter, bulk packagings are not authorized.

(3) Non-bulk packagings are authorized as specified in the Packing Method Table for Generic Types, as follows. Column 1 of the table specifies the generic type by identification (ID) number from the § 172.101 Table. Column 2 of the table specifies the generic proper shipping name from the § 172.101 Table. Column 3 of the table specifies the series of packing methods authorized for use (e.g., "OP1A–OP5A" means that packing methods OP1A, OP2A, OP3A, OP4A, and OP5A are authorized). The Table of Packing Methods in paragraph (d) of this section defines the packing methods. The Packing Method Table for Generic Types is as follows:

§ 173.225(c) —PACKING METHOD TABLE FOR GENERIC TYPES

UN No.	Proper shipping name	Packing method
(1)	(2)	(3)
UN3101	Organic peroxide type B, liquid	OP1A–OP5A
UN3102	Organic peroxide type B, solid	OP1B–OP5B
UN3103	Organic peroxide type C, liquid	OP1A–OP6A
UN3104	Organic peroxide type C, solid	OP1B–OP6B
UN3105	Organic peroxide type D, liquid	OP1A–OP7A
UN3106	Organic peroxide type D, solid	OP1B–OP7B
UN3107	Organic peroxide type E, liquid	OP1A–OP8A
UN3108	Organic peroxide type E, solid	OP1B–OP8B
UN3109	Organic peroxide type F, liquid	OP1A–OP8A
UN3110	Organic peroxide type F, solid	OP1B–OP8B
UN3111	Organic peroxide type B, liquid, temperature controlled	OP1A–OP5A
UN3112	Organic peroxide type B, solid, temperature controlled	OP1B–OP5B
UN3113	Organic peroxide type C, liquid, temperature controlled	OP1A–OP6A
UN3114	Organic peroxide type C, solid, temperature controlled	OP1B–OP6B
UN3115	Organic peroxide type D, liquid, temperature controlled	OP1A–OP7A
UN3116	Organic peroxide type D, solid, temperature controlled	OP1B–OP7B
UN3117	Organic peroxide type E, liquid, temperature controlled	OP1A–OP8A
UN3118	Organic peroxide type E, solid, temperature controlled	OP1B–OP8B
UN3119	Organic peroxide type F, liquid, temperature controlled	OP1A–OP8A
UN3120	Organic peroxide type F, solid, temperature controlled	OP1B–OP8B

(4) Samples. Samples of new organic peroxides or new formulations of organic peroxides identified in the Organic Peroxides Table in paragraph (b) of this section, for which complete test data are not available, and which are to be transported for further testing or evaluation, may be assigned an appropriate shipping description for organic peroxide Type C, packaged and offered for transportation, under the following conditions:

(i) Data available to the person offering the material for transportation must indicate that the sample would pose a level of hazard no greater than that of an organic peroxide Type C and that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation;

(ii) The sample must be packaged in accordance with packing method OP2A or OP2B, for a liquid or solid, respectively;

(iii) Packages of the organic peroxide may be offered for transportation and transported in a quantity not to exceed 10 kg (22 pounds) per transport vehicle; and

(iv) One of the following shipping descriptions must be assigned:

(A) Organic peroxide Type C, liquid, 5.2, UN 3103;

(B) Organic peroxide Type C, solid, 5.2, UN 3104;

(C) Organic peroxide Type C, liquid, temperature controlled, 5.2, UN 3113; or

(D) Organic peroxide Type C, solid, temperature controlled, 5.2, UN 3114.

(d) *Tables of Packing Methods.* The tables in this paragraph specify the types of packagings and quantity limitations that apply for each packing method in the series OP1A–OP8A, for liquids (Packagings for Liquid Organic Peroxides), and the series OP1B–OP8B, for solids (Packaging for Solid Organic Peroxides). In each table, Column 1a specifies the type of packaging, Column 1b specifies the packaging code, and Columns 2a through 2h specify the packing methods.

(1) A liquid organic peroxide for which a packing method is specified in paragraph (b) or (c) of this section must be packaged in accordance with the following provisions:

§ 173.225(d)(1)—TABLE 11.2 (A)—PACKAGINGS FOR LIQUID ORGANIC PEROXIDES

Type and materials	Packaging code (see 9.4.7)	Maximum quantity or net mass per packing method [1]							
		OP1A [2]	OP2A [2]	OP3A [2]	OP4A [2]	OP5A [2]	OP6A [2]	OP7A	OP8A
Steel drum	1A1	(*)	(*)	(*)	(*)	(*)	(*)	60	225
Steel drum [3]	1A2	(*)	(*)	(*)	(*)	(*)	(*)	50 kg	200 kg
Aluminum drum	1B1	(*)	(*)	(*)	(*)	(*)	(*)	60 liters	225 liters
Fiber drum [3]	1G	0.5 kg	0.5/10 kg	5 kg	5 KG	50 kg	50 kg	50 kg	200 kg
Plastics drum	1H1	0.5 L	0.5 L	5 L	5 L	30 L	60 L	60 L	225 L
Plastics jerrican	3H1	0.5 L	0.5 L	5 L	5 L	30 L	60 L	60 L	60 L
Wooden box [3]	4C1	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plywood box [3]	4D	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Fiberboard box [3]	4G	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plastics receptacle with outer steel drum.	6HA1	(*)	(*)	(*)	(*)	(*)	(*)	60 L	225 L
Plastics receptacle with outer aluminum drum.	6HB1	(*)	(*)	(*)	(*)	(*)	(*)	60 L	225 L
Plastics receptacle with outer fiber drum.	6HG1	0.5 L	0.5 L	5 L	5 L	30 L	60 L	60 L	225 L
Plastics receptacle with outer fiberboard box.	6HG2	0.5 L	0.5 L	5 L	5 L	30 L	60 L	60 L	60 L
Plastics receptacle with outer plastics drum.	6HH1	0.5 L	0.5 L	5 L	5 L	30 L	60 L	60 L	225 L
Plastics receptacle with outer solid plastics box.	6HH2	0.5 L	0.5 L	5 L	5 L	30 L	60 L	60 L	60 L

(*)=Prohibited for organic peroxide types B and C.
[1]=If two values are given, the first applies to the maximum net mass per inner receptacle and the second to the maximum net mass of the complete package.
[2]=For combination packagings containing organic peroxide type B or C, only plastics bottles, plastics jars, glass bottles or glass ampoules may be used as inner packagings. However, glass receptacles may only be used as inner receptacles for packing methods OP1A and OP2A.
[3]=Only allowed as part of a combination packaging. Inner receptacles must be suitable for liquids.

(2) A solid organic peroxide for which a packing method is specified in paragraph (b) or (c) of this section must be packaged in accordance with the following provisions:

§ 173.225(d)(2)—PACKAGINGS FOR SOLID ORGANIC PEROXIDES

Type and materials	Packaging code (see 9.4.7)	Maximum quantity or net mass per packing method [1]							
		OP1B [2]	OP2B [2]	OP3B [2]	OP4B [2]	OP5B [2]	OP6B [2]	OP7B	OP8B
Steel drum	1A2	(*)	(*)	(*)	(*)	(*)	(*)	50 kg	200 kg
Aluminum drum	1B2	(*)	(*)	(*)	(*)	(*)	(*)	50 kg	200 kg
Fiber drum	1G	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Plastics drum	1H2	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Wooden box	4C1	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plywood box	4D	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Fiberboard box	4G	0.5 kg	0.5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plastics receptacle with outer steel drum.	6HA1	(*)	(*)	(*)	(*)	(*)	(*)	50 kg	200 kg
Plastics receptacle with outer aluminum drum.	6HB1	(*)	(*)	(*)	(*)	(*)	(*)	50 kg	200 kg
Plastics receptacle with outer fiber drum.	6HG1	0.5 kg	0.5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	200 kg

§ 173.225(d)(2)—Packagings For Solid Organic Peroxides—Continued

Type and materials	Packaging code (see 9.4.7)	Maximum quantity or net mass per packing method [1]							
		OP1B [2]	OP2B [2]	OP3B [2]	OP4B [2]	OP5B [2]	OP6B [2]	OP7B	OP8B
Plastics receptacle with outer fiberboard box.	6HG2	0.5 kg	0.5 kg	5 kg	5 kg	30 kg	60 kg	50 kg	75 kg
Plastics receptacle with outer plastics drum.	6HH1	0.5 kg	0.5 kg	5 kg	5 kg	30 kg	60 kg	50 kg	200 kg
Plastics receptacle with outer solid plastics box.	6HH2	0.5 kg	0.5 kg	5 kg	5 kg	30 kg	60 kg	50 kg	75 kg

[1] Prohibited for organic peroxide types B and C.
[2] If two values are given, the first applies to the maximum net mass per inner receptacle and the second to the maximum net mass of the complete package.
[3] For combination packagings containing organic peroxide type B or C, only non-metallic packagings allowed. However, glass receptacles may only be used as inner receptacles for packing methods OP1B and OP2B.
[4] If fire retardant partitions are used, the maximum net mass of the complete package may be 25 kg.

(e) *Bulk packagings for organic peroxides.* When bulk packagings are authorized under the provisions of the Organic Peroxides Table in paragraph (b) of this section, only the following packagings are authorized:

(1) *Rail cars.* DOT 103W, 103AW, 111A60F1, 111A60W1, 111A100F2, and 111A100W2 tank car tanks are authorized. DOT 103W, 111A60F1 and 111A60W1 tank car tanks must have bottom outlets effectively sealed from inside. Gauging devices are required on DOT 103W tank car tanks. Riveted tank car tanks are not authorized.

(2) *Cargo tanks.* Specification MC 310, MC 311 and MC 312 cargo tank motor vehicles with a tank design pressure of at least 172 kPa (25 psig) are authorized. Bottom outlets are not authorized.

(3) *Portable tanks.* Specification IM 101 intermodal portable tanks are authorized as follows:

(i) Each tank must have a minimum design pressure of 267 kPa (39 psig), a minimum shell thickness of 6.35 mm (0.250 inch) mild steel.

(ii) Bottom outlets are not authorized.

(iii) Each tank must be equipped with at least two self-reclosing pressure relief devices of at least 7.6 cm (3.0 inches) diameter. The pressure relief devices must be set at a pressure that is determined by the following formula:

Pressure relief valve setting = 1.2 × [Vapor pressure of lading at 46 °C (115 °F) + Static head of lading + Pressure of gas padding, if any]

(iv) For tertiary butyl hydroperoxide (TBHP), each tank car, cargo tank or portable tank must contain 7.6 cm (3.0 inches) low density polyethylene (PE) saddles having a melt index of between 0.2 and 10.0 g/min (ASTM D1238, condition E) as part of the lading, with a ratio of PE to TBHP over a range of 0.008 to 0.012 by mass. Alternatively, plastic or metal containers equipped with fusible plugs having a melting point between 69 °C (156 °F) and 71 °C (160 °F) and filled with a sufficient quantity of water to dilute the TBHP to 65 percent or less by mass may be used. The PE saddles must be visually inspected after each trip and, at a minimum, once every 12 months, and replaced when discoloration, fracture, severe deformation, or other indication of change is noted.

(v) Specification 57 metal portable tanks are authorized only for tert-butyl cumyl peroxide, di-(2-tert-butylperoxyisopropyl)-benzene(s), and dicumyl peroxide.

§ 173.226 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone A.

Division 6.1, Packing Group I, materials that are poisonous by inhalation and that fall within the boundaries of Hazard Zone A in the graph found in § 173.133 must be packed in non-bulk packagings in accordance with the following paragraphs:

(a) In specification cylinders, as authorized in § 173.40.

(b) In 1A1, 1B1, or 1N1 drums further packed in a 1A2 or 1H2 drum. Both inner and outer drums must conform to the performance test requirements of Subpart M of Part 178 of this subchapter at the Packing Group I performance level. The outer drum must have a minimum thickness of 1.50 mm (0.059 inches) for a 1A2 outer drum or 6.30 mm (0.248 inch) for a 1H2 outer drum. Capacity of the inner drum may not exceed 220 L (58 gallons). In addition, the inner drum must—

(1) Be capable of satisfactorily withstanding the hydrostatic pressure test in § 178.605 of this subchapter at a test pressure of 550 kPa (80 psig);

(2) Satisfactorily withstand the leakproofness test in § 178.604 of this subchapter using an internal air pressure of at least twice the vapor pressure at 55 °C (131 °F) of the material to be packaged;

(3) Have screw-type closures that are—

(i) Closed and tightened to a torque prescribed by the closure manufacturer, using a device that is capable of measuring torque;

(ii) Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation; and

(iii) Provided with a cap seal that is properly applied in accordance with the cap seal manufacturer's recommendations and is capable of withstanding an internal pressure of at least 100 kPa (15 psig).

(4) Have a minimum thickness as follows:

(i) If the capacity of the inner drum is less than or equal to 120 L (32 gallons), the minimum thickness of the inner drum is—

(A) For a 1A1 or 1N1 drum, 1.3 mm (0.051 inches); and

(B) For a 1B1 drum, 3.9 mm (0.154 inches).

(ii) If the capacity of the inner drum is greater than 120 L (32 gallons), the thickness of the inner drum is—

(A) For a 1A1 or 1N1 drum, 1.7 mm (0.067 inches); and

(B) For a 1B1 drum, 4.7 mm (0.185 inches); and

(5) Be isolated from the outer drum by a shock-mitigating, non-reactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material around the body of the inner drum, and at least 7.6 cm (3 inches) on the top and bottom, between the inner and outer drum.

(c) In combination packagings, consisting of an inner packaging system and an outer packaging, as follows:

(1) *Outer packagings:*

Steel drum: 1A2
Aluminum drum: 1B2
Metal drum, other than steel or aluminum: 1N2
Plywood drum: 1D
Fiber drum: 1G
Plastic drum: 1H2
Wooden barrel: 2C2
Steel jerrican: 3A2
Plastic jerrican: 3H2
Steel box: 4A1 or 4A2

Aluminum box: 4B1 or 4B2
Natural wood box: 4C1 or 4C2
Plywood box: 4D
Reconstituted wood box: 4F
Fiberboard box: 4G
Expanded plastic box: 4H2
Solid plastic box: 4H2

(2) *Inner packaging system.* The inner packaging system consists of two packagings: an impact-resistant receptacle of glass, earthenware, plastic or metal securely cushioned with a non-reactive, absorbent material and packed within a leak-tight packaging of metal or plastic. This combination packaging in turn is packed within the outer packaging. Capacity of each inner receptacle may not exceed 4 L (1 gallon). An inner receptacle that has a closure must have a screw-type closure which is physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation. Both the inner packaging system and the outer packaging must conform to the performance test requirements of subpart M of part 178 of this subchapter, at the Packaging Group I performance level. The inner packaging system must meet these tests without the benefit of the outer packaging. The total amount of liquid contained in the outer packaging may not exceed 16 L (4 gallons).

§ 173.227 Materials poisonous by inhalation. Division 6.1. Packing Group I, Hazard Zone B.

Division 6.1, Packing Group I, materials that are poisonous by inhalation and that fall within the boundaries of Hazard Zone B in the graph found in § 173.133 shall be packed in non-bulk packagings which conform to the performance test requirements of subpart M of part 178 of this subchapter, at the Packing Group I performance level. The following packagings are authorized:

(a) Packagings as authorized in § 173.226.

(b) 1A1, 1B1, 1N1 or 1H1 drums further packed in a 1A2 or 1H2 drum or a 6HA1 composite. Both the inner and outer drums must conform to the performance test requirements of subpart M of part 178 of this subchapter at the Packing Group I performance level. The outer drum must have a minimum thickness of 1.35 mm (0.053 inches) for a 1A2 outer drum or 6.30 mm (0.248 inches) for a 1H2 outer drum. In addition, the inner drum must—

(1) Satisfactorily withstand the leakproofness test in § 178.604 of this subchapter using an internal air pressure of at least two times the vapor pressure at 55 °C (131 °F) of the material to be packaged;

(2) Have screw closures that are—

(i) Closed and tightened to a torque prescribed by the closure manufacturer, using a device that is capable of measuring torque;

(ii) Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation; and

(iii) Provided with a cap seal that is properly applied in accordance with the cap seal manufacturer's recommendations and is capable of withstanding an internal pressure of at least 100 kPa (15 psig).

(3) Have a minimum thickness as follows:

(i) If the capacity of the inner drum is less than or equal to 30 L (7.9 gallons), the minimum thickness of the inner drum is:

(A) For a 1A1 drum, 0.69 mm (0.027 inch);

(B) For a 1B1 drum, 2.79 mm (0.110 inch);

(C) For a 1H1 drum, 1.14 mm (0.045 inch); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.0625 inch), the outer steel drum shall be 0.96 mm (0.038 inch).

(ii) If the capacity of the inner drum is greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons), the minimum thickness of the inner drum is—

(A) For a 1A1 drum, 1.08 mm (.043 inch);

(B) For a 1B1 drum, 3.9 mm (0.154 inch);

(C) For a 1H1 drum, 3.18 mm (0.125 inch); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.625 inch) and the outer steel drum shall be 0.96 mm (0.0378 inches).

(iii) If the capacity of the inner drum is greater than 120 L (31.7 gallons), the thickness of the inner drum is—

(A) For a 1A1 or 1N1 drum, 1.35 mm (0.053 inches);

(B) For a 1B1 drum, 4.7 mm (0.185 inches);

(C) For a 1H1 drum, 3.16 mm (0.124 inches); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.62 inch) and the outer steel drum shall be 1.08 mm (0.43 inch).

(4) Be isolated from the outer drum by a shock-mitigating, non-reactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material around the body of the inner drum, and at least 7.6 cm (3 inches) on the top and bottom, between the inner and outer drum; and

(5) Have a capacity not greater than 220 L (58 gallons).

(c) 1A1, 1B1, 1N1 or 6HA1 drums described in paragraph (b) of this section may be used without being further packed in a 1A2 or 1H2 drum if the shipper loads the material, blocks and braces the drums within the transport vehicle and seals the transport vehicle used. Drums may not be stacked (double decked) within the transport vehicle. Shipments must be from one origin to one destination only without any intermediate pickup or delivery.

§ 173.228 Bromine pentafluoride or bromine trifluoride.

(a) When the § 172.101 Table specifies that a hazardous material be packaged under this section, only non-bulk packagings prescribed in paragraph (b) of this section are authorized for its transportation. Each packaging must conform to the general packaging requirements of subpart B of this part, to the specification requirements of part 178 of this subchapter and to the requirements of the special provisions of Column 7 of the § 172.101 Table.

(b) Specification 3A150, 3AA150, 3B240, 3BN150, 4B240, 4BA240, 4BW240 and 3E1800 cylinders are authorized. Each valve outlet must be sealed by a threaded cap or threaded plug. Cylinder valves must be protected as specified for corrosive gases in § 173.301(g). No cylinder may be equipped with any pressure relief device. Specification 3E1800 cylinders must be packaged in accordance with the requirements of § 173.301(k).

§ 173.229 Chloric acid solution or chlorine dioxide hydrate, frozen.

When the § 172.101 Table specifies that a hazardous material be packaged in accordance with this section, only 4G fiberboard boxes, with inner packagings of polyethylene or other suitable material, are authorized. Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate or acid in a frozen state during transportation. Each packaging must conform to the general packaging requirements of subpart B of part 173, and to the requirements of part 178 of this subchapter at the Packing Group I performance level. Transportation is authorized only by private or contract carrier by motor vehicle.

§ 173.230 Non-bulk packagings for ORM-D materials.

(a) *General.* Exceptions in the following paragraphs are permitted only if this section, or § 173.306 of this part, is referenced for the specific hazardous material in the § 172.101 Table of this subchapter.

(b) *Cartridges, small arms, and cartridges power devices.* (1) Cartridges, small arms, and cartridges power devices (which are used to project fastening devices) which have been classed as a Division 1.4S explosive may be reclassed, offered for transportation, and transported as ORM–D material when packaged in accordance with paragraph (b)(2) of this section; such transportation is excepted from the requirements of subparts E (Labeling) and F (Placarding) of part 172 of this subchapter. Cartridges, small arms, and cartridges power devices that may be shipped as ORM–D material is limited to:

(i) Ammunition for rifle, pistol or shotgun;

(ii) Ammunition with inert projectiles or blank ammunition;

(iii) Ammunition having no tear gas, incendiary, or detonating explosive projectiles; and

(iv) Ammunition not exceeding 12.7 mm (50 caliber or 0.5 inch) for rifle or pistol, cartridges or 8 gauge for shotshells.

(2) Packaging for cartridges, small arms, and cartridges power devices as ORM–D material must be as follows:

(i) Ammunition must be packed in inside boxes, or in partitions which fit snugly in the outside packaging, or in metal clips;

(ii) Primers must be protected from accidental initiation;

(iii) Inside boxes, partitions or metal clips must be packed in securely-closed strong outside packagings; and

(iv) Maximum gross weight is limited to 30 kg (66 pounds) per package.

(c) *Compressed gases.* A compressed gas which conforms to the provisions of paragraph (a)(1), (a)(3) except (a)(3)(vi), or (b) except (b)(1)(iii) of § 173.306 of this subchapter and is a "Consumer commodity" as defined in § 171.8 of this subchapter may be renamed "Consumer commodity" and reclassed as ORM–D material. Each completed package must conform to the requirements of Subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. Shipments are excepted from the requirements of Subparts E (Labeling) and F (Placarding) of Part 172 of this subchapter.

(d) Other consumer commodity exceptions are provided for Class (or Division) 3, 4.1, 5.1, 5.2, 6.2, 8 or 9 materials, if the § 172.101 Table entry for the specific material refers to, and the material meets the provisions in §§ 173.150, 173.151, 173.152, 173.153, 173.154 or 173.155, as appropriate.

Subpart F—Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7

§ 173.240 Bulk packaging for certain low hazard solid materials.

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) *Rail cars:* Class DOT 103, 104, 105, 109, 111, 112, 114, or 115 tank car tanks; Class 106 or 110 multi-unit tank car tanks; AAR Class 203W, 206W, and 211W tank car tanks; and metal non-DOT specification, sift-proof tank car tanks and sift-proof closed cars.

(b) *Motor vehicles:* Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, DOT 406, DOT 407, and DOT 412 cargo tank motor vehicles; non-DOT specification, sift-proof cargo tank motor vehicles; and sift-proof closed vehicles.

(c) *Portable tanks and closed bins:* DOT 51, 52, 53, 56, 57 and 60 portable tanks; IM 101 and 102 portable tanks; marine portable tanks conforming to 46 CFR 64; and sift-proof non-DOT specification portable tanks and closed bins.

§ 173.241 Bulk packagings for certain low hazard liquid and solid materials

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) *Rail cars:* Class DOT 103, 104, 105, 109, 111, 112, 114, or 115 tank car tanks; Class 106 or 110 multi-unit tank car tanks and AAR Class 203W, 206W, and 211W tank car tanks.

(b) *Cargo tanks:* DOT specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, DOT 406, DOT 407, and DOT 412 cargo tank motor vehicles; and non-DOT specification cargo tank motor vehicles suitable for transport of liquids.

(c) *Portable tanks:* DOT 51, 52, 53, 56, 57 and 60 portable tanks; IM 101 and 102 portable tanks; marine portable tanks conforming to 46 CFR 64; and non-DOT specification portable tanks suitable for transport of liquids. DOT 57 portable tanks used for the transportation by vessel of Class 3, Packing Group II, materials must conform to the following:

(1) Each tank must have a minimum design pressure of 62 kPa (9 psig) and be equipped in accordance with § 178.253–4 of this subchapter, except that frangible devices are not authorized; and

(2) No pressure relief device may open at less than 34.4 kPa (5 psig).

§ 173.242 Bulk packagings for certain medium hazard liquids and solids, including solids with dual hazards.

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) *Rail cars:* Class DOT 103, 104, 105, 109, 111, 112, 114, or 115 tank car tanks; Class 106 or 110 multi-unit tank car tanks and AAR Class 206W tank car tanks. Except for DOT Specification 111A100W4 and 111J100W4 tank car tanks, Class DOT 103, 104, and 111 tank car tanks used to transport materials meeting the definition of a Class 3 material in § 173.121 of this subchapter, must have many closures so designed that pressure will be released automatically and safely in the process of removing the manway cover.

(b) *Cargo tanks:* Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, DOT 406, DOT 407, and DOT 412 cargo tank motor vehicles. Cargo tanks used to transport Class 3, Packing Group I or II, or Packing Group III with a flash point of less than 38 °C (100 °F); Class 6, Packing Group I or II; and Class 8, Packing Group I or II materials must conform to the following special requirements:

(1) Pressure relief system: Except as provided by § 173.33(d), each cargo tank must be equipped with a pressure relief system meeting the requirements of § 178.346–10 or § 178.347–10 of this subchapter. However, pressure relief devices on MC 310, MC 311 and MC 312 cargo tanks must meet the requirements for a Specification MC 307 cargo tank. Pressure relief devices on MC 330 and MC 331 cargo tanks must meet the requirement in § 178.337–9 of this subchapter.

(2) Bottom outlets: DOT 406, DOT 407 and DOT 412 must be equipped with stop-valves meeting the requirements of § 178.345–11 of this subchapter; MC 304, MC 307, MC 310, MC 311, and MC 312 cargo tanks must be equipped with stop-valves capable of being remotely closed

within 30 seconds of actuation by manual or mechanic means and (except for Class 8, Packing Group I and II) by a closure activated at a temperature not over 121 °C (250 °F); MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11 of this subchapter.

(c) *Portable tanks:* DOT 51, 52, 53, 56, 57 and 60 portable tanks; and marine portable tanks conforming to 46 CFR part 64. DOT 57 portable tanks used for the transportation by vessel of Class 3, Packing Group II, materials must conform to the following:

(1) Each tank must have a minimum design pressure of 62 kPa (9 psig) and be equipped in accordance with § 178.253–4 of this subchapter, except that frangible devices are not authorized; and

(2) No pressure relief device may open at less than 34.4 kPa (5 psig).

§ 173.243 Bulk packaging for certain high hazard liquids and dual hazard liquids which pose a moderate hazard.

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) *Rail cars:* Class DOT 103, 104, 105, 109, 111, 112, 114, or 115 tank car tanks; and Class 106 or 110 multi-unit tank car tanks. Gauging devices are required on Class DOT 103, 104, and 111 tank car tanks. Riveted tank car tanks are not authorized. Except for DOT Specification 111A100W4 and 111J100W4 tank car tanks, Class DOT 103, 104, and 111 tank car tanks used to transport materials meeting the definition of a Class 3 material in § 173.121 of this subchapter, must have many closures so designed that pressure will be released automatically and safely in the process of removing the manway cover.

(b) *Cargo tanks.* Specification MC 304, MC 307, MC 330, MC 331 cargo tank motor vehicles; and MC 310, MC 311, MC 312, DOT 407, and DOT 412 cargo tank motor vehicles with tank design pressure of at least 172.4 kPa (25 psig). Cargo tanks used to transport Class 3 or Division 6.1 materials, or Class 8, Packing Group I or II materials must conform to the following special requirements:

(1) Pressure relief system: Except as provided by § 173.33(d), each cargo tank must be equipped with a pressure relief system meeting the requirements of § 178.346–10 or 178.347–10 of this subchapter. However, pressure relief devices on MC 310, MC 311 and MC 312 cargo tanks must meet the requirements for a Specification MC 307 cargo tank. Pressure relief devices on MC 330 and MC 331 cargo tanks must meet the requirement in § 178.337–9 of this subchapter.

(2) Bottom outlets: DOT 406, DOT 407 and DOT 412 must be equipped with stop-valves meeting the requirements of § 178.345–11 of this subchapter: MC 304, MC 307, MC 310, MC 311, and MC 312 cargo tanks must be equipped with stop-valves capable of being remotely closed within 30 seconds of actuation by manual or mechanic means and (except for Class 8, Packing Group I and II) by a closure activated at a temperature not over 121 °C (250 °F); MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11 of this subchapter.

(c) *Portable tanks:* DOT 51 and DOT 60 portable tanks; and marine portable tanks conforming to 46 CFR 64 with design pressure of at least 172.4 kPa (25 psig).

§ 173.244 Bulk packaging for certain pyrophoric liquids (Division 4.2), poisonous liquids with inhalation hazards (Division 6.1), and bases (Class 2).

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) *Rail cars:* Class DOT 105, 109, 112, or 114 tank car tanks; and Class 106 or 110 multi-unit tank car tanks. Riveted tank car tanks are not authorized.

(b) *Cargo tanks:* Specification MC 330 and MC 331 cargo tank motor vehicles.

(c) *Portable tanks:* DOT 51 portable tanks.

§ 173.245 Bulk packaging for extremely hazardous materials such as poisonous gases (Division 2.3).

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) [Reserved]

(b) Cargo tank motor vehicles and portable tanks, when approved by the Associate Administrator for Hazardous Materials Safety.

§ 173.249 Bromine.

When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of part 173 of this subchapter and the special provisions specified in Column 7 of the § 172.101 Table.

(a) Class DOT 105A300W or 105A500W tank cars. Class 105A500W tank cars may be equipped with manway cover plates, pressure relief valves, vent valves, and loading/unloading valves that are required on Class 105A–300W tank cars. Tank cars must conform with paragraphs (d) through (f) of this section.

(b) Specification MC 310, MC 311, MC 312 or DOT 412 cargo tank motor vehicles conforming with paragraphs (d) through (f) of this section.

(c) Specification IM 101 intermodal portable tanks conforming with paragraphs (d) through (f) of this section.

(d) The tank must be made from nickel-clad or lead-lined steel plate. Nickel cladding or lead lining must be on the inside of the tank. Nickel cladding must comprise at least 20 percent of the required minimum total thickness. Nickel cladding must conform to ASTM Specification B162–69. Lead lining must be at least 4.763 mm (0.188 inch) thick. All tank equipment and appurtenances in contact with the lading must be lined or made from metal not subject to deterioration by contact with lading.

(e) Maximum filling density is 300 percent of the tank's water capacity. Minimum filling density is 287 percent of the tank's water capacity. Maximum water capacity is 9,253 kg (20,400 pounds) for DOT 105A300W tank cars. Maximum quantity of lading in DOT 105A300W tank cars is 27,216 kg (60,000 pounds). Maximum water capacity is 16,964 kg (37,400 pounds) for DOT 105A500W tank cars and DOT 105A500W tank cars equipped as described in paragraph (a) of this section. Maximum quantity of lading in DOT 105A500W tank cars is 49,895 kg (110,000 pounds).

(f) Tank shell and head thickness for cargo tank motor vehicles and portable tanks must be at least 9.5 mm (0.375 inch) excluding lead lining.

Subpart G—Gases; Preparation and Packaging

124b. The heading of subpart G is revised to read as set forth above.

§ 173.300 [Removed and reserved]

125. Section 173.300 is removed and reserved.

126. In § 173.306, the following changes are made:

a. In paragraphs (a)(1), (a)(3) introductory text, and (b) introductory text, the phrase "subpart N of this part" is removed and replaced with the phrase "paragraph (h) of this section".

b. Paragraph (h) is added to read as follows:

§ 173.306 Limited quantities of compressed gases.

* * * * *

(h) A limited quantity which conforms to the provisions of paragraph (a)(1), (a)(3), or (b) of this section and is a "consumer commodity" as defined in § 171.8 of this subchapter, may be renamed "consumer commodity" and reclassed as ORM–D material. In addition to the exceptions provided by paragraphs (a) and (b) of this section—

(1) Outside packagings are not required to be marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED REGULATIONS";

(2) Shipments of ORM–D materials are not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance or hazardous waste or unless offered for transportation or transported by aircraft; and

(3) Strong outer packagings as specified in this section and the marking requirements specified in § 172.312 of this subchapter are not required for ORM–D materials when unitized in cages, carts or similar overpacks and when shipped by a private or contract motor carrier from a distribution center to a retail outlet.

§ 173.308 [Amended]

127. In § 173.308 paragraph (a) introductory text, the phrase "§ 173.21(e)" is removed and replaced with the phrase "§ 173.21(i)".

127a. Section 173.314 is revised to read as follows:

§ 173.314 Requirements for compressed gases in tank car tanks.

(a) *Definitions.* For definitions of compressed gases, see § 173.300.

(b) *General requirements.* (1) Tank car tanks containing compressed gases must not be shipped unless they were loaded by or with the consent of the owner thereof.

(2) Tank car tanks must not contain gases capable of combining chemically and must not be loaded with any gas which combines chemically with the gas previously loaded therein, until all residue has been removed and interior of tank thoroughly cleaned.

(3) For cars of the DOT–106A and 110A class, the tanks must be placed in position and attached to car structure by the shipper.

(4) Wherever the word "approved" is used in this part of the regulations, it means approval by the Association of American Railroads Committee on Tank Cars as prescribed in § 179.3 of this subchapter.

(5) Except as otherwise provided in this subchapter, each single unit tank car tank, which contains anhydrous ammonia, ammonia solutions with more than 50 percent ammonia, a Division 2.1 material, or a Division 2.3 material, must be marked with the name of contents (§ 172.101 of this subchapter) in accordance with the requirements of § 172.330 of this subchapter or as otherwise approved by the Department.

(6) For single unit tank car tanks, built after December 30, 1971, which are loaded with anhydrous ammonia or a material which meets the definition for Division 2.1, gaskets for manway covers and for mounting of fittings must be made of heat resistance materials approved by the AAR Tank Car Committee.

(c) *Authorized gases, filling densities, and tank car tanks.* A compressed gas offered for transportation in a tank car tank must be prepared in accordance with paragraphs (b) through (i) of this section, §§ 172.101, 173.10, 173.24b, 173.31, and 173.248 of this subchapter, and the following table (for cryogenic liquids, see § 173.319):

Kind of gas	Maximum permitted filling density, Note 1	Required tank car tank, see § 173.31
Anhydrous ammonia or ammonia solutions, with more than 50 percent ammonia.	Note 21	DOT–106A500X, Note 25.
	Note 21	DOT–105A300W, 112S340W, 114S340W, Note 24.
Argon	Note 20	DOT–107A.
Bromotrifluoromethane (R–13B1 or H–1301)	124	DOT–110A800W, Notes 13 and 25.
	140	DOT–105A500W, Note 13.
Carbon dioxide, refrigerated liquid	Note 5	DOT–105A500W, Note 6.
Chlorine	125	DOT–106A500X, Note 25.
	125	DOT–105A500W, Notes 12 and 30.
Dimethylamine, anhydrous	59	DOT–106A500X.
	62	DOT–105A300W, Notes 4 and 23.
	61	DOT–112T340W, 112J340W.
Dimethyl ether	59	DOT–106A500X, 110A500W.
	62	DOT–105A300W, Notes 4 and 23.
Division 2.1 materials not specifically provided for in this table.	Note 21	DOT–106A, 110A, Note 7.
	Note 21	DOT–105A, 111A100W4, 112T, 112J, 114T, 114J, Notes 4 and 23.
Division 2.2 materials not specifically provided for in this table.	*Note 21*	*DOT–106A, 110A, Note 7.*
	Note 21	DOT–105A, 111A100W4, 109A, 112A, 114A.
Division 2.3, Hazard Zone A, materials not specifically provided for in this table.	Note 21	Note 14.
Division 2.3, Hazard Zone B, materials not specifically provided for in this table.	Note 21	DOT–106A, 110A, Note 7.
	Note 21	DOT–105J500W, Note 3.
Division 2.3, Hazard Zone C, materials not specifically provided for in this table.	Note 21	DOT–106A and 110A, Note 7.
	Note 21	DOT–105J300W, 105J300ALW, 112J340W, 112T340W, 114J340W, 114T340W, Notes 3 and 27.
Division 2.3, Hazard Zone D, materials not specifically provided for in this table.	Note 21	DOT–106A and 110A, Note 7.
	Note 21	DOT–105A, 109A, 112A, 114A, Note 15.
Ethylamine	Note 21	DOT–106A and 110A, Note 7.
	Note 21	DOT–105A100W4, 111A100W4, 112J200W, 112T200W, 114J340W, 114T340W, Notes 4 and 23.
Helium	Note 20	DOT–107A.
Hydrogen	Note 20	DOT–107A, Note 2.
Hydrogen chloride, refrigerated liquid	89.0 maximum to 60.1 minimum at maximum 90 psig, when offered for transportation.	DOT–105A600W, Notes 17 and 30.

Kind of gas	Maximum permitted filling density, Note 1	Required tank car tank, see § 173.31
Hydrogen sulfide	68	DOT-106A800X, Notes 7 and 8.
Methyl bromide	Note 21	DOT-106A, Note 7.
	Note 21	DOT-105A100W, 111A100W4, Notes 29 and 30.
Methyl chloride	84	DOT-106A500X, Note 25.
	85	DOT-112T340W, 112J340W, Note 4.
	86	DOT-105A300W, Notes 4 and 23.
Methyl mercaptan	80	DOT-106A500X, Note 7.
	82	DOT-105A300W, Notes 4 and 23.
Methylamine, anhydrous	60	DOT-106A500X.
	62	DOT-105A300W, Notes 4 and 23.
	61	DOT-112T340W, 112J340W, Note 4.
Nitrogen	Note 20	DOT-107A.
Nitrosyl chloride	110	DOT-106A800X, Notes 7 and 11.
	124	DOT-105A300W, Notes 10 and 30.
Nitrous oxide	Note 5	DOT-105A500W, Notes 6 and 30.
Oxygen	Note 20	DOT-107A.
Sulfur dioxide	125	DOT-106A500X, 110A500W, Note 25.
	125	DOT-105A200W, Note 30.
Sulfuryl fluoride	120	DOT-105A500W.
Vinyl fluoride, inhibited	59.6 maximum to 53.6 minimum at maximum 105 psig, when offered for transportation.	DOT-105A600W, Notes 17 and 23.

NOTE 1: The filling density for liquefied gases is hereby defined as the percent ratio of the weight of gas in the tank to the weight of water that the tank will hold. For determining the water capacity of the tank in pounds, the weight of a gallon (231 cubic inches) of water at 60°F in air shall be 8.32828 pounds.

NOTE 2: Each tank must be equipped with one or more safety relief devices of approved type and discharge area; the discharge outlet of each safety relief device must be connected to a manifold having an unobstructed discharge area of at least 1½ times the total discharge area of the safety relief devices connected to the manifold; all manifolds must be connected to a single common header having an unobstructed discharge outlet pointing upward and extending above top of the car; the header and the header outlet must each have an unobstructed discharge area at least equal to the total discharge area of the manifolds connected to the header; the header outlet must be equipped with an approved ignition device which will instantly ignite any hydrogen discharged through the safety relief device.

NOTE 3: If the material also meets the definition of a Division 2.1 material, then the provisions of Note 4 are applicable.

NOTE 4: For single unit tank car tanks, interior pipes of loading and unloading valves must be equipped with excess-flow valves of approved design. For single unit tank car tanks built after December 30, 1971, the interior pipes of gaging devices with an opening for the passage of lading exceeding 1.52 mm (0.060 inch) diameter must be equipped with excess flow valves of approved design; the interior pipes of sampling devices must be equipped with excess-flow valves of approved design; the protective housing cover must be provided with an opening above each safety relief valve which is concentric with the discharge of the valve and which has an area at least equal to the valve outlet area; and each protective housing cover opening must be provided with a weatherproof cover designed for vertical discharge.

NOTE 5: The liquid portion of the gas at 0°F must not completely fill the tank.

NOTE 6: Tank must be insulated with an approved material of a thickness so that the thermal conductance is not more than 0.03 B.t.u. per square foot, per degree F differential in temperature per hour; except that the insulation thickness directly over the center sills may be reduced to give thermal conductance not exceeding 0.04 B.t.u. per square foot, per degree F differential in temperature per hour; this reduction is to permit an anchorage which must not exceed 7 inches from top of center sills to bottom of tank. Tank must be equipped with one safety relief valve of approved design set to open at a pressure not exceeding ⅝ of the test pressure of the tank and one frangible disc of approved design set to function at a pressure less than the test pressure of the tank. The discharge capacity of each of these safety relief devices must be sufficient to prevent building up of pressure in tank in excess of ¾ of the test pressure of the tank. Tanks must be equipped with two pressure-regulating valves of approved design set to open at a pressure not to exceed 350 psi on 105A500-W tanks and at a pressure not to exceed 400 psi on 105A600-W tanks. Each regulating valve and safety relief device must have its final discharge piped to the outside of the protective housing.

NOTE 7: Specification 106A or 110A tanks authorized only for transportation by rail freight and by highway. (See §§ 174.204 and 177.834(m) of this subchapter for special requirements.)

NOTE 8: Each tank must be equipped with adequate safety relief devices of the fusible plug type having a yield temperature not over 170°F, nor less than 157°F. Each device must be resistant to extrusion of the fusible alloy and leak tight at 130°F. Each valve outlet must be sealed by a threaded cap or a threaded solid plug, in addition, all valves must be protected by a metal cover.

NOTE 9: [Reserved]

NOTE 10: Tanks must be made of or clad with a metal not subject to rapid deterioration by the lading; all appurtenances such as manhole covers, venting, loading and discharge valves, safety relief valves, check valves, and education pipes, must be made of metal not subject to rapid deterioration by the lading; cork must be used as an insulating material.

NOTE 11: Tanks of nitrosyl chloride shall be nickel-clad and safety relief devices shall be of the fusible plug type and shall function at a temperature of not exceeding 175°F and be vapor tight at 130°F.

NOTE 12: Interior pipes of liquid discharge valves must be equipped with excess flow valves of approved design. The quantity of chlorine loaded into a single-unit tank car tank must not exceed 90 tons. Nominal 16-, 30-, 55-, 85- or 90-ton tank car tanks must not be loaded in excess of the normal lading weights. Tank car tanks built to ICC-105A500 may be stenciled either ICC-105A300 or ICC-105A500; tank car tanks built to ICC or DOT 105A500W may be stenciled either 105A300W or 105A500W; each tank must be equipped with safety relief valve required by the stenciled specification. Tanks not larger than 55-ton chlorine capacity built to ICC-105A300, or ICC-105A300W may be continued in service if the interior pipes of liquid discharge valves are equipped with excess flow valves of approved design. Tanks having forge welded anchors must not be used for transportation of chlorine.

NOTE 13: This gas may be transported in authorized tank car tanks stenciled "DISPERSANT GAS" or "REFRIGERANT GAS."

NOTE 14: No tank car tanks are authorized, except as provided for in §§ 172.101 and 172.102 of this subchapter for phosgene, nitrogen tetraoxide, and nitric oxide.

NOTE 15: If the material also meets the definition of a Division 2.1 material, then class DOT 109A tank car tanks are not authorized, specification DOT 112 tank car tanks must conform to class DOT 112T or DOT 112J requirements, specification DOT 114 tank car tanks must conform to class DOT 114T or DOT 114J requirements, and the provisions of Notes 4 and 23 are applicable.

NOTE 16: Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

NOTE 17: See paragraph (g) of this section.

NOTE 18: [Reserved]

NOTE 19: [Reserved]

NOTE 20: The gas pressure at 130°F in any uninsulated class DOT107A tank may not exceed seven-tenths of the marked test pressure, except that a tank may be charged with helium to a pressure 10 percent in excess of the marked maximum gas pressure at 130°F of each tank.

NOTE 21: See paragraph (b)(1) of § 173.24b of this subchapter.

NOTE 22: [Reserved]

NOTE 23: Each Specification 105 tank car tank built after August 31, 1981, shall conform to class DOT-105J. After December 31, 1986, each Specification 105 tank car tank built before September 1, 1981, and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-105J. After December 31, 1988, each Specification 111 tank car tank with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-111J. Specification 111 tank car tanks built after March 1, 1984 are not authorized for the transportation of flammable gases.

NOTE 24: Each Specification 105 tank car tank built after August 31, 1981, shall conform to class DOT-105S. Each Specification 105 tank car tank built before September 1, 1981, and with a water capacity (shell full volume including manways) exceeding 18,500 U.S. gallons, shall conform to class DOT-105S.

NOTE 25: Specification 105A and 110A tanks for these commodities are authorized for transportation by rail freight, highway, and cargo vessel. (See §§ 174.204, 176.200, 176.230, and 177.834(m) of this subchapter for additional requirements.)

NOTE 26: [Reserved]

NOTE 27: Bottom outlets and bottom washouts are not authorized.

NOTE 28: [Reserved]

NOTE 29: DOT 111A100W4 tank car tanks built after September 30, 1991 are not authorized.

NOTE 30: Each specification DOT 105 tank car tank built after September 30, 1991 must conform to class DOT 105J requirements.

(d) [Reserved]

(e) *Verification of content.* The amount of liquefied gas loaded into each tank may be determined either by measurement or calculation of the weight. If by measurement, the weight must be checked after disconnecting the loading line by the use of proper scales. If by calculation, the weight of liquefied petroleum gas, methylacetylene propadiene, stabilized, dimethylamine, monomethylamine, or trimethylamine may be calculated using the outage tables supplied by the tank car owners and the specific gravities as determined at the plant, and this computation must be checked by determination of specific gravity of product after loading. Carriers may verify calculated weights by use of proper scales. The use of a fixed tube gauge device is authorized for determining the weight of methyl mercaptan in Specification 105A300W tanks instead of weighing.

(f) [Reserved]

(g) Special requirements for hydrogen chloride, refrigerated liquid, and vinyl fluoride, inhibited.

(1) The shipper shall notify the Bureau of Explosives whenever a car is not received by the consignee within 20 days from the date of shipment.

(2) A tank car containing hydrogen chloride, refrigerated liquid must have the auxiliary valve on the pressure relief device closed during transportation.

(h) Foreign tank cars in domestic use. Except as authorized by § 171.12a, tank cars made in foreign countries, except Canada, must not be used in domestic traffic until they have been tested in this country and proper reports rendered as required by the specifications that apply.

(i) Tank car tanks used for anhydrous ammonia; butadiene; chlorodifluoroethane; chlorodifluoromethane; chloropentafluoroethane; chlorotrifluoromethane; dichlorodifluoromethane; difluoroethane; dimethylamine; dispersant gas, n.o.s., classified as a Division 2.1 material; dispersant gas, n.o.s., classified as a Division 2.2 material; liquefied petroleum gas; methylacetylene-propadiene, stabilized; methylamine; refrigerant gas, n.o.s. classified as a Division 2.1 material; refrigerant gas, n.o.s. classified as a Division 2.2 material; trimethylamine; and vinyl chloride may, as an alternate, conform with the special requirements in the table in this paragraph. Safety relief valves may be set to the following pressures, provided the total valve discharge capacity is sufficient to prevent building up pressure in the tank in excess of 90 percent of the tank test pressure:

Safety relief valves, p.s.i.	DOT specifications		
	105[1]300W	112[1]340W 114[1]340W	112[1]400W 114[1]400W
Start-to-discharge pressure	247.5	280.5	330
Start-to-discharge tolerance	±7.5	±8.4	±10
Vapor tight pressure (minimum)	196	224	264
Flow rating pressure	270	306	360

[1] Denotes the letter "A", "S", "J", or "T".

128. In § 173.315, paragraph (a)(2) is added to read as follows:

§ 173.315 Compressed bases in cargo *tanks and portable tanks.*

(a) * * *

(2) Other gases not listed by name in the table in paragraph (a)(1) of this section may be shipped in portable tanks or cargo tanks subject to the following conditions:

(i) Minimum packaging design pressure must not be less than—

(A) For a non-flammable and non-poisonous gas lading (Division 2.2), the vapor pressure at the reference temperature of the lading.

(B) For a gas which is toxic or flammable (Division 2.1 or 2.3), or both, the vapor pressure at the reference temperature of the lading plus one percent or 172.4 kPa (25 psig), whichever is less, for each additional hazard.

(ii) Maximum permitted filling density may not exceed that specified in paragraph (c) of this section

* * * * *

129 Subpart H is removed and reserved and new §§ 173 321 173 322, 173 323, 173 324, 173 334, 173 335 173 336, 173 337 173 338, and 173 340 are added to Subpart G to read as follows

§ 173.321 Ethylamine.

Ethylamine must be packaged as follows:

(a) In 1A1 drums which meet Packing Group I performance level requirements.

(b) In specification cylinders as prescribed for any compressed gas except acetylene.

§ 173.322 Ethyl chloride.

Ethyl chloride must be packaged in any of the following single or combination non-bulk packagings which meet Packing Group I performance level requirements:

(a) In 4C1, 4C2, 4D or 4F wooden boxes with glass, earthenware, or metal inner receptacles not over 500 g (17.6 ounces) capacity each;

(b) In 4G fiberboard boxes with glass, earthenware, or metal inner receptacles not over 500 g (17.6 ounces) capacity each. Outer packagings may not exceed 30 kg (66 pounds) gross weight,

(c) In 1A1 drums of not over 100 L (26 gallons) capacity each, or

(d) In specification cylinders as prescribed for any compressed gas except acetylene

§ 173.323 Ethylene oxide.

(a) For packaging ethylene oxide in non-bulk packagings, copper, silver mercury or any of their alloys may not be used in any part of a packaging, valve, or other packaging appurtenance if that part, during normal conditions of transportation, may come in contact with ethylene oxide liquid or vapor. All packaging and gaskets must be constructed of materials which are compatible with ethylene oxide and do not lower the auto-ignition temperature of ethylene oxide.

(b) Ethylene oxide must be packaged in one of the following:

(1) In 4G fiberboard boxes with one inner glass ampoule or vial of no more than 100 g (3.5 ounces) capacity cushioned with noncombustible material The completed package must be capable of passing Packing Group I performance tests

(2) In 4G fiberboard boxes constructed with top and bottom pads and perimeter liner Inner packagings must be aluminum receptacles of no more than 135 g (4 8 ounces capacity cushioned with incombustible material No more than 12 receptacles may be packed in one box and no more than 10 boxes

may be overpacked under the provisions of § 173.25 of this Part. Each completed package must be capable of passing Packing Group I performance tests.

(3) In 4C1, 4C2, 4D or 4F wooden boxes or 4G fiberboard boxes with inner metal receptacles of no more than 340 g (12 ounces) capacity. The metal receptacle must be capable of withstanding no less than a 1241.1 kPa (180 psig) burst pressure. No more than 12 receptacles may be packed in one box, and each receptacle may not be liquid full below 82 °C (180 °F). Each inner receptacle must be insulated and equipped with a relief device of the fusible plug type with yield temperature of 69 °C to 77 °C (156 °F to 171 °F). The capacity of relief device and insulation must be such that the charged receptacle will not explode when tested by the method described in CGA Pamphlet C–14 or other equivalent method. Each completed package must be capable of passing all Packing Group I performance tests.

(4) In specification cylinders, as authorized for any compressed gas except acetylene. Cylinders must be seamless or welded steel (not brazed) with a nominal capacity of no more than 115 L (30 gallons) and may not be liquid full below 82 °C (180 °F). Cylinders over 4 L (1 gallon) capacity must be equipped with educator tubes and must be insulated. Before each refilling, each cylinder must be tested for leakage at no less than 103.4 kPa (15 psig) pressure. In addition, each cylinder must be equipped with a fusible type relief device with yield temperature of 69 °C to 77 °C (157 °F to 170 °F). The capacity of the relief device and the effectiveness of the insulation must be such that the charged cylinder will not explode when tested by the method described in CGA Pamphlet C–14 or other equivalent method.

(5) In 1A1 steel drums of no more than 231 L (61 gallons) and meeting Packing Group I performance standards. The drum must be lagged, of all welded construction with the inner shell having a minimum thickness of 1.7 mm (0.068 inches) and the outer shell having a minimum thickness of 2.4 mm (0.095 inches). Drums must be capable of withstanding a hydrostatic test pressure of 690 kPa (100 psig). Lagging must be of sufficient thickness so that the drum, when filled with ethylene oxide and equipped with the required pressure relief device, will not rupture when exposed to fire. The drum may not be liquid full below 85 °C (185 °F), and must be marked "THIS END UP" on the top head. Before each refilling, each drum must be tested for leakage at no less than 103 kPa (15 psig) pressure. Each drum must be equipped with a fusible type relief device with yield temperature of 69 °C to 77 °C (157 °F to 170 °F), and the capacity of the relief device must be such that the filled drum will not rupture when tested by the method described in CGA Pamphlet C–14 or other equivalent method.

(c) When § 172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of subparts A and B of this part, the special provisions specified in Column 7 of the § 172.101 Table, and paragraphs (d) through (j) of this section:

(1) *Tank cars.* DOT 105J100W tank car tanks; DOT 105A100W or 111A100W4 tank car tanks built before September 1, 1981 and having a water capacity not exceeding 70,030 L (18,500 gallons); and DOT 111J100W4 tank car tanks built before March 2, 1984.

(2) *Cargo tanks.* Specification MC 330 and MC 331 cargo tank motor vehicles.

(3) *Portable tanks.* DOT 51 portable tanks.

(d) The pressure relief devices must be set to function at 517 kPa (75 psig). Portable tanks fitted with non-reclosing devices made and in use prior to December 31, 1967, may continue to be used in ethylene oxide service.

(e) In determining outage, consideration must be given to the lading temperature and solubility of inert gas padding in ethylene oxide as well as the partial pressure exerted by the gas padding.

(f) Each tank, loaded or empty, must be padded with dry nitrogen or other suitable inert gas of sufficient quantity to render the vapor pressure of the tank nonflammable up to 105 °F (41 °C). The gas used for padding must be free of impurities which may cause the ethylene oxide to polymerize, decompose or undergo other violent chemical reaction.

(g) Copper, silver, mercury, magnesium or their alloys may not be used in any part of the tank or appurtenances that are normally in contact with the lading.

(h) Neoprene, natural rubber and asbestos gaskets are prohibited. All packing and gaskets must be made of materials which do not react with or lower the autoignition temperature of the lading.

(i) Each tank must be insulated with cork (at least 10 cm (4 inches) thick), or mineral wool, fiberglass or other suitable insulation material of sufficient thickness so that the thermal conductance at 16 °C (60 °F) is not more than 0.075 Btu per hour per square foot per degree F. temperature differential. Portable tanks made and in use prior to December 31, 1987 equipped with fusible plugs instead of a safety relief valve or frangible disc, must have sufficient insulation so that the tank as filled for shipment will not rupture in a fire. The insulation on portable tanks or cargo tank motor vehicles must be protected with a steel jacket at least 2.54 mm (0.100 inch) thick, or as required by the specification.

(j) Tank car tanks built after December 30, 1971 must be equipped with a thermometer well.

§ 173.324 Ethyl methyl ether.

Ethyl methyl ether must be packed as follows:

(a) In specification cylinders, as authorized for any compressed gas except acetylene; or

(b) In packagings as specified in § 173.201 which meet Packing Group I performance level requirements.

§ 173.334 Organic phosphates mixed with compressed gas.

Hexaethyl tetraphosphate, parathion, tetraethyl dithio pyrophosphate, tetraethyl pyrophosphate, or other Division 6.1 organic phosphates (including a compound or mixture), may be mixed with a non-flammable compressed gas. This mixture must not contain more than 20 percent by weight of organic phosphate and must be packaged in specification 3A240, 3AA240, 3B240, 4A240, 4B240, 4BA240, or 4BW240 cylinders meeting the following requirements.

(a) Each cylinder may be charged with not more than 5 kg (11.0 pounds) of the mixture, to a maximum filling density of not more than 80 percent of the water capacity;

(b) Each cylinder must be charged in compliance with § 173.301 (e) and (f);

(c) No cylinder may be equipped with an eduction tube or a fusible plug;

(d) No cylinder may be equipped with any valve unless the valve is a type approved by the Associate Administrator for Hazardous Materials Safety;

(e) Cylinders must be overpacked in a box so arranged to protect each valve or other closing device from damage. Except as provided in paragraph (f) of this section, no more than four cylinders may be packed in a box. Each box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package is dropped 1.8 m (5.9 feet) onto solid concrete and impacted at the package's weakest point.

(f) Cylinders may be packed in strong wooden boxes with valves or other closing devices protected from injury, with not more than twelve cylinders in one outside wooden box. An outer fiberboard box may be used when not more than four such cylinders are to be shipped in one packaging. Valves must be adequately protected. Box and valve protection must be of strength sufficient to protect all parts of inner packagings and valves from deformation or breakage resulting from a drop of at least 1.8 m (5.9 feet) onto a concrete floor, impacting at the weakest point.

§ 173.335 Gas generator assemblies.

Gas generator assemblies (aircraft) containing liquefied non-flammable, non-toxic gas and a solid propellant cartridge must be packaged as follows:

(a) The gas must be packaged in specification steel cylinders authorized for any compressed gas except acetylene not exceeding 10.5 L (2.8 gallons) internal volume and having a minimum design burst pressure of 19,700 kPa (2,857 psi);

(b) Fittings must be protected against damage under conditions normal incident to transport, any trigger must be fitted with a safety locking pin, and a non-propulsive plug must be installed on the discharge tube; and

(c) Each complete unit must be individually and tightly packed to prevent movement in wooden boxes (4C1 or 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fiberboard boxes (4G), or plastic boxes, (4H1and 4H2) of Packing Group II performance level, or in the original manufacturer's transit box.

§ 173.336 Nitrogen dioxide, liquid; nitrogen peroxide, liquid; and nitrogen tetroxide, liquid.

Nitrogen dioxide, liquid, nitrogen peroxide, liquid, and nitrogen tetroxide, liquid must be packed in specification cylinders as follows:

(a) As prescribed in § 173.192, or

(b) Specification 3A480, 3AA480, 3AL1800, or 3E1800 metal cylinders, with valves removed, are authorized. Each valve opening must be closed by means of a solid metal plug with tapered thread properly luted to prevent leakages; valve protection cap must be used and be at least 4.76 mm (0.187 inches) thick gas-tight, with 4.76 mm (0.187 inches) faced seat for gasket and with United States standard form thread. Transportation in 3AL cylinders is authorized only by highway or rail. Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901c, paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified therein.

§ 173.337 Nitric oxide.

Nitric oxide must be packed in Specification 3A1800, 3AA1800, 3E1800, or 3AL1800 cylinders charged to a pressure of not more than 5,170 kPa (750 psi) at 21 °C (70 °F). Cylinders must be equipped with a valve of stainless steel and valve seat of material which will not be deteriorated by contact with nitric oxide or nitrogen dioxide. Cylinders or valves may not be equipped with pressure relief devices of any type. Valve outlets must be sealed by a solid threaded cap or plug and an inert gasketing material. In addition—

(a) Specification 3E1800 cylinders must be overpacked in strong wooden boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each overpack must conform to § 173.25.

(b) Specification 3A, 3AA, and 3AL cylinders must have their valves protected by metal caps or other equally protective guards securely attached to the cylinders and be of sufficient strength to protect the valves from injury during transit, or by overpacking in strong wooden boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each overpack must conform to § 173.25. Transportation in 3AL cylinders is authorized only by highway or rail.

(c) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901C, paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901C may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901C paragraph 4.4.2.3 and meet the standard of cleanliness specified therein.

§ 173.338 Tungsten hexafluoride.

Tungsten hexafluoride must be packed in specification 3A, 3AA, 3BN, or 3E (§§ 178.36, 178.37, 178.39, 178.42 of this subchapter) cylinders. Cylinders must be equipped with a valve protection cap or be packed in a strong outside container complying with the provisions of § 173.40. Outlets of any valves must be capped or plugged. As an alternative, the cylinder opening may be closed by the use of a metal plug. Specification 3E cylinders must be shipped in an overpack that complies with the provisions of § 173.40.

§ 173.340 Tear gas devices.

(a) Packagings for tear gas devices must be approved prior to initial transportation by the Associate Administrator for Hazardous Materials Safety.

(b) Tear gas devices may not be assembled with, or packed in the same packaging with, mechanically- or manually-operated firing, igniting, bursting, or other functioning elements unless of a type and design which has been approved by the Associate Administrator for Hazardous Materials Safety.

(c) Tear gas grenades, tear gas candles, and similar devices must be packaged in one of the following packagings conforming to the requirements of part 178 of this subchapter at the Packing Group II performance level:

(1) In UN 4C1, 4C2, 4D, or 4F metal-strapped wooden boxes. Functioning elements not assembled in grenades or devices must be in a separate compartment of these boxes, or in inner or separate outer boxes, UN 4C1, 4C2, 4D, or 4F, and must be so packed and cushioned that they may not come in contact with each other or with the walls of the box during transportation. Not more than 50 tear gas devices and 50 functioning elements must be packed in one box, and the gross weight of the outer box may not exceed 35 kg (77 pounds).

(2) In a UN 1A2 metal drum. Functioning elements must be packed in a separate inner packaging or compartment. Not more than 24 tear gas devices and 24 functioning elements must be packed in one outer drum, and the gross weight of the drum may not exceed 35 kg (77 pounds).

(3) In a UN 4G fiberboard box with inside tear gas devices meeting Specifications 2P or 2Q. Each inside packaging must be placed in fiberboard tubes fitted with metal ends or a fiber box with suitable padding. Not more than 30 inner packagings must be packed in one outer box, and the gross weight of the outer box may not exceed 16 kg (35 pounds).

(4) In other packagings of a type or design which has been approved by the

Associate Administrator for Hazardous Materials Safety.

(d) Tear gas devices may be shipped completely assembled when offered by or consigned to the U.S. Department of Defense, provided the functioning elements are so packed that they cannot accidentally function. Outer packagings must be UN 4C1, 4C2, 4D, or 4F metal-strapped wooden boxes.

§ 173.416 [Amended]

130. In § 173.416, the following changes are made:

a. In paragraph (d), the phrase "§ 178.104" is removed and replaced with the phrase "§ 178.354".

b. In paragraphs (e) and (f), the phrase "§ 178.194" is removed and replaced with "§ 178.362".

c. In paragraphs (e) and (g), the phrase "§ 178.34" is removed and replaced with the phrase "§ 178.360".

d. In paragraph (g), the phrase "§ 178.195" is removed and replaced with the phrase "§ 178.364".

131. In § 173.416, paragraph (c) is revised to read as follows:

§ 173.416 Authorized Type B packages.

* * * * *

(c) Any Type B(U) or B(M) packaging that meets the applicable requirements of the regulations of the International Atomic Energy Agency (IAEA) in its "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6" and for which the foreign competent authority certificate has been revalidated by DOT pursuant to § 173.473. This packaging is authorized only for export and import shipments.

* * * * *

§ 173.417 [Amended]

132. In § 173.417, the following changes are made:

a. In paragraphs (a)(1) and (b)(1), the phrase "§ 178.103" is removed and replaced with the phrase "§ 178.352".

b. In paragraphs (a)(2) and (b)(2), the phrase "§ 178.104" is removed and replaced with the phrase "§ 178.354".

c. In paragraph (a)(6)(iii), the phrase "§ 178.103–5(a)", is removed and replaced with the phrase "§ 178.352".

d. In paragraphs (b)(1) and (b)(2), the phrase "§ 178.34" is removed and replaced with "§ 178.360".

e. In paragraph (b)(5), the phrases "§ 178.120" and "§ 178.121" are removed and replaced with the phrases "§ 178.356" and "§ 178.358", respectively.

133. In § 173.417, paragraph (a)(5), paragraph (a)(6) introductory text, and paragraph (b)(4) are revised to read as follows:

§ 173.417 Authorized packaging—fissile materials.

(a) * * *

(5) Any other Type A or Type B, Type B(U), or Type B(M) packaging that also meets the applicable requirements for fissile material packaging in Section V of the International Atomic Energy Agency "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6," and for which the foreign competent authority certificate has been revalidated by the U.S. Competent Authority, in accordance with § 173.473. These packages are authorized only for export and import shipments.

(6) A 55-gallon 1A2 steel drum, subject to the following conditions:

* * * * *

(b) * * *

(4) Type B(U) or B(M) packaging that meets the applicable requirements for fissile radioactive materials in Section V of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6" and for which the foreign competent authority certificate has been revalidated by the U.S. Competent Authority in accordance with § 173.473. These packagings are authorized only for import and export shipments.

* * * * *

133a. Section 173.421–2 is revised to read as follows:

§ 173.421–2 Requirements for multiple hazard limited quantity radioactive materials.

(a) Except as provided in paragraph (b) of this section or in § 173.4 of this subchapter, when a limited quantity Class 7 material meets the definition of another hazard class or division, it shall be:

(1) Classed for the additional hazard;

(2) Packaged to conform with the requirements specified in § 173.421 (a) through (e) or § 173.422 (a) through (g), as appropriate; and

(3) Offered for transportation in accordance with the requirements applicable to the hazard for which it is classed.

(b) When a limited quantity Class 7 material meets the definition of Class 9 or is a combustible liquid in a non-bulk packaging, it shall be:

(1) Classed as a Class 7 material if:

(i) The material is not a hazardous waste or hazardous substance; and

(ii) The material is offered for transportation in a mode to which requirements of this subchapter pertaining to the specific material do not apply;

(2) Classed combustible liquid or Class 9, as appropriate, if:

(i) The material is a hazardous waste or hazardous substance; or

(ii) The material is offered for transportation in a mode to which requirements of this subchapter pertaining to the specific material do apply;

(3) Packaged to conform with requirements specified in § 173.421 (a) through (e) or § 173.422 (a) through (g), as appropriate; and

(4) Offered for transportation in accordance with requirements applicable to the hazard for which it is classed.

(c) A limited quantity Class 7 material which is classed other than Class 7 under the provisions of paragraph (a) or (b) of this section is excepted from the requirements of §§ 173.421–1(a), 172.203(d), and 172.204(c)(4) of this subchapter if the entry "Limited quantity radioactive material" appears on the shipping paper in association with the basic description.

(d) After May 2, 1991, a limited quantity Class 7 material classed other than Class 7 may not be offered for transportation aboard a passenger-carrying aircraft unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

§ 173.471 [Amended]

134. In § 173.471, paragraph (e) is removed and reserved.

135. The introductory text of § 173.473 is revised to read as follows:

173.473 Requirements for foreign-made packages.

In addition to other applicable requirements of this subchapter, each shipper of a foreign-made Type B, Type B(U), Type B(M), or fissile material package for which a competent authority certificate is required by the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6," shall also comply with the following requirements:

* * * * *

Subparts J through O—[Removed and Reserved]

136. Subparts J, K, L, M, N, O are removed and reserved.

Appendix B [Amended]

137. In appendix B to part 173, the following changes are made:

a. The title is amended by changing the word "POLYETHYLENE" to "PLASTIC".

b. In the first and second paragraphs, the word "polyethylene" is removed and

replaced with the word "plastic" wherever it appears.

c. In the second sentence of the first paragraph, the phrase "§ 173.24(d)(3)" is removed and replaced with the phrase "§ 173.24(e)(3)(iii)".

d. In paragraph 6, the phrase "a height of 1.2 meters (3.9 feet) onto solid concrete" is removed and replaced with the phrase "a height determined in accordance with § 178.603(d) of this subchapter onto a rigid non-resilient, flat and horizontal surface".

138. Appendix C is added to part 173 to read as follows:

Appendix C to Part 173—Procedure for Base-level Vibration Testing

Base-level vibration testing shall be conducted as follows:

1. Three sample packagings, selected at random, must be filled and closed as for shipment. A non-hazardous material may be used in place of the hazardous material if it has essentially the same physical characteristics.

2. The three packages must be placed on a vibrating platform that has a vertical double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate.

3. The test must be performed continuously for one hour at a frequency that causes each package to be raised from the vibrating platform to such a degree that a piece of material of approximately 1.6 mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

4. Immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage.

5. Rupture or leakage from any of the packages constitutes failure of the test.

139. Appendix D is added to part 173 to read as follows:

Appendix D to Part 173—Test Methods for Dynamite (Explosive, Blasting, Type A)

1. *Test method D–1—Leakage test.* A wooden stick, 114 mm (4.5 inches) long and 4.8 mm (0.2 inch) inch in diameter, with a sharpened end is used to punch 5 holes in one end of the wrapper of a dynamite cartridge. A cork stopper is placed on the bottom of a glass volumetric cylinder. The dynamite cartridge is placed, perforated end down, resting on the cork stopper in the cylinder. The entire assembly is placed in an oven at 38 °C (100 °F) for 48 hours and then examined visually for evidence of leakage.

2. *Test method D–2—Centrifugal exudation test.* The test apparatus consists of a glass tube, 135 mm (5.3 inches) long and one inch in diameter, with both ends open, and is assembled in the following manner:

(a) Close the bottom with a plastic plug of diameter equal to the inner diameter of the glass tube;

(b) Place a small amount of absorbent cotton on top of the plug;

(c) Place a plastic disk that matches the inner diameter to the glass tube and has seven small perforations on top of the cotton; and

(d) Place 10 g (0.35 ounce) of the dynamite sample on top of the disk.

The assembled glass tube is then placed in a hand-operated centrifuge and spun for one minute at 600 rpm (revolutions per minute). The dynamite sample is then removed from the glass tube and weighed to determine the percent of weight loss.

3. *Test method D–3—Compression exudation test.* The entire apparatus for this test is shown in Figure 1 of this appendix. The test is conducted using the following procedures:

(a) A glass tube, 135 mm (5.3 inches) long and one inch in diameter, is held on a wooden base;

(b) A small amount of absorbent cotton is placed into the bottom of the glass tube;

(c) Ten g (0.35 ounce) of dynamite sample are placed on top of the cotton in the glass tube;

(d) A small amount of absorbent cotton is placed on top of the dynamite sample;

(e) A plastic disk that matches the inner diameter of the glass tube and has seven small perforations is placed on top of the cotton;

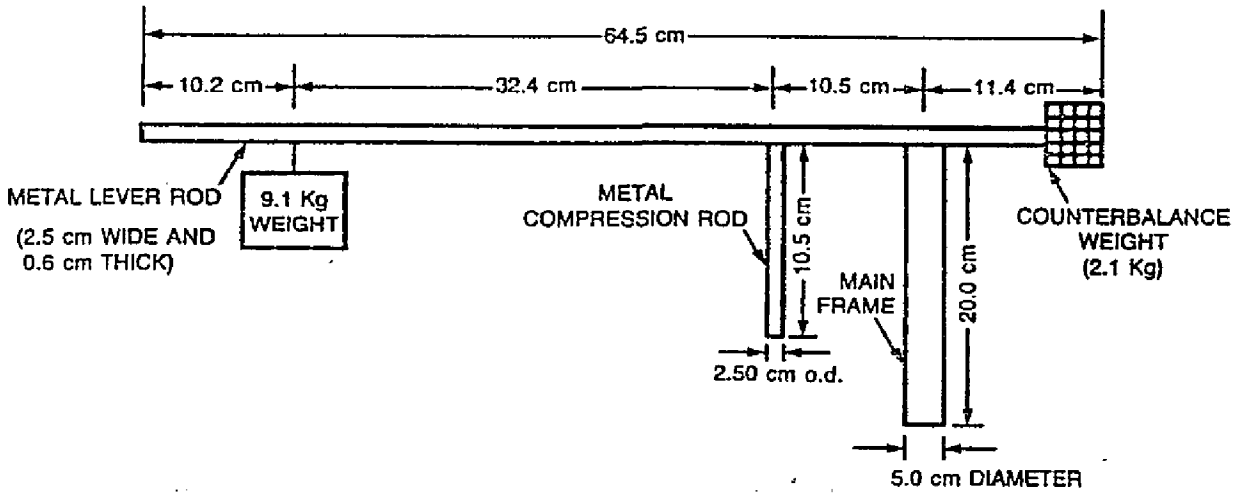
(f) A plastic plug matching the inner diameter of the glass tube is then placed on top of the disk;

(g) The glass tube assembly is placed under the compression rod, and compression is applied by means of the weight on the metal lever rod. The sample is compressed for one minute; and

(h) The dynamite sample is then removed from the glass tube and weighed to determine the percent of weight loss.

BILLING CODE 4910–60–M

FIGURE 1
COMPRESSION APPARATUS



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140. Appendix E is added to part 173 to read as follows:

Appendix E to Part 173—Guidelines for the Classification and Packing Group Assignment of Class 4 Materials

1. *General.* Tests and criteria for assignment to the three divisions of Class 4 are addressed below. The following principles should be applied to the classification of, and assignment of a packing group to, a new material or a new composition of existing material(s) not already covered by the entries in the § 172.101 Hazardous Material Table.

2. *Classification and packing group assignment of a Division 4.1 material.*

a. A wetted explosive is listed as Division 4.1 in the § 172.101 Hazardous Material Table after consideration of all appropriate data to ensure that its explosive properties are suppressed. Packing Group I is assigned to any wetted explosive.

b. A self-reactive material is listed in the § 172.101 Hazardous Material Table after consideration of the particular properties of the material. The following considerations apply:

(1) Any self-reactive material which, when packaged for transport, can detonate, is forbidden.

(2) Any self-reactive material which in laboratory testing shows a high mechanical sensitivity and is liable to detonate or deflagrate rapidly is forbidden. (Deflagration is the subsonic transmission of a decomposition front through a material without the necessary participation of oxygen from the air.)

(3) Any self-reactive material which in laboratory testing shows a high mechanical sensitivity is provisionally acceptable as a self-reactive material of Division 4.1, provided that this formulation does not detonate or deflagrate rapidly.

(4) *Assignment of Packing Groups.* Packing Group II is assigned to self-reactive materials.

c. Readily combustible solids are classed in Division 4.1 in accordance with the following test methods and the procedure indicated in the flow-chart, figure E–1 of this appendix.

(1) *Preliminary screening test.*

(A) The material in its commercial form, is formed into an unbroken strip or powder train about 250 mm long by 20 mm wide by 10 mm high on a cool, impervious, low-heatconducting base plate.

(B) A hot flame (minimum temperature 1000 °C) from a gas burner (minimum diameter 5 mm is applied to one end of the powder train until the powder ignites or for a maximum of 2 minutes (5 minutes for powders of metals or metal-alloys). Note whether combustion propagates along 200 mm of the train within the 2 minute test period (or 20 minutes for metal powders).

(C) If the material does not ignite and propagate combustion either by burning with flame or smoldering along 200 mm of the powder train within the 2 minute (or 20 minute) test period, then the material may not be classified as a flammable solid and no further testing is required.

(D) If the material propagates burning of a 200 mm length of the powder train in less than 2 minutes, or less than 20 minutes for metal powders, the full test program below must be carried out.

(2) *Burning rate test.*

(A) The powdered or granular material, in its commercial form, is loosely filled into a mold 250 mm long with a triangular cross-section of inner height 10 mm and width 20 mm. (See Figure E–2 of this appendix.) On both sides of the mold, in the longitudinal direction, two metal sheets are mounted as lateral limitations which extend 2 mm beyond the upper edge of the triangular cross-section (Figure E–2 of this appendix). The mold is then dropped three times from a height of 2 cm onto a solid surface. The lateral limitations are then removed and the impervious, non-combustible, low heat conducting plate is placed on top of the mold, the apparatus inverted and the mold removed. Pasty materials are spread on a non-combustible surface in the form of a rope 250 mm in length with a cross-section of about 1 cm^2. Any suitable ignition source, such as a small flame or a hot wire of minimum temperature 1000 °C, is used to ignite the pile at one end. In the case of a moisture-sensitive material, the test must be carried out as quickly as possible, after its removal from the container.

(B) Arrange the pile across the draft in a fume-chamber. The air speed must be sufficient to prevent fumes escaping into the laboratory and should not be varied during the test. A draft screen may be erected around the apparatus.

(C) Add 1 ml of a wetting solution to the pile 30–40 mm beyond the 100 mm timing zone. (See 2c(2)d.) The addition of wetting agents may be necessary because, with many materials, water rolls off the sides of the pile. Wetting agents used must be free from combustible diluents and the total active matter in the wetting solution may not exceed 1 percent. This liquid may be added to a hollow up to 3 mm deep and 5 mm in diameter in the top of the pile. Apply the wetting solution to the ridge drop by drop, ensuring the whole cross-section of the pile is wetted without loss of liquid from the sides. The liquid must be applied over the shortest possible length of the pile consistent with avoiding loss from the sides. This portion of the test is not applicable to metal powders.

(D) Ignite one end of the pile. When the pile has burned a distance of 80 mm, measure the rate of burning over the next 100 mm. Note whether or not the wetted zone stops propagation of the flame. The test is performed six times using a clean cool plate each time, unless a positive result is observed earlier.

(3) *Criteria for classification.*

(A) Powdered, granular or pasty materials are classified in Division 4.1 when the time of burning of one or more of the test runs, according to the test method described in 2.3.2, is less than 45 s or the rate of burning is more than 2.2 mm/s.

(B) Powders of metals or metal alloys are classified when they can be ignited and the reaction spreads over the whole length of the sample in 10 minutes or less.

(4) *Assignment of packing groups.*

(A) *Combustible solids (other than metal powders).* Packing Group II is assigned if the burning time is less than 45 s and the flame passes the wetted zone. Packing Group III is assigned if the burning time is less than 45 s and the wetted zone stops the flame propagation for at least 4 minutes.

(B) *Powders of metal or metal alloys.* Packing Group II is assigned if the zone of reaction spreads over the whole sample in 5 minutes or less. Packing Group III is assigned if the reaction spreads over the whole length of the sample in more than 5 minutes.

d. Solids which may cause or contribute to fire through friction are classified in Division 4.1 by analogy with existing entries. The packing group for solids which may cause or contribute to a fire through friction is assigned by comparison with existing classifications or in accordance with any appropriate special provision.

3. *Division 4.2—Materials liable to spontaneous combustion*

a. *Pyrophoric materials.*

(1) *Test method for solid pyrophoric materials.* One to two cm^3 of the powdery material to be tested is poured from about 1 m height onto a non-combustible surface and it is observed whether the material ignites during dropping or within 5 minutes of settling. This procedure is repeated six times unless a positive result is obtained earlier.

(2) *Test method for liquid pyrophoric materials.*

(A) Part 1: A porcelain cup of about 10 cm diameter is filled with diatomaceous earth or silica gel at room temperature to a height of about 5 mm. Approximately 5 ml of the liquid to be tested is poured into the prepared porcelain cup and it is observed if the material ignites within 5 minutes. This procedure is repeated six times unless a positive result is obtained earlier.

(B) Part 2: A 0.5 ml test sample is delivered from a syringe to an indented dry No. 3 Whatman filter paper. The test is conducted at 25±2 °C and a relative humidity of 50±5 percent. Observations are made to see if ignition or charring occurs on the filter paper within five minutes after the liquid to be tested is introduced. This procedure is repeated three times using fresh filter paper each time unless a positive result is obtained earlier.

(3) *Criterion for classification.*

(A) *Solid material.* If the sample ignites in one of the tests, the material is considered pyrophoric and should be classified in Division 4.2.

(B) *Liquid material.* If the liquid ignites in part 1 of the test, or if it ignites or chars the filter paper in part 2 of the test, it is considered to be pyrophoric and should be classified in Division 4.2.

(4) *Assignment of packing group.* Packing Group I is assigned to all pyrophoric solids and liquids.

b. *Self-heating materials.*

(1) *Test method for self-heating materials.*

(A) A hot air circulating type of oven with an inner volume of more than 9 liters and capable of controlling the internal temperature at 140±2 °C is used.

(B) Cubic sample containers of 2.5 cm and 10 cm side, made of stainless steel net with a mesh opening of 0.053 mm, with their top surface open, are used. Each container is

housed in a cubic container cover made from a stainless steel net with a mesh opening of 0.595 mm and slightly larger than the sample container, so that the container fits in this cover. In order to avoid the effect of air circulation, another stainless steel cage, made from a net with a mesh opening of 0.595 mm and 15×15×25 cm in size, is further installed to house the cover.

(C) Chromel-Alumel thermocouples of 0.3 mm diameter are used for temperature measurement. One is placed in the center of the sample and another between the sample container and the oven wall. The temperatures are measured continuously.

(D) The sample, powder or granular, in its commercial form, is filled to the brim of the sample container and the container tapped several times. If the sample settles, more is added. If the sample is heaped, it is leveled to the brim. The container is housed in the cover and cage, then hung at the center of the oven.

(E) The oven temperature is raised to 140 °C and kept there for 24 hours. The temperature of the sample is recorded. The first test is conducted with a 10 cm cube sample. Observations are made to determine if spontaneous ignition occurs or if the temperature of the sample exceeds 200 °C. If negative results are obtained, no further test is necessary. If positive results are obtained, a second test is conducted with a 2.5 cm cube sample to determine the data for packing group assignment.

(2) *Criteria for classification.* A self-heating material should be classified in Division 4.2 if in the first test using a 10-cm cube sample, spontaneous ignition occurs or the temperature of the sample exceeds 200 °C during the 24-hour testing time. This criterion is based on the self-ignition temperature of charcoal, which is 50 °C for a cubic volume of 27 m^3 and 140 °C for a one-litre sample. Materials with self-ignition temperatures higher than 50 °C for 27 m^3 should not be classified in Division 4.2.

(3) *Assignment of packing groups.*

(A) Packing Group II is assigned to materials which give positive results when tested with the 2.5 cm cube sample.

(B) Packing Group III is assigned to materials which give positive results when tested with the 10-cm cube sample but which give a negative result with a 2.5-cm cube sample.

4. *Division 4.3—Dangerous when wet materials.*

The following test method is used to determine whether the reaction of a material with water leads to the development of a dangerous amount of gases which may be flammable or toxic. The test method can be applied to solid and liquid materials. It is not applicable to pyrophoric materials.

a. *Test method.* The material should be tested at a temperature of 20 °C and atmospheric pressure by bringing it into contact with water. For a solid material, the package should be inspected for any particles < 500 μm diameter. If that powder constitutes more than 1 percent (mass) of the total or if the material is friable, then the whole of the sample should be ground to a powder before testing to allow for a reduction in particle size during handling and transport, otherwise the material should be tested in its commercial state. The testing should be performed three times. If spontaneous ignition of the gas occurs at any step, the material is classified in Division 4.3, and no further testing is necessary.

(1) A small quantity (approximately 2 mm diameter) of the test material is placed in a trough of distilled water at 20 °C. It is noted whether any gas is evolved and if it spontaneously ignites.

(2) A small quantity of the test material (approximately 2 mm diameter) is placed in the center of a filter paper which is floated flat on the surface of distilled water at 20 °C in a 100 mm diameter evaporating dish. The filter paper is to keep the material in one place, under which condition the likelihood of spontaneous ignition of any gas is greatest. It is noted whether any gas is evolved and if it spontaneously ignites.

(3) The test material is made into a pile approximately 2 cm high and 3 cm in diameter with an indentation in the top. A few drops of water are added to the hollow. It is noted whether any gas is evolved and if it spontaneously ignites.

(4) Water is put into the dropping funnel and enough of the material (up to a maximum weight of 25 g) to produce between 100 cm^3 and 250 cm^3 of gas is weighed and placed in a conical flask. The top of the dropping funnel is opened to let the water into the conical flask and a stop watch is started. The volume of gas evolved is measured by any suitable means. The time taken for all the gas to be evolved is noted and, where possible, intermediate readings are taken. The rate of evolution of gas is calculated over 7 hours at 1-hour intervals. If the rate of evolution is erratic or is increasing after 7 hours, the measuring time should be extended to a maximum time of 5 days. The 5-day test may be stopped if the rate of evolution becomes steady or continually decreases and sufficient data has been established to assign a packing group to the material or to determine that the material should not be classified in Division 4.3. If the chemical identity of the gas is unknown, the gas should be tested for flammability and toxicity.

b. *Criteria for classification.* A material should be classified in Division 4.3 if:

(1) spontaneous ignition takes place in any step of the test procedure, or

(2) there is an evolution of a flammable or toxic gas at a rate greater than 1 liter per kilogram of the material per hour.

c. *Assignment of packing groups.*

(1) Packing Group I is assigned to any material which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable or toxic gas is equal to or greater than 10 liters per kilogram of material over any 1 minute.

(2) Packing Group II is assigned to any material which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable or toxic gas is equal to or greater than 20 liters per kilogram of material per hour, and which does not meet the criteria for Packing Group I.

(3) Packing Group III is assigned to any material which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable or toxic gas is greater than 1 liter per kilogram of material per hour, and which does not meet the criteria for Packing Groups I or II.

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FIGURE E-1: FLOW CHART FOR ASSIGNING READILY COMBUSTIBLE SOLIDS (EXCEPT METAL POWDER) TO DIVISION 4.1

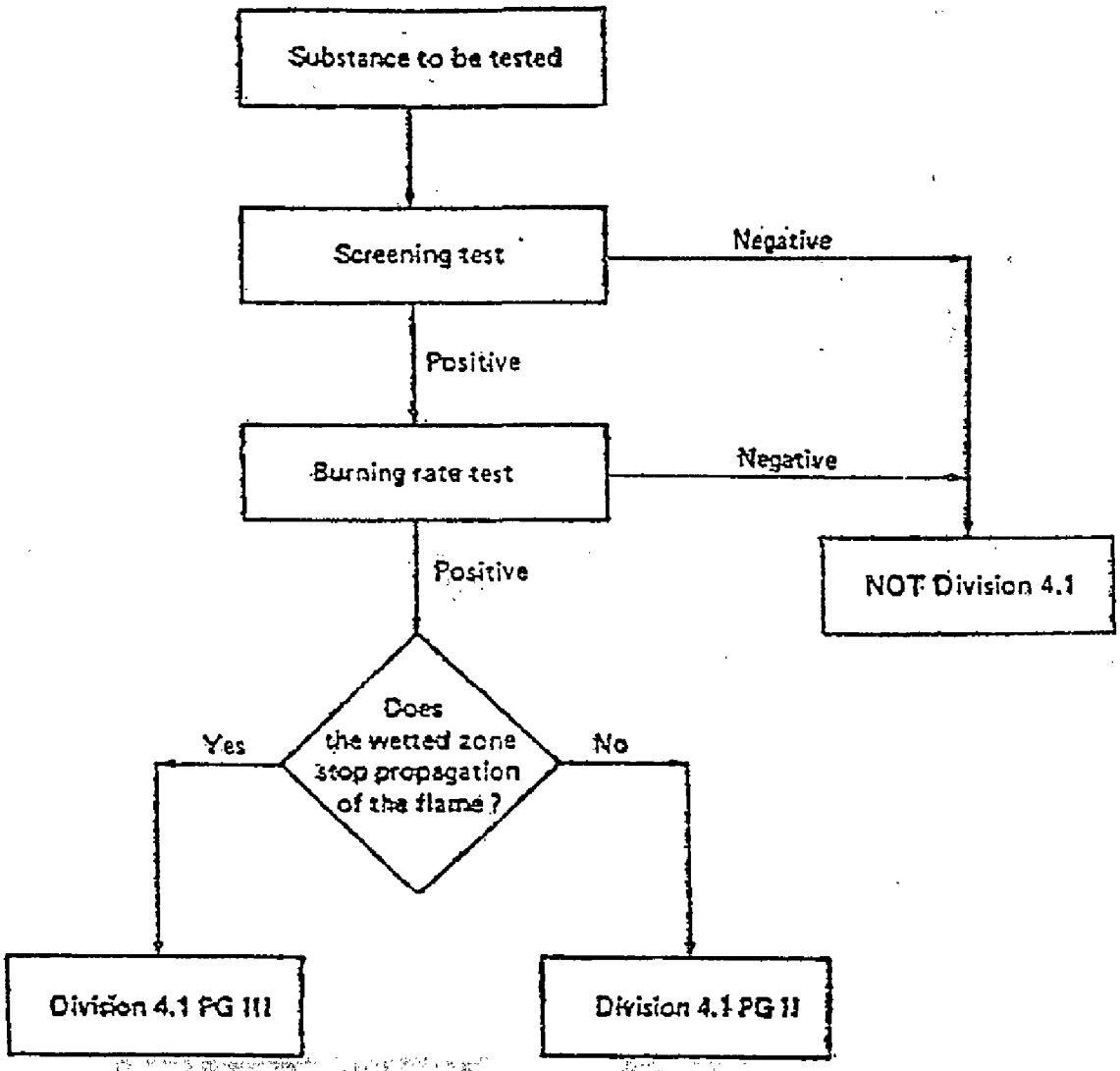
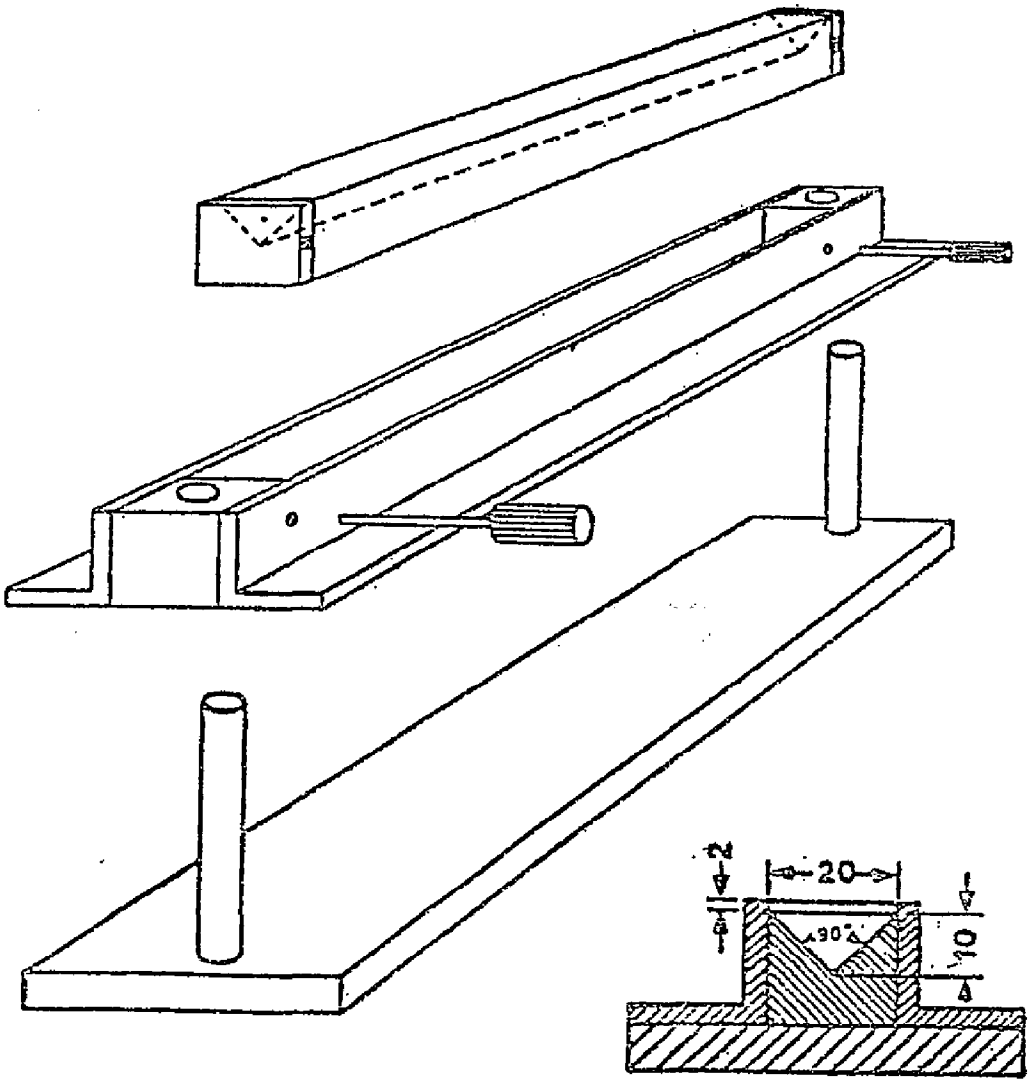


FIGURE E-2 POWDER TRAIN MOLD



Dimensions shown
are in millimeters (mm)

Length of mold: 250 mm

BILLING CODE 4910-60-C

141. Appendix F is added to part 173 to read as follows:

Appendix F to Part 173—Guidelines for the Classification and Packing Group Assignment of Division 5.1 Materials

1. Introduction

This test method is designed to measure the potential for a solid substance to increase the burning rate or burning intensity of a combustible substance when the two are thoroughly mixed. Two tests are run in triplicate for each substance to evaluated, one at a 1- to 1- ratio, by mass, of the sample to sawdust and one at a 4- to 1- ratio, by mass, of the sample to sawdust. To determine whether a material should be in Division 4.1, the burning characteristics of each mixture are compared with a standard having a 1- to 1- ratio, by mass, of ammonium persulfate and sawdust. If a material is classified in Division 5.1, the packing group is determined using the same method, with potassium perchlorate and potassium bromate substituted for ammonium persulfate as appropriate.

2. Procedure

(a) Ammonium persulfate, potassium perchlorate, and potassium bromate are reference substances. These substances should pass through a sieve mesh size smaller than 0.3 mm and should not be ground. Dry the reference substances at 65 °C for 12 hours and keep in a desiccator until required.

(b) The combustible material for this test is softwood sawdust. It should pass through a sieve mesh smaller than 1.6 mm and should contain less than 5 percent of water by weight. If necessary, spread it in a layer less than 25 mm thick, dry for 4 hours and keep in a desiccator until required.

(c) Prepare a 30.0g±0.1 g mixture of the reference substance and sawdust in a 1- to 1- ratio, by mass. Two 30.0±0.1 g mixtures of the material to be tested, in the particle size in which it is to be transported, and the sawdust, are prepared in ratios of 1-to-1, by mass and 4-to-1 by mass. Each mixture should be mixed mechanically without excessive stress as thoroughly as possible.

(d) The test should be conducted in a ventilated area under the following ambient conditions:

temperature 20 °C±5 °C

humidity 50 percent ± 10 percent

(e) Form each of the mixtures into a conical pile with dimensions of approximately 70-mm base diameter and 60-mm height on a cool, impervious, low-heat-conducting surface. Ignite the pile by means of a wire of inert metal in the form of a circular loop 40 mm in diameter positioned inside the pile 1 mm above the test surface. Heat the wire electrically to 1000 °C until the first sign of combustion are observed or it is clear that the pile cannot be ignited. Turn off the electrical power used to heat the wire as soon as there is combustion.

(f) Record the time from the first observable sign of combustion to the end of all reaction: smoke, flame, incandescence.

(g) Repeat the test three times for each of the two mixing ratios.

3. Criteria for classification

A substance should be classified in Division 5.1 if, in either concentration tested, the mean burning time of the sawdust, established from three tests, is equal to or less than that of the average of the three tests with ammonium persulfate mixture.

4. Assignment of packing group

(a) Packing Group I is assigned to any substance which, in either mixture ratio tested, exhibits a burning time less than potassium bromate.

(b) Packing Group II is assigned to any substance which, in either mixture ratio tested, exhibits a burning time equal to or less than that of potassium perchlorate and the criteria for Packing Group I are not met.

(c) Packing Group III is assigned to any substance which, in either concentration tested, exhibits a burn time equal to or less than that of ammonium persulfate and the criteria for Packing Groups I and II are not met.

PART 174—CARRIAGE BY RAIL

142. The authority citation for part 174 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 49 CFR 1.53(e), 1.53, app. A to part 1.

§ 174.8 [Amended]

143. In § 174.8, paragraphs (b) and (c), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

§ 174.10 [Amended]

144. In § 174.10, the following changes are made:

a. In paragraph (a), the phrase "EXPLOSIVES A" is removed and replaced with the phrase "EXPLOSIVES 1.1 or 1.2 (EXPLOSIVES A)".

b. In paragraph (d), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

§ 174.14 [Amended]

145. In § 174.14, paragraph (b), the phrase "flammable liquid or gas, or a poison gas" is removed and replaced with the phrase "Division 2.1 (flammable gas), Division 2.3 (poisonous gas) or Class 3 (flammable liquid) material".

§ 174.16 [Amended]

146. In § 174.16, the following changes are made:

a. In paragraph (a), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

b. In paragraphs (b)(1), (b)(2), and (b)(3), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

§ 174.18 [Amended]

147. In § 174.18, the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" in both places it appears.

§ 174.25 [Amended]

148. In § 174.25, paragraph (a)(2), the table is revised to read as follows:

§ 174.25 Additional information on waybills, switching orders and other billings.

(a) * * *

(2) * * *

Class/Division	Placard notation	Placard endorsement
Division 1.1	Placarded EXPLOSIVES 1.1 [1]	Explosives.
Division 1.2	Placarded EXPLOSIVES 1.2 [1]	Explosives.
Division 1.1 *or* 1.2, and Div. 2.3 [2] (chemical ammunition)	Placarded EXPLOSIVES 1.1 *or* EXPLOSIVES 1.2, and POISON GAS [1]	Explosives and poison gas.
Division 1.3	Placarded EXPLOSIVES 1.3	Dangerous.
Division 1.4	Placarded EXPLOSIVES 1.4	Dangerous.
Division 1.5	Placarded EXPLOSIVES 1.5	Dangerous.
Division 1.6	Placarded EXPLOSIVES 1.6	Dangerous.
Division 2.1	Placarded FLAMMABLE GAS	Dangerous.
Division 2.2	Placarded NONFLAMMABLE GAS	Dangerous.
Division 2.3 Zone A [2]	Placarded POISON GAS [1]	Poison gas Zone A.
Division 2.3 (other than Zone A)	Placarded POISON GAS	Dangerous.
Class 3	Placarded FLAMMABLE	Dangerous.
Combustible Liquid	Placarded COMBUSTIBLE	(None).
Division 4.1	Placarded FLAMMABLE SOLID	Dangerous.
Division 4.2	Placarded SPONTANEOUSLY COMBUSTIBLE	Dangerous.
Division 4.3	Placarded DANGEROUS WHEN WET	Dangerous.

Class/Division	Placard notation	Placard endorsement
Division 5.1	Placarded OXIDIZER	Dangerous.
Division 5.2	Placarded ORGANIC PEROXIDE	Dangerous.
Division 6.1 PG I Zone A [2]	Placarded POISON [1]	Poison PG I Zone A.
Division 6.1 PG I and II (other than PG I Zone A)	Placarded POISON	Dangerous.
Class 7	Placarded RADIOACTIVE	Radioactive material.
Class 8	Placarded CORROSIVE	Dangerous.
Class 9	(None)	(None).
ORM-D	(None)	(None).
Mixed loads of hazardous materials placarded DANGEROUS	Placarded DANGEROUS	Dangerous.
Tank cars which contain a residue of a hazardous material other than a combustible liquid.	See Sec. 174.25(c)	Dangerous.
Tank cars which contain a residue of a combustible liquid	See 174.25(c)	(None.

[1] Use of square background required (See § 172.510(a)).
[2] Identified as required in § 172.203(m)(3)).

* * * * *

§ 174.25 [Amended]

149. In § 174.25, the following changes are made:

a. In § 174.25, paragraph (a)(2)(i), the phrase "⅜ of an inch" is removed and replaced with the phrase "9 mm (0.4 inch)".

b. In paragraph (a)(2)(ii), the phrase "1/10 of an inch" is removed and replaced with the phrase ".25 cm (0.98 inch)".

c. In paragraph (c), the phrase "Petroleum Naptha" is removed and replaced with the word "Naptha", the phrase "Combustible liquid" is removed and replaced with the phrase "Class 3" and the phrase "Placarded: COMBUSTIBLE—RESIDUE" is removed and replaced with the phrase "Placarded: FLAMMABLE—RESIDUE".

d. In paragraph (d), the phrase "Explosives A" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials" each place it appears.

§ 174.26 [Amended]

150. In § 174.26, in paragraph (a), the phrase "EXPLOSIVE A" is removed and replaced with the phrase "EXPLOSIVES 1.1 or 1.2 (EXPLOSIVES A)" and the phrase "POISON GAS" is removed and replaced with the phrase "POISON GAS (Division 2.3 Hazard Zone A and Division 6.1 PG I Hazard Zone A materials)".

§ 174.47 [Amended]

151. In § 174.47, paragraphs (a) and (b), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

§ 174.49 [Amended]

152. In § 174.49, the phrase "flammable liquids, gases, or vapors" is removed and replaced with the phrase "Division 2.1 (flammable gas) or Class 3 (flammable liquid) materials or vapors".

§ 174.50 [Amended]

153. In § 174.50, paragraph (d), the phrase "three inches in size" is removed and replaced with the phrase "7.5 cm (3 inches) in size".

§ 174.67 [Amended]

154. In § 174.67, the following changes are made:

a. In paragraph (a)(3), the phrase "12 inches high by 15 inches wide" is removed and replaced with the phrase "30 cm (12 inches) high by 38 cm (15 inches) wide", the phrase "4 inches high" is removed and replaced with the phrase "10 cm (3.9 inches)", and the phrase "2 inches high" is removed and replaced with the phrase "5 cm (2 inches)".

b. In paragraph (k), the phrase "36 inches long" is removed and replaced with the phrase "0.9 m (3.0 feet) long".

155. Section 174.81 is revised to read as follows:

§ 174.81 Segregation of hazardous materials.

(a) This section applies to materials which meet one or more of the hazard classes defined in this subchapter and are in packages which are required to be labeled or placarded under the provisions of part 172 of this subchapter.

(b) When a rail car is to be transported by vessel, other than a ferry vessel, hazardous materials on or within that rail car must be stowed and segregated in accordance with § 171.12 of this subchapter.

(c) In addition to the provisions of paragraph (d) of this section, cyanides or cyanide mixtures may not be loaded or stored with acids.

(d) Hazardous materials may not be loaded, transported, or stored together, except as provided in this section, and in accordance with the following Table:

SEGREGATION TABLE FOR HAZARDOUS MATERIALS

Class or Division	Notes	1.1, 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas zone A	2.3 gas other than zone A	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG I zone A	7	8 liquids only
Explosives, 1.1 and 1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives, 1.3		*	*	*	*	*	X		X	X	X		X	X	X	X	X		X
Explosives, 1.4		*	*	*	*	*	O		O	O	O		O				O		O
Very insensitive explosives, 1.5.		*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives, 1.6.		*	*	*	*	*													
Flammable gases, 2.1		X	X	O	X				X	O			O	O	O	O	O	O	O
Non-toxic, non-flammable gases, 2.2.		X			X														
Poisonous gas Zone A, 2.3.		X	X	O	X		X				X	X	X	X	X	X			X
Poisonous gas other than Zone A, 2.3.		X	X	O	X		O				O	O	O	O	O	O			O
Flammable liquids, 3	B	X	X	O	X				X	O		O	O	O	O	O	X		

SEGREGATION TABLE FOR HAZARDOUS MATERIALS—Continued

Class or Division	Notes	1.1, 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas zone A	2.3 gas other than zone A	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG I zone A	7	8 liquids only
Flammable solids, 4.1	B	X			X				X	O	O						X		O
Spontaneously combustible materials, 4.2.		X	X	O	X		O		X	O	O						X		X
Dangerous when wet materials, 4.3.		X	X		X		O		X	O	O						X		X
Oxidizers, 5.1	A,B	X	X		X		O		X	O	O						X		O
Organic peroxides, 5.2	B	X	X		X		O		X	O	O						X		O
Poisonous liquids PG I Zone A, 6.1.		X	X	O	X		O				X	X	X	X	X	X			X
Radioactive materials, 7		X			X		O												
Corrosive liquids, 8	B	X	X	O	X		O		X	O		O	X	X	O	O	X		

(e) Instructions for using the segregation table for hazardous materials in paragraph (d) of this section are as follows:

(1) The absence of any hazard class or division, or a blank space in the Table indicates that no restrictions apply.

(2) The letter "X" in the Table indicates that these materials may not be loaded, transported, or stored together in the same rail car or storage facility during the course of transportation.

(3) The letter "O" in the Table indicates that these materials may not be loaded, transported, or stored together in the same rail car or storage facility during the course of transportation, unless separated by a distance of 1.2 m (4 feet) in all directions, or separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur. Notwithstanding the methods of separation employed, Class 8 (corrosive) liquid materials may not be loaded above Class 4 (flammable solid) materials or Class 5 (oxidizing) materials.

(4) The "*" in the Table indicates that segregation among different Class 1 (explosive) materials is governed by the compatibility table in paragraph (f) of this section.

(5) The notes in the second column of the Table mean the following:

(i) "A" means that, notwithstanding the requirements of the letter "X", ammonium nitrate fertilizer may be loaded or stored with Division 1.1 (Class A explosive) materials.

(ii) "B" means that, in addition to the requirements of the letter "O", materials may not be loaded and transported together unless, for each class or division, packages are separately palletized at a minimum height of 10 cm (3.9 inches) off the floor of the rail car, or are separated in a manner that, in the event of leakage under conditions normally incident to transportation, commingling of hazardous materials would not occur.

(6) When the § 172.101 Table or § 172.402 of this subchapter requires a package to bear a subsidiary hazard label, segregation appropriate to the subsidiary hazard must be applied when that segregation is more restrictive than that required by the primary hazard. However, hazardous materials of the same class may be stowed together without regard to segregation required by any secondary hazard if the materials are not capable of reacting dangerously with each other and causing combustion or dangerous evolution of heat, evolution of flammable, poisonous, or asphyxiant gases, or formation of corrosive or unstable materials.

(f) Class 1 (explosive) materials may not be loaded, transported, or stored together, except as provided in this section, and in accordance with the following Table:

COMPATIBILITY TABLE FOR CLASS 1 (EXPLOSIVE) MATERIALS

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A		X	X	X	X	X	X	X	X	X	X	X	X
B	X		X	X	X	X	X	X	X	X	X	X	
C	X	X		2	2	X	X	X	X	X	X	3	
D	X	X	2		2	X	X	X	X	X	X	3	
E	X	X	2	2		X	X	X	X	X	X	3	
F	X	X	X	X	X		X	X	X	X	X	X	
G	X	X	X	X	X	X		X	X	X	X	X	
H	X	X	X	X	X	X	X		X	X	X	X	
J	X	X	X	X	X	X	X	X		X	X	X	
K	X	X	X	X	X	X	X	X	X		X	X	
L	X	X	X	X	X	X	X	X	X	X	1	X	X
N	X	X	3	3	3	X	X	X	X	X	X		
S	X	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	X	4/5	

(g) Instructions for using the compatibility table for Class 1 (explosive) materials in paragraph (f) of this section are as follows:

(1) A blank space in the Table indicates that no restrictions apply.

(2) The letter "X" in the Table indicates that explosives of different compatibility groups may not be carried on the same rail car, unless packed in separate freight containers (e.g., two or more freight containers mounted upon the same rail car).

(3) The numbers in the Table mean the following:

(i) "1" means explosives from compatibility group L may only be carried on the same rail car with an identical explosive.

(ii) "2" means any combination of explosives from compatibility group C, D, or E is assigned to compatibility group E.

(iii) "3" means any combination of explosives from compatibility group C, D, or E with those in compatibility group N is assigned to compatibility group D.

(iv) "4" means detonators and detonating primers, Division 1.4S (Class C explosives), may not be loaded in the same car with Division 1.1 and 1.2 (Class A explosive) materials.

(v) "5" means Division 1.4S fireworks may not be loaded in the same car with Division 1.1 or 1.2 (Class A explosive) materials.

(h) Except as provided in paragraph (i) of this section, explosives of the same compatibility group but of different divisions may be transported together provided that the whole shipment is transported as though its entire contents were of the lower division. For example, a mixed shipment of Division 1.2 (Class A explosive) materials and Division 1.4 (Class C explosive) materials, compatibility group D, must be transported as Division 1.2 (Class A explosive) materials.

(i) When Division 1.5 (blasting agent) materials, compatibility group D are transported in the same freight container as Division 1.2 (Class A explosive) materials, compatibility group D, the shipment must be transported as Division 1.1 (Class A explosive) materials, compatibility group D.

156. The subpart D heading is revised to read as follows:

Subpart D—Handling of Placarded Rail Cars, Transport Vehicles and Freight Containers

157. A new § 174.82 is added to subpart D to read as follows:

§ 174.82 General requirements for the handling of placarded rail cars, transport vehicles, freight containers, and bulk packages.

(a) Unless otherwise specified, this subpart does not apply to the handling of rail cars, transport vehicles, freight containers, or bulk packagings, which contain combustible liquids, Class 6 PG III materials, Class 9 materials, or ORM-D materials.

(b) A placarded rail car, transport vehicle, freight container, or bulk package may not be transported in a passenger train.

158. Section 174.83 is revised to read as follows:

§ 174.83 Switching placarded rail cars, transport vehicles, freight containers, and bulk packagings.

(a) In switching operations where the use of hand brakes is necessary—

(1) It must be determined by trial whether a loaded, placarded car, or a car occupied by a rider in a draft containing a placarded car, has its hand brakes in proper working condition before it is cut off;

(2) A loaded, placarded tank car or a draft which includes loaded placarded tank car may not be cut off until the preceding rail car clears the ladder track; and

(3) A loaded, placarded tank car or a draft which includes a loaded placarded tank car must clear the ladder track before another rail car is allowed to follow.

(b) A rail car shall not be allowed to move under its own momentum, or be coupled into or struck by any other rail car with more force than is necessary to complete the coupling, when any rail car is:

(1) Placarded in Division 1.1 or 1.2 (Class A Explosives);

(2) A tank car placarded in Division 2.3 (PG I, Hazard Zone A: poisonous gas) or 6.1 (PG I, Hazard Zone A: poisonous liquid);

(3) A Class DOT 113 tank car placarded in Division 2.1 (flammable gas); or

(4) A placarded flatcar, or a flatcar transporting a loaded placarded rail car, transport vehicle, freight container, or bulk packaging.

(c) When transporting a rail car, transport vehicle, or freight container placarded for Division 1.1 or 1.2 (Class A explosive) materials in a terminal, yard, or on a side track or siding, the placarded rail car must be separated from the engine by at least one non-placarded rail car and must be placed in a location so that it will be safe from danger of fire. A rail car, transport vehicle, or freight container placarded for Division 1.1 or 1.2 (Class A explosive) materials may not be placed under a bridge or overhead crossing, or in or alongside a passenger shed or station, except during transfer operations.

159. Section 174.84 is revised to read as follows:

§ 174.84 Position in train of loaded placarded rail cars, transport vehicles, freight containers or bulk packagings when accompanied by guards or technical escorts.

A rail car placarded in Division 1.1 or 1.2 (Class A explosive); Division 2.3 (PG I, Hazard Zone A; poisonous gas); or Division 6.1 (PG I, Hazard Zone A; poisonous liquid) in a moving or standing train must be next to and ahead of any car occupied by the guards or technical escorts accompanying the placarded rail car. However, if a rail car occupied by the guards or technical escorts has temperature control equipment in operation, it must be the fourth car behind any car requiring Division 1.1 or 1.2 (Class A explosive) placards.

160. Section 174.85 is revised to read as follows:

§ 174.85 Position in train of placarded cars, transport vehicles, freight containers, and bulk packagings.

(a) Except as provided in paragraphs (b) and (c) of this section, the position in a train of each loaded placarded car, transport vehicle, freight container, and bulk packaging must conform to the provisions of this section.

(b) A car placarded "RADIOACTIVE" must be separated from a locomotive, occupied caboose, or carload of undeveloped film by at least one non-placarded car.

(c) A car placarded "RESIDUE" must be separated from a locomotive or occupied caboose by at least one non-placarded car.

(d) Position of rail cars in a train. In the following table:

POSITION IN TRAIN OF PLACARDED CARS TRANSPORTING HAZARDOUS MATERIALS

RESTRICTIONS	Placard Group 1	Placard Group 2		Placard Group 3		Placard Group 4
	Rail Car	Tank Car	Rail Car	Tank Car	Rail Car	Rail Car
1. When train length permits, placarded car may not be nearer than the sixth car from the engine or occupied caboose.	X	X		X		
2. When train length does not permit, placarded car must be placed near the middle of the train, but not nearer than the second car from an engine or occupied caboose.	X	X		X		
3. An open-top car when any of the lading protrudes beyond the car ends or if shifted would protrude beyond the car ends.	X	X		X		
4. Loaded flat car except closed TOFC/COFC equipment, auto carriers, and other specially-equipped cars with tie-down devices for handling vehicles. Permanent bulk head flat cars are considered the same as open-top cars.	X	X		X		
5. Any rail car, transport vehicle, or freight container with temperature control equipment or internal combustion engine in operation.	X	X		X		
6. Placarded cars may not be placed next to each other based on the following:						
Placard Group 1		X	X	X	X	X
Placard Group 2	X			X	X	X
Placard Group 3	X	X	X			X
Placard Group 4	X	X	X	X	X	

PLACARD GROUP:
Group 1—Divisions 1.1 and 1.2 (Class A explosive) materials.
Group 2—Divisions 1.3, 1.4, 1.5 (Class B and C explosive), Class 2 (compressed gas; other than Div 2.3, PG I, Zone A), Class 3 (flammable liquid), Class 4 (flammable solid), Class 5 (oxidizing), Class 6 (poisonous liquid; other than Div 6.1, PG I, Zone A), and Class 8 (corrosive) materials.
Group 3—Divisions 2.3 (PG I, Zone A; poisonous gas) and 6.1 (PG I, Zone A; poisonous liquid) materials.
Group 4—Class 7 (radioactive) materials.

(1) Where an "X" appears at the intersection of a Placard Group column and a Restriction row, the corresponding restriction applies.

(2) "Rail Car" means a car other than a tank car.

(3) For purposes of this subpart, each unit of an articulated intermodal rail car shall be considered as one car.

§ 174.86 [Removed]

161. Section 174.86 is removed.

§ 174.87 [Removed]

162. Section 174.87 is removed.

§ 174.88 [Removed]

163. Section 174.88 is removed.

§ 174.89 [Removed]

164. Section 174.89 is removed.

§ 174.90 [Removed]

165. Section 174.90 is removed.

§ 174.91 [Removed]

166. Section 174.91 is removed.

§ 174.92 [Removed]

167. Section 174.92 is removed.

§ 174.93 [Removed]

168. Section 174.93 is removed.

Subpart E—Class 1 (Explosive) Materials

169. The subpart E heading is revised to read as set forth above.

§ 174.100 [Amended]

170. In § 174.100, the following changes are made:

a. In the section heading and paragraph (b), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

b. In paragraph (a), the word "Explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

c. In paragraph (b), the word "explosive" is removed and replaced with the phrase "Class 1 (explosive) material".

§ 174.101 [Amended]

171. In § 174.101, the following changes are made:

a. In paragraph (b), the phrase "Class A or Class B explosives" is removed and replaced with the phrase "Division 1.1, 1.2, or 1.3 (Class A or Class B explosive) materials" both places it appears, and the phrase "500 pounds" is revised to read "226 kg (500 pounds)".

b. In paragraph (o) introductory text, the phrase "Class A or Class B explosives" is removed and replaced with the phrase "Division 1.1, 1.2, or 1.3 (Class A or Class B explosive) materials" both places it appears.

c. In paragraph (c), the phrase "high explosives, low explosives or black powder" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

d. In paragraphs (a), (d), (h), and (l), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials" and in paragraph (n) introductory text, the phrase "Class A explosive" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) material".

e. In paragraph (h), the word "Explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" in the second and last sentences.

f. In the section heading and paragraphs (e), (f), (i), (j), (k), (n)(2), (o)(1), and (o)(4), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

g. In paragraphs (n)(1), (n)(3), (o)(2), and (o)(3), the phrase "3 miles per hour" is removed and replaced with the phrase "13 km (8.1 miles) per hour".

§ 174.102 [Amended]

172. In § 174.102, the following changes are made:

a. In paragraphs (a) and (b), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

b. In paragraph (b), "Explosives" and "explosives" are removed and replaced with the phrase "Class 1 (explosive) materials" both places they appear.

§ 174.103 [Amended]

173. In § 174.103, the following changes are made:

a. In paragraph (a), the phrase "high explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

b. In paragraphs (a), (c) introductory text, and (e), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

c. In paragraph (d), the phrase "at least 2 inches" is removed and replaced with the phrase "at least 5 cm (2 inches)".

§ 174.104 [Amended]

174. In § 174.104, the following changes are made:

a. In the section heading and paragraphs (a), (b) introductory text, (c), (d), (e), and (f), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

b. In paragraph (a), the phrase "80,000 pounds capacity" is removed and replaced with the phrase "36,300 kg (80,028 pounds) capacity".

c. In paragraphs (b)(4), (b)(7), and (b)(8), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

d. In paragraph (b)(10), the phrase "three-eighths inch thick" is removed and replaced with the phrase "1 cm (0.4 inch) thick".

e. In paragraph (b)(11), the phrase "at least 12 inches" is removed and replaced with the phrase "at least 30 cm (12 inches)".

f. In paragraph (f), the phrase "7 by 7 inches, or 6 by 8 inches" is removed and replaced with the phrase "18 by 18 cm (7.1 by 7.1 inches) or 15 by 20 cm (5.9 by 7.9 inches)".

§ 174.105 [Amended]

175. In § 174.105, in the section heading and text, the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

§ 174.106 [Amended]

176. In § 174.106, in the section heading and paragraphs (a), (b), and (c), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

§ 174.107 [Amended]

177. In § 174.107, the following changes are made:

a. In the section heading and paragraphs (a) and (b), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

b. In paragraph (b), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

§ 174.109 [Amended]

178. In § 174.109, the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

§ 174.110 [Amended]

179. In § 174.110, the following changes are made:

a. The phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

b. The phrase "150 pounds" is removed and replaced with the phrase "68 kg (150 pounds)".

c. The word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

d. The phrase "1 inch thick" is removed and replaced with the phrase "2.5 cm (0.98 inch) thick".

e. The phrase "2 inches high" is removed and replaced with the phrase "5 cm (2 inches) high".

f. The phrase "EXPLOSIVES A placards" is removed and replaced with the phrase "EXPLOSIVES 1.1 or 1.2 (EXPLOSIVES A) placards".

g. The phrase "Explosives A" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

§ 174.112 [Amended]

180. In § 174.112, in the section heading and paragraphs (a), (b), (c) introductory text, and (c)(3), the phrase "Class B explosives" is removed and replaced with the phrase "Division 1.3 (Class B explosive) materials and Division 1.2 (devices corresponding to Class B explosive) materials" each place it appears.

§ 174.114 [Amended]

181. In § 174.114, the following changes are made:

a. The paragraph (a) designation is removed.

b. The section heading phrase "'EXPLOSIVES A' laden cars" is removed and replaced with the phrase "Cars loaded with Division 1.1 or 1.2 (explosive) materials".

c. The phrase "'EXPLOSIVES A' placards" is removed and replaced with the phrase "EXPLOSIVES 1.1 or EXPLOSIVES 1.2 (EXPLOSIVES A) placards".

§ 174.115 [Amended]

182. In § 174.115, in the section heading and paragraphs (a), (b) introductory text, and (b)(3), the phrase "Class C explosives" is removed and replaced with the phrase "Division 1.4 (Class C explosive) materials" each place it appears.

Subpart F—Detailed Requirements for Class 2 (Gases) Materials

183. The subpart F heading is revised to read as set forth above.

§ 174.200 [Amended]

184. In § 174.200, the following changes are made:

a. In paragraphs (a) and (b), the phrase "Flammable gases" is removed and replaced with the phrase "Division 2.1 (flammable gas) materials" and in paragraph (c) introductory text the phrase "flammable gases" is removed and replaced with the phrase "Division 2.1 (flammable gas) materials".

b. In paragraph (c)(4), the phrase "over 130 degrees F" is removed and replaced with the phrase "over 54 °C (129 °F)".

§ 174.201 [Amended]

185. In § 174.201, the following changes are made:

a. In the section heading, the phrase "Compressed gas" is removed and replaced with the phrase "Class 2 (gases) material".

b. In paragraphs (a) introductory text and (c), the phrase "compressed gases" is removed and replaced with the phrase "Class 2 (gases) materials".

§ 174.204 [Amended]

186. In § 174.204, the following changes are made:

a. In paragraph (a) introductory text, the phrase "compressed gas" is removed and replaced with the phrase "Class 2 (gases) material".

b. In paragraph (a)(2)(i), the phrase "flammable cryogenic liquid" is, removed and replaced with the phrase "Division 2.1 (flammable gas) material that is a cryogenic liquid".

§ 174.208 [Amended]

187. In § 174.208, the following changes are made:

a. In paragraph (a), the phrase "flammable liquid or gas" is removed and replaced with the phrase "Class 3 (flammable liquid) materials or Division 2.1 (flammable gas) materials".

b. In paragraph (b), the phrase "poisonous liquid, gas, or solid" is removed and replaced with the phrase "Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials".

§ 174.280 [Amended]

188. In § 174.280, the following changes are made:

a. In the section heading, the phrase "Poison gases" is removed and replaced with the phrase "Division 2.3 (poisonous gas) materials".

b. In § 174.280, the phrase "poison label" is removed and replaced with the phrase "POISON GAS label".

189. Section 174.290 is revised to read as follows:

§ 174.290 Materials extremely poisonous by inhalation shipped by, for, or to the Department of Defense.

(a) General. The provisions of this section apply only to materials extremely poisonous by inhalation which are Division 2.3 materials in Hazard Zone A and Division 6.1 materials in Hazard Zone A, as defined in § 173.133(a)(2) of this subchapter. Such materials when shipped by, for, or to the Department of Defense may be transported by rail only if loaded and handled in accordance with the requirements of this section.

(b) A Division 2.3 Hazard Zone A or a Division 6.1 Hazard Zone A material extremely poisonous by inhalation may be transported in:

(1) UN 1N1 or UN 1N2 metal drums or equivalent military specification metal drums, by boxcar, gondola car (flat bottom), or stock car in carload lots. See § 174.55(a) (1) through (4) and § 174.600 for blocking, bracing, and stowage requirements;

(2) Tanks which are authorized under this subchapter for a Hazard Zone A material extremely poisonous by inhalation, Specification DOT 106A (§§ 179.300 and 179.301 of this subchapter), mounted on or secured to a multi-unit car or gondola car (flat bottom) in carload lots only;

(3) Bombs, by boxcar, or gondola car (flat bottom) in carload lots only; or

(4) Projectiles or ammunition for cannon with gas filled projectiles, by boxcar in carload or less-than-carload lots.

(c) Each shipment of one or more carloads of a material extremely poisonous by inhalation, as described in paragraph (b) of this section, must be accompanied by a Department of Defense qualified escort supplied with equipment to handle leaks and other packaging failures which could result in escape of the material. The escort shall remain with the shipment during the entire time that it is in the custody of the carrier and in the event of leakage or escape of material, shall make repairs and perform decontamination as necessary.

(d) When a material extremely poisonous by inhalation is transported in a tank, the tank must be securely mounted on a rail car especially provided for it or on a gondola car prepared with substantial wooden frames and blocks.

(e) Bombs, projectiles, and cannon ammunition being transported by rail must be loaded, blocked and braced as shown in Bureau of Explosives Pamphlet No. 6A, or Department of Defense specifications. When a shipment is loaded in a gondola car it must be securely blocked and braced and not loaded higher than the sides of the car.

(f) When a material extremely poisonous by inhalation is transported in drums with filling holes in the heads, they must be loaded on their bottoms. They may be loaded in rows, lengthwise of the car and any space between the sides of the car and the nearest row of drums must be "filled in" with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of drums, or they may be loaded across the car in staggered stacks of which the number of drums in alternate stacks is reduced by one drum. All drums in stacks following the first stack loaded in the end of the car must be placed tightly into the angle of the space formed by the sidewalls of the drum in the preceding stack. Any space between the sides of the car and the drums in stacks having the greater number of drums must be filled in with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of the drums.

(g) When a material extremely poisonous by inhalation is transported in drums with filling holes in the sides, they must be loaded on their sides with the filling holes up. They must be loaded lengthwise of the car in rows and any space between the sides of the car and the nearest row of drums must be filled in with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of the drums.

(h) When a material extremely poisonous by inhalation is transported in drums in a boxcar, they must be loaded from ends of the car toward the space between the car doors, and there braced by center gates and wedges. See Sketch 1, Bureau of Explosives Pamphlet No. 6.

(i) The doorways of a boxcar in which a material poisonous by inhalation is being transported must be protected by one of the methods prescribed in Sketch 1, Bureau of Explosives Pamphlet No. 6A.

Subpart G—Detailed Requirements for Class 3 (Flammable Liquid) Materials

190. The subpart G heading is revised to read as set forth above.

§ 174.300 [Amended]

191. In § 174.300, the following changes are made:

a. In paragraph (a), the phrase "Flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials" and in paragraph (c) introductory text, the phrase "flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

b. In paragraph (b), the phrase "flammable liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

c. In paragraph (c)(4), the phrase "over 130 degrees F" is removed and replaced with the phrase "over 54 °C (129 °F)".

d. Paragraph (d) is removed and paragraph (e) is redesignated as paragraph (d).

e. In newly designated paragraph (d), the phrase "flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

§ 174.304 [Amended]

192. In § 174.304, in the section heading the phrase "Flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials" and in the text the phrase "flammable liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) material".

193. Section 174.380 is revised to read as follows:

§ 174.380 Class 3 (flammable liquid) materials, with a subsidiary hazard of Division 6.1 (poisonous) materials, with foodstuffs.

(a) A carrier may not transport any package of Class 3 (flammable liquid) material bearing a POISON label in the same car with materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals.

(b) A carrier must separate any package of Class 3 (flammable liquid) material bearing a KEEP AWAY FROM FOOD label from materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals as required in § 174.81(e)(3) for classes identified with the letter "C" in the Segregation Table for Hazardous Materials.

Subpart H—Detailed Requirements for Class 4 (Flammable Solid) Materials

194. The subpart H heading is revised to read as set forth above.

§ 174.410 [Amended]

195. In § 174.410, paragraph (d), the phrase "Specification 15A or 12C" is removed and replaced with the phrase "UN 4C1, UN 4C2, or UN 4G" and the phrase "(§§ 178.168, 178.206 of this subchapter)" is removed.

196. Section 174.430 is added to read as follows:

§ 174.430 Special handling requirements for Division 4.2 (pyroforic liquid) materials.

Cylinders containing Division 4.2 (pyroforic liquid) materials, unless packed in strong box or case and secured therein to protect valves, must be loaded with all valves and safety relief devices in the vapor space. All cylinders must be secured so that no shifting occurs in transit.

197. Section 174.480 is revised to read as follows:

§ 174.480 Class 4 (flammable solid) materials, with a subsidiary hazard of Division 6.1 (poisonous) materials, with foodstuffs.

(a) A carrier may not transport any package of Class 4 (flammable solid) material bearing a POISON label in the same car with materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals.

(b) A carrier must separate any package of Class 4 (flammable solid) material bearing a KEEP AWAY FROM FOOD label from materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals as required in § 174.81(e)(3) for classes identified with the letter "O" in the Segregation Table for Hazardous Materials.

Subpart I—Detailed Requirements for Division 5.1 (Oxidizing) Materials

198. The subpart I heading is revised to read as set forth above.

§ 174.510 [Amended]

199. In § 174.510, the phrase "listed in § 173.182(b) of this subchapter" is removed.

200. Section 174.580 is revised to read as follows:

§ 174.580 Division 5.1 (oxidizer) materials, with a subsidiary hazard of Division 6.1 (poisonous materials), with foodstuffs.

(a) A carrier may not transport any package of Division 5.1 (oxidizer) material bearing a POISON label in the same car with materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals.

(b) A carrier must separate any package of Division 5.1 (oxidizer), material bearing a KEEP AWAY FROM FOOD label from materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals as required in § 174.81(e)(3) for classes identified with the letter "O" in the Segregation Table for Hazardous Materials.

Subpart J—Detailed Requirements for Division 6.1 (Poisonous) Materials

201. The Subpart J heading is revised to read as set forth above.

202. Section 174.600 is revised to read as follows:

§ 174.600 Special handling requirements for materials extremely poisonous by inhalation.

A tank car containing a material extremely poisonous by inhalation which is a Division 2.3 material in Hazard Zone A or a Division 6.1 material in Hazard Zone A, as defined in § 173.133(a)(2) of this subchapter, may not be transported by rail unless it is originally consigned or subsequently reconsigned to a party having a private track on which it is to be delivered and unloaded (see § 171.8 of this subchapter) or to a party using railroad siding facilities which are equipped for piping the liquid or gas from the tank car to permanent storage tanks or sufficient capacity to receive the entire contents of the car. See the requirements in § 174.290 for materials extremely poisonous by inhalation which are shipped by, for, or to the Department of Defense.

§ 174.615 [Amended]

203. In § 174.615, the following changes are made:

a. In paragraph (a), the phrase "Paris green" is removed and replaced with the phrase "copper acetoarsenite (Paris green)".

b. In paragraphs (a) and (b), the phrase "poisonous materials" is revised to read "Division 6.1 (poisonous) materials" each place it appears.

204. Section 174.680 is revised to read as follows:

§ 174.680 Division 6.1 (poisonous) materials with foodstuffs.

(a) A carrier may not transport any package bearing a POISON label in the same car with materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals.

(b) A carrier must separate any package bearing a KEEP AWAY FROM FOOD label from materials marked as or known to be foodstuffs, feed, or any other edible materials intended for consumption by humans or animals as required in § 174.81(e)(3) for classes identified with the letter "O" in the Segregation Table for Hazardous Materials.

Subpart K—Detailed Requirements for Class 7 (Radioactive) Materials

205. The subpart K heading is revised to read as set forth above.

§ 174.700 [Amended]

206. In § 174.700, the following changes are made:

a. In paragraphs (c), (d), and (e)(2), the phrase "radioactive material" and in paragraph (e)(3), the phrase "Radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material" each place it appears.

b. In the section heading and paragraphs (b), (c), (e) introductory text, and (f), the phrase "radioactive materials" and in paragraph (e)(1), the phrase "Radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

c. In paragraph (c), the phrase "closer than three feet" is removed and replaced with the phrase "closer than 1 m (3 feet)", and the phrase "nor closer than 15 feet" is removed and replaced with the phrase "nor closer than 4.5 m (15 feet)".

d. In paragraph (d), the phrase "at least 20 feet" is removed and replaced with the phrase "at least 6 m (20 feet)".

e. In paragraph (e) introductory text, the phrase "weighing 15,000 pounds" is removed and replaced with the phrase "weighing 6,805 kg (15,002 pounds)"

f. In paragraph (e)(1), the phrase "weighing 5,000 pounds" is removed and replaced with the phrase "weighing 2,268 kg (5,000 pounds)".

g. In paragraph (e)(3), the phrase "weighing 700 pounds" is removed and replaced with the phrase "weighing 315 kg (694 pounds)".

§ 174.715 [Amended]

207. In § 174.715, the following changes are made:

a. In paragraphs (a) and (b), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraph (b), the phrase "at 3 feet" is removed and replaced with the phrase "at 1 m (3 feet)" and the phrase "3 inches high" is removed and replaced with the phrase "8 cm (3 inches) high".

§ 174.750 [Amended]

208. In § 174.70, the following changes are made:

a. In paragraphs (a) and (b), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials" each place it appears.

b. In paragraph (b), the phrase "radioactive material" is removed and

replaced with the phrase "Class 7 (radioactive) material".

c. In paragraph (b), the last sentence is removed.

Subpart L—Detailed Requirements for Class 8 (Corrosive) Materials

209. The subpart L heading is revised to read as follows:

§ 174.800 [Amended]

210. In § 174.800, the following changes are made:

a. In the section heading, the phrase "corrosive materials" is revised to read "Class 8 (corrosive) materials".

b. In paragraph (a), the phrase "corrosive liquids" is revised to read "Class 8 (corrosive) materials".

c. In paragraph (a), the first and last sentences are removed and the designation (a) is removed.

d. Paragraphs (b) and (c) are removed.

§ 174.810 [Amended]

211. In § 174.810, the following changes are made:

a. In paragraph (a), the phrase "and may not be loaded or stored with explosives" is removed.

b. In paragraph (b), the reference "§ 173.258" is removed and replaced with the reference "§ 173.159".

§ 174.812 [Removed and Reserved]

212. Section 174.812 is removed and reserved.

Subpart M—Detailed Requirements for Class 9 (Miscellaneous Hazardous) Materials

213. The subpart M heading is revised to read as set forth above.

§ 174.840 [Amended]

214. In § 174.840, the reference "§ 173.1090" is removed and replaced with "§ 173.216".

PART 175—CARRIAGE BY AIRCRAFT

215. The authority citation for part 175 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1807, 1808; 49 CFR Part 1.

§ 175.10 [Amended]

216. In § 175.10, the following changes are made:

a. In paragraph (a) (4) (i), the phrase "75 ounces (net weight ounces and fluid ounces)" is removed and replaced with the phrase "2 kg (70 net weight ounces) or 2 liters (68 fluid ounces)".

b. In paragraph (a) (4) (ii), the phrase "16 fluid ounces or 1 pound" is removed and replaced with the phrase "47 ml (16 fluid ounces) or 0.5 kg (1.1 pound)".

c. In paragraph (a)(8), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) materials".

d. In paragraph (a)(13), the phrase "5 pounds" is removed and replaced with the phrase "2.3 kg (5.07 pounds)" both places it appears; and the reference "§ 173.615(a)" is removed and replaced with the phrase "§ 173.217".

e. In paragraph (a)(14)(vii), the phrase "ten feet" is removed and replaced with the phrase "3 m (10 feet)".

f. In paragraph (a)(17), the phrase "4 pounds" is removed and replaced with the phrase "2 kg (4.4 pounds)".

g. In paragraph (a)(19), the reference "§ 173.260(d)" is removed and replaced with the reference "§ 173.159(d)".

§ 175.25 [Amended]

217. In § 17.2, in paragraph (a)(2)(ii), the phrase "three eighths of an inch" is removed and replaced with the phrase "1 cm (0.4 inch)" and the phrase "one quarter inch" is removed and replaced with the phrase "6.0 mm (0.2 inch)".

§ 175.30 [Amended]

218. In § 175.30, in paragraph (c)(2), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

§ 175.33 [Amended]

219. In § 175.33, paragraphs (a)(3) and (a)(6), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

§ 175.45 [Amended]

220. In § 175.45, the following changes are made:

a. In paragraph (a)(2), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraph (a)(3), the phrase "etiologic agents" is removed and replaced with the phrase "materials in Division 6.2 (etiologic or infectious substances)" both places it appears.

§ 175.75 [Amended]

221. In § 175.75, the following changes are made:

a. In paragraph (a)(2), the phrase "50 pounds net weight" is removed and replaced with the phrase "25 kg (55 pounds) net weight"; the phrase "150 pounds net weight" is removed and replaced with the phrase "75 kg (165 pounds) net weight"; and the phrase "non-flammable compressed gas" is removed and replaced with the phrase "Division 2.2 (non-flammable compressed gas) materials".

b. In paragraphs (a)(3) introductory text and (a)(3)(ii), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

c. In paragraph (b), the phrase "ORM material" is removed and replaced with the phrase "Class 9 (miscellaneous hazardous) materials, or ORM-D materials".

§ 175.81 [Amended]

222. In § 175.81, paragraph (b), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

§ 175.85 [Amended]

223. In § 175.85, the following changes are made:

a. In paragraph (c)(1)(i), the phrase "Radioactive (ICAO Class 7) materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraph (c)(1)(ii), the phrase "Poison B (ICAO Division 6.1) liquids and solids" is removed and replaced with the phrase "Division 6.1 (poisonous) materials".

c. Paragraphs (c)(1)(iii) and (c)(1)(vii) are removed and paragraphs (c)(1)(iv) through (c)(1)(vi) are redesignated as (c)(1)(iii) through (c)(1)(v).

d. In newly designated paragraph (c)(1)(iii), the phrase "Etiologic (ICAO Division 6.2) agents" is removed and replaced with the phrase "materials in Division 6.2 (etiologic or infectious substances)".

e. In newly designated paragraph (c)(1)(iv), the phrase "Flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials" and the phrase "73 °F. (23 °C.)" is removed and replaced with the phrase "23 °C (73 °F)".

224. In § 175.85, newly designated paragraph (c)(1)(v) is revised to read as follows:

§ 175.85 Cargo location.

* * * * *

(c) * * *

(1) * * *

(v) Class 9 (miscellaneous hazardous) materials, and ORM-D materials.

* * * * *

§ 175.90 [Amended]

225. In § 175.90, paragraph (d) introductory text, the phrase "an etiologic agent" is removed and replaced with the phrase "a material in Division 6.2 (etiologic or infectious substance)".

§ 175.305 [Amended]

226. In § 175.305, paragraph (a), the reference "§ 173.120" is removed and replaced with the reference "§ 173.220".

§ 175.310 [Amended]

227. In § 175.310, the following changes are made:

a. In the introductory paragraph, the phrase "more than 20 gallons" is removed and replaced with the phrase "more than 76 liters (20 gallons)".

b. In paragraph (c)(1), the phrase "5 gallons capacity" is removed and replaced with the phrase "20 liters (5.3 gallons) capacity"; the phrase "DOT Specification 12B fiberboard box" is removed and replaced with the phrase "UN 4G fiberboard box"; the phrase "DOT Specification 15A, 15B, 15C, 16A, 19A or 19B wooden box" is removed and replaced with the phrase "UN 4C1 wooden box"; and the phrase "at least one-half inch thickness" is removed and replaced with the phrase "at least 1.3 cm (0.51 inch) thickness".

c. In paragraph (c)(2), the phrase "10 gallons capacity" is removed and replaced with the phrase "40 liters (11 gallons) capacity"; the phrase "DOT Specification 15A, 15B, 15C, 16A, 19A or 19B wooden box" is removed and replaced with the phrase "UN 4C1 wooden box"; and the phrase "at least one-half inch thickness" is removed and replaced with the phrase "at least 1.3 cm (0.51 inch) thickness".

d. In paragraph (c)(3), the phrase "DOT Specification 17E container" is removed and replaced with the phrase "UN 1A1 steel drum" and the phrase "5 gallons capacity" is removed and replaced with the phrase "20 liters (5.3 gallons) capacity".

228. In § 175.320, paragraph (a), the table is revised to read as follows:

§ 175.320 Cargo aircraft only; only means of transportation.

(a) * * *

Material	Class	Conditions
Detonators and detonating primers	Division 1.1 or 1.2 (Class A) explosives	Permitted only when no other hazardous material is aboard the aircraft.
Detonators and detonating primers	Division 1.4 (Class C) explosives	With the exception of Division 1.1 or 1.2 detonators and detonating primers, permitted only when there are no Division 1.1 or 1.2 (Class A) explosives aboard aircraft.
Fuel, aviation, turbine engine; methyl alcohol; or toluene.	Class 3 (flammable liquid)	Permitted in metal drums authorized for Packing Group I or II liquid hazardous materials having rated capacities of 220 liters (58.1 gallons) or less. May not be transported in the same aircraft with Class 1 (explosives), Class 5 (oxidizing), or Class 8 (corrosive) materials. Permitted in installed tanks each having a capacity of more than 450 liters (118.9 gallons) subject to the conditions specified in paragraph (c) of this section.
Gasoline	Class 3 (flammable liquid)	Permitted in metal drum having rated capacities of 220 liters (58.1 gallons) or less. May not be transported in the same aircraft with materials classed as Class 1 (explosive), Class 5 (oxidizing), or Class 8 (corrosive) materials. Permitted in installed tanks each having a capacity of 450 liters (118.9 gallons). Subject to the conditions specified in paragraph (c) of this section.
High explosives	Division 1.1 or 1.2 (Class A) explosives	Limited to Class 1 (explosive) materials to be used for blasting. Permitted only when no other cargo is aboard the aircraft or when being transported in the same aircraft with an authorized shipment of any one or more of any of the following materials to be used for blasting: Ammonium nitrate-fuel oil mixtures. Blasting agent n.o.s. Detonating cord. Propellant explosive (solid) (Division 1.3) (water gels only) Propellant explosive (liquid) (Division 1.3) (water gels only)
Oil n.o.s.; petroleum oil or petroleum oil, n.o.s.	Class 3 (flammable liquid)	Permitted in metal drums having rated capacities of 220 liters (58.1 gallons) or less. May not be transported in the same aircraft with materials classed as Class 1 (explosive), Class 5 (oxidizing), or Class 8 (corrosive) materials. Permitted in installed tanks each having a capacity of 450 liters (118.9 gallons). Subject to the conditions specified in paragraph (c) of this section.
Combustible liquid n.o.s.	Class 3 (combustible liquid)	Permitted in installed tanks each having a capacity of more than 450 liters (118.9 gallons) subject to the conditions specified in paragraph (c) of this section.

* * * * *

§ 175.320 [Amended]

229. In § 175.320, the following changes are made:

a. In paragraph (b)(8), the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (explosive) materials".

b. In paragraph (b)(9), the phrase "within 50 feet" is removed and replaced with the phrase "within 15 m (49 feet)".

c. In paragraph (c) introductory text, the phrase "flammable liquids and combustible liquids" is removed and replaced with the phrase "Class 3 (flammable) and combustible liquid) materials" and the phrase "110 gallons" is removed and replaced with the phrase "420 liters (111 gallons)".

d. In paragraph (c)(4)(iii), the phrase "flammable or combustible liquid" is removed and replaced with the phrase "Class 3 (flammable and combustible liquid) materials" both places it appears and the phrase "within 50 feet" is removed and replaced with the phrase "15 m (50 feet)".

230. In § 175.630, the section heading is revised to read as follows:

§ 175.630 Special requirements for Division 6.1 (poisonous) materials and materials in Division 6.2 (etiologic or infectious substances).

§ 175.630 [Amended]

231. In § 175.630, the following changes are made:

a. In paragraph (a), the phrase "POISON or ETIOLOGIC AGENT label" is removed and replaced with the phrase "POISON, KEEP AWAY FROM FOOD, ETIOLOGIC AGENT, or INFECTIOUS SUBSTANCE label" and the phrase "poisons or etiologic agents" is removed and replaced with the phrase "Division 6.1 (poisonous) materials or materials in Division 6.2 (etiologic or infectious substances)" both places it appears.

b. In paragraph (b), the phrase "such poisons" is removed and replaced with the phrase "such Division 6.1 (poisonous) materials".

232. In § 175.640, the section heading is revised to read as follows:

§ 175.640 Special requirements for Class 9 (miscellaneous hazardous) material.

§ 175.640 [Amended]

233. In § 175.640, the reference "§ 173.1090" is removed and replaced with "§ 173.216".

§ 17.700 [Amended]

234. In § 175.700, the following changes are made:

a. In the section heading and paragraph (b), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials" each place it appears.

b. In paragraph (c), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

§ 175.701 [Amended]

235. In § 175.701, in the section heading and paragraphs (b)(1) and (b)(2), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials" each place it appears.

§ 175.702 [Amended]

236. In § 17.702, the following changes are made:

a. In the section heading and paragraphs (b)(2)(i) and (b)(2)(iv), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraph (a) and (b)(2)(iii), the phrase "20 feet (6 meters)" is removed and replaced with the phrase "6 m (20 feet)".

c. In paragraph (b)(2)(i), the phrase "30 feet (9 meters)" is removed and replaced with the phrase "9 m (30 feet)".

§ 175.703 [Amended]

237. In § 17.703, the following changes are made:

a. In the section heading and paragraphs (a), (b), (c) introductory text, and (d)(3), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraph (c)(1), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

§ 175.705 [Amended]

238. In § 175.705, the section heading and paragraph (a), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials" each place it appears.

PART 176—CARRIAGE BY VESSEL

239. The authority citation for part 176 is revised to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1808; 49 CFR Part 1.53, app. A to part 1.

240. Section § 176.2 is added to read as follows:

§ 176.2 Definitions.

As used in this part—

Cantline means the v-shaped groove between two abutting, parallel horizontal cylinders.

Cargo net means a net made of fiber or wire used to provide convenience in handling loose or packaged cargo to and from a vessel.

Clear of living quarters means that the hazardous material must be located so that in the event of release of the material, leakage or vapors will not penetrate accommodations, machinery spaces or other work areas by means of entrances or other openings in bulkheads or ventilation ducts.

Closed freight container means a freight container which totally encloses its contents by permanent structures. A freight container formed partly by a tarpaulin, plastic sheet, or similar material is not a closed freight container.

Commandant (G-MTH) means the Chief, Marine Technical and Hazardous Materials Division, Office of Marine Safety, Security and Environmental Protection, United States Coast Guard, Washington, DC 20593-0001.

Compartment means any space on a vessel that is enclosed by the vessel's decks and its sides or permanent steel bulkheads.

CSC safety approval plate means the safety approval plate specified in Annex I of the International Convention for Safe Containers (1972) and conforming to the specifications in 49 CFR 451.23 and 451.25. The plate is evidence that a freight container was designed, constructed, and tested under international rules incorporated into U.S. regulations in 49 CFR parts 450 through 453. The plate is found in the door area of the container.

Deck structure means a structure of substantial weight and size located on the weather deck of a vessel and integral with the deck. This term includes superstructures, deck houses, mast houses, and bridge structures.

Draft means a load or combination of loads capable of being hoisted into or out of a vessel in a single lift.

Dunnage means lumber of not less than 25 mm (0.98 inch) commercial thickness or equivalent material laid over or against structures such as tank tops, decks, bulkheads, frames, plating, or ladders, or used for filling voids or fitting around cargo, to prevent damage during transportation.

Explosives anchorage means an anchorage so designated under 33 CFR part 110, subpart B.

Explosive article means an article or device which contains one or more explosive substances. Individual explosive articles are identified in the schedules for Class I (explosive) articles found in the IMDG Code.

Explosives handling facility means—

(1) A "designated waterfront facility" designated under 33 CFR part 126 when loading, handling, and unloading Class 1 (explosives) materials; or

(2) A facility for loading, unloading, and handling military Class 1 (explosives) materials which is operated or controlled by an agency of the Department of Defense.

Explosive substance means a solid or liquid material, or a mixture of materials, which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to its surroundings. Individual explosive substances are identified in the schedules for Class 1 (explosive) substances in the IMDG Code.

Handling means the operation of loading and unloading a vessel; transfer to, from, or within a vessel, and any ancillary operations.

Hold means a compartment below deck that is used exclusively for the carriage of cargo.

In containers or the like means in any clean, substantial, weatherproof box structure which can be secured to the vessel's structure, including a portable magazine or a closed transport unit. Whenever this stowage is specified, stowage in deckhouses, mast lockers and oversized weatherproof packages (overpacks) is also acceptable.

Incompatible materials means two materials whose stowage together may result in undue hazards in the case of leakage, spillage, or other accident.

Landing mat means a shock absorbing pad used in loading Class 1 (explosive) materials on vessels.

Machinery Spaces of Category A are those spaces, and trunks to such spaces, which contain:

(1) Internal combustion machinery used for main propulsion;

(2) Internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kw; or

(3) any oil-fired boiler or fuel unit.

Magazine means an enclosure designed to protect certain goods of Class 1 (explosive) materials from damage by other cargo and adverse weather conditions during loading.

unloading, and when in transit; and to prevent unauthorized access. A magazine may be a fixed structure in the vessel, a closed freight container, a closed transport vehicle, or a portable magazine.

Master of the Vessel, as used in this part, includes the person in charge of an unmanned vessel or barge.

Open freight container means a freight container that does not totally enclose its contents by permanent structures.

Overstowed means a package or container is stowed directly on top of another. However, with regard to Class 1 (explosive) stowage, such goods may themselves be stacked to a safe level but other goods should not be stowed directly on top of them.

Pallet means a portable platform for stowing, handling, and moving cargo.

Palletized unit means packages or unpackaged objects stacked on a pallet, banded and secured to the pallet by metal, fabric, or plastic straps for the purpose of handling as a single unit.

Pie plate means a round, oval, or hexagonal pallet without sideboards, used in conjunction with a cargo net to handle loose cargo on board a vessel.

Portable magazine means a strong, closed, prefabricated, steel or wooden, closed box or container, other than a freight container, designed and used to handle Class 1 (explosive) materials either by hand or mechanical means.

Readily combustible material means a material which may or may not be classed as a hazardous material but which is easily ignited and supports combustion. Examples of readily combustible materials include wood, paper, straw, vegetable fibers, products made from such materials, coal, lubricants, and oils. This definition does not apply to packaging material or dunnage.

Responsible person means a person empowered by the master of the vessel to make all decisions relating to his or her specific task, and having the necessary knowledge and experience for that purpose.

Safe working load means the maximum gross weight that cargo handling equipment is approved to lift.

Skilled person means a person having the knowledge and experience to perform a certain duty.

Skipboard means a square or rectangular pallet without sideboards, usually used in conjunction with a cargo net to handle loose cargo on board a vessel.

Splice as used in § 176.172 of this part, means any repair of a freight container main structural member which replaces material, other than complete replacement of the member.

Transport unit means a transport vehicle or a freight container. A "closed transport unit" means a transport unit in which the contents are totally enclosed by permanent structures. An "open transport unit" means a transport unit which is not a closed transport unit. Transport units with fabric sides or tops are not closed transport units for the purposes of this part.

Tray means a type of pallet constructed to specific dimensions for handling a particular load.

241. In § 176.3, paragraph (b) is revised to read as follows:

§ 176.3 Unacceptable hazardous materials shipments.

* * * * *

(b) A carrier may not transport by vessel any explosive or explosive composition described in § 173.54 of this subchapter.

242. Section 176.4 is added to read as follows:

§ 176.4 Port security and safety regulations.

(a) Each carrier, master, agent, and charterer of a vessel and all other persons engaged in handling hazardous materials on board vessels shall comply with the applicable provisions of 33 CFR parts 6, 109, 110, 125, 126, and 160.

(b) Division 1.1 and 1.2 (Class A and B explosive) materials may only be loaded on and unloaded from a vessel at—

(1) A facility of particular hazard as defined in 33 CFR 126.05(b);

(2) An explosives anchorage listed in 33 CFR part 110; or

(3) A facility operated or controlled by the Department of Defense.

(c) With the concurrence of the COTP, Division 1.1 and 1.2 (Class A and B explosive) materials may be loaded on or unloaded from a vessel in any location acceptable to the COTP.

243. In § 176.5, paragraph (e) is removed and paragraphs (b)(6) and (d) are revised to read as follows:

§ 176.5 Application to vessels.

* * * * *

(b) * * *

(6) A tug or towing vessel, except when towing another vessel having Class 1 (explosive) materials, Class 3 (flammable liquids), or Division 2.1 (flammable gas) materials, in which case the owner/operator of the tug or towing vessel shall make such provisions to guard against and extinguish fire as the Coast Guard may prescribe;

* * * * *

(d) Except for transportation in bulk packagings (as defined in § 171.8 of this subchapter), the bulk carriage of hazardous materials by water is governed by 46 CFR chapter I, subchapters D, I, N and O.

244. Section 176.9 is revised to read as follows:

§ 176.9 "Order-Notify" or "C.O.D." shipments.

A carrier may not transport Division 1.1 or 1.2 (Class A explosive) materials, detonators, or boosters with detonators which are:

(a) Consigned to "order-notify" or "C.O.D.", except on a through bill of lading to a place outside the United States; or

(b) Consigned by the shipper to himself unless he has a resident representative to receive the shipment at the port of discharge.

245. In § 176.11, paragraphs (a), (c), and (f) are revised to read as follows:

§ 176.11 Exceptions.

(a) A hazardous material may be offered and accepted for transport by vessel when in conformance with the IMDG Code, subject to the conditions and limitations set forth in § 171.12(b) of this subchapter. Class 1 (explosive) materials may be offered and accepted for transportation by vessel in accordance with this paragraph in place of §§ 176.83, 176.84, and 176.112 through 176.174 of this part. A hazardous material which conforms to the provisions of this paragraph (a) is not subject to the requirement specified in § 172.201(d) of this subchapter for an emergency response telephone number, when transportation of the hazardous material originates and terminates outside the United States and the hazardous material—

(1) Is not offloaded from the vessel; or

(2) Is offloaded between ocean vessels at a U.S. port facility without being transported by public highway.

* * * * *

(c) The requirements of this subchapter governing the transportation of combustible liquids do not apply to the transportation of combustible liquids in non-bulk (see definitions in § 171.8 of this subchapter) packages on board vessels.

* * * * *

(f) Paragraph (a) of this section does not apply to hazardous materials, including certain hazardous wastes and hazardous substances as defined in § 171.8 of this subchapter, which are not subject to the requirements of the IMDG Code.

* * * * *

246. In § 176.30, paragraphs (a)(3) and (a)(5) are revised to read as follows:

§ 176.30 Dangerous cargo manifest.

(a) * * *

(3) Shipping name and identification number of each hazardous material on board as listed in § 172.101 of this subchapter or as listed in the IMDG Code and an emergency response telephone number as prescribed in subpart G of part 172 of this subchapter.

* * * * *

(5) Classification of the hazardous material in accordance with either:

(i) The Hazardous Materials Table, § 172.101 of this subchapter; or

(ii) The International Maritime Organization's IMDG Code.

* * * * *

247. In § 176.54, the section heading and paragraphs (b)(1) and (b)(2) are revised to read as follows:

§ 176.54 Repairs involving welding, burning, and power-actuated tools and appliances.

* * * * *

(b) * * *

(1) The repairs or work are approved by the COTP under 33 CFR 126.15(c); or

(2) Emergency repairs to the vessel's main propelling or boiler plant or auxiliaries are necessary for the safety of the vessel. If such repairs are performed, the master of the vessel must immediately notify the nearest COTP.

248. Section 176.57 is revised to read as follows:

§ 176.57 Supervision of handling and stowage.

(a) Hazardous materials may be handled or stowed on board a vessel only under the direction and observation of a responsible person assigned this duty.

(b) For a vessel engaged in coastwise voyages, or on rivers, bays, sounds or lakes, including the Great Lakes when the voyage is not foreign-going, the responsible person may be an employee of the carrier and assigned this duty by the carrier, or a licensed officer attached to the vessel and assigned by the master of the vessel.

(c) For a domestic vessel engaged in a foreign-going or intercoastal voyage, the responsible person must be an officer possessing an unexpired license issued by the USCG and assigned this duty by the master of the vessel.

(d) For a foreign vessel, the responsible person must be an officer of the vessel assigned this duty by the master of the vessel.

249. Section 176.58 is revised to read as follows:

§ 176.58 Preparation of the vessel.

(a) Each hold or compartment in which hazardous materials are to be stowed must be free of all debris before the hazardous materials are stowed. Bilges must be examined and all residue of previous cargo removed.

(b) All decks, gangways, hatches, and cargo ports over or through which hazardous materials must be passed or handled in loading or unloading must be free of all loose materials before cargo handling operations begin.

(c) No debris that creates a fire hazard or a hazardous condition for persons engaged in handling hazardous materials may be on the weather deck of a vessel during loading or unloading operations.

(d) Hatch beams and hatch covers may not be stowed in a location that would interfere with cargo handling.

250. Section 176.65 is revised to read as follows:

§ 176.65 Alternative stowage procedures.

When a hazardous material is to be loaded on board a vessel and it is shown to the satisfaction of the Coast Guard Captain of the Port for the place where the vessel is being loaded that it is impracticable to comply with a stowage location requirement specified in the § 172.101 Table of this subchapter or a segregation, handling or stowage requirement specified in this part, the Captain of the Port may authorize in writing the use of an alternative stowage location or method of segregation, handling or stowage subject to such conditions as he finds will insure a level of safety at least equal to that afforded by the regulatory requirement concerned.

251. In § 176.69, paragraphs (a) and (b) are revised and paragraphs (d) and (e) are added to read as follows:

§ 176.69 General stowage requirements for hazardous materials.

(a) Hazardous materials (except as provided in paragraph (c) of this section and Class 9 (miscellaneous hazardous materials) materials) must be stowed in a manner that will facilitate inspection during the voyage, their removal from a potentially dangerous situation, and the removal of packages in case of fire.

(b) Each package marked in accordance with § 172.312(a)(2) of this subchapter must be stowed as to remain in the position indicated during transportation.

* * * * *

(d) Packages of hazardous materials must be secured and dunnaged to prevent movement in any direction. Vertical restraints are not required if the shape of the package and the stuffing pattern preclude shifting of the load.

(e) Packages of hazardous materials must be braced and dunnaged so that they are not likely to be pierced by the dunnage or crushed by a superimposed load.

§ 176.74 [Amended]

252. In § 176.74 paragraph (c), the word "ORM" is replaced with the words "Class 9 (miscellaneous hazardous materials) materials".

253. In § 176.76, paragraphs (a)(9) and (c) are removed and reserved, and the section heading and paragraphs (a) introductory text, (a)(2), (a)(5) and (b) are revised to read as follows:

§ 176.76 Transport vehicles, freight containers, and portable tanks containing hazardous materials.

(a) Except as provided in paragraphs (b) through (f) of this section, hazardous materials authorized to be transported by vessel may be carried on board a vessel in a transport vehicle or freight container, subject to the following conditions (see additional requirements concerning the transport of Class 1 (explosive) materials in §§ 176.168 through 176.172 of this subchapter):

* * * * *

(2) All packages in the transport vehicle or freight container must be secured to prevent movement in any direction. Restraint is not required if the shape of the packages, loading pattern, and horizontal restraint preclude vertical movement of the load within the freight container or transport vehicle;

* * * * *

(5) Each package marked in accordance with § 172.312(a)(2) of this subchapter must be stowed as marked;

* * * * *

(9) [Reserved]

* * * * *

(b) A transport vehicle containing hazardous materials may be carried only on board a trailership, trainship, ferry vessel or car float.

(c) [Reserved]

* * * * *

254. In § 176.78, paragraphs (a), (d), (e)(1), (f)(3), and (l) are revised to read as follows:

§ 176.78 Use of power-operated industrial trucks on board vessels.

(a) *Power Operated trucks.* A power-operated truck (including a power-operated tractor, forklift, or other specialized truck used for cargo handling) may not be used on board a vessel in a space containing a hazardous material unless the truck conforms to the requirements of this section. The COTP may suspend or prohibit the use of cargo handling vehicles or equipment

when that use constitutes a safety hazard.

* * * * *

(d) *Class 1 (explosive) materials.* No power-operated truck may be used to handle Class 1 (explosive) materials or other cargo in an area near Class 1 (explosive) materials on board a vessel except:

(1) A power-operated truck designated EE or EX.

(2) A power-operated truck designated LPS, GS, D, or DS may be used under conditions acceptable to the COTP.

(e) *Other hazardous materials.* (1) Only an "EX", "EE", "GS", "LPA", or "DS" truck may be used in a hold or compartment containing Division 2.1 (flammable gas) materials, Class 3 (flammable liquids), Class 4 (flammable solids) materials, or Class 5 (oxidizers or organic peroxides) materials, cottons or other vegetable fibers, or bulk sulfur.

* * * * *

(f) * * *

(3) A forklift truck used to handle small objects or unstable loads must be equipped with a load backrest extension having height, width, and strength sufficient to prevent any load, or part of it, from falling toward the mast when the mast is in a position of maximum backward tilt. The load backrest extension must be constructed in a manner that does not interfere with good visibility.

(l) *Packaging and stowage of fuel on board a vessel.* Division 2.1 (flammable gas) materials and flammable liquids used as fuel for industrial trucks must be packaged and stowed as authorized in 46 CFR 147.60 or 46 CFR 147.45, respectively.

255. Section 176.83 is revised to read as follows:

§ 176.83 Segregation.

(a) *General.* (1) This section applies to all cargo spaces on deck and under deck on all types of vessels.

(2) Segregation is obtained by maintaining certain distances between incompatible hazardous materials or by requiring the presence of one or more steel bulkheads or decks between them or a combination thereof. Intervening spaces between such hazardous materials may be filled with other cargo which is not incompatible with the hazardous materials.

(3) In addition to general segregation between classes of hazardous materials, there may be a need to segregate a particular material from other materials which would contribute to its hazard. Such segregation requirements are indicated by code numbers in Column 10B of the § 172.101 Table.

(4) Segregation is not required between hazardous materials of different classes which comprise the same substance but vary only in their water content (e.g., sodium sulphide in Division 4.2 or Class 8).

(5) Whenever hazardous materials are stowed together, whether or not in a transport unit, the segregation of such hazardous materials from others must always be in accordance with the most restrictive requirements for any of the hazardous materials concerned.

(6) When the § 172.101 Table or § 172.402 requires packages to bear a subsidiary hazard label or labels, the segregation appropriate to the subsidiary hazards must be applied when that segregation is more restrictive than that required by the primary hazard. For the purposes of this paragraph, the segregation requirements corresponding to an explosive subsidiary hazard are—except for organic peroxides which are those corresponding to Division 1.3—those for Division 1.4 (Class C explosive) materials.

(7) Where, for the purposes of segregation, terms such as "away from" a particular hazard class are used in the § 172.101 Table, the segregation requirement applies to:

(i) all hazardous materials within the hazard class; and

(ii) all hazardous materials for which a secondary hazard label of that class is required.

(8) Notwithstanding paragraphs (a)(6) and (a)(7) of this section, hazardous materials of the same class may be stowed together without regard to segregation required by secondary hazards if the materials are not incompatible.

(9) Stowage in a shelter-'tween deck cargo space is not considered to be "on deck" stowage.

(b) *General Segregation Table.* The following table sets forth the general requirements for segregation between the various classes of hazardous materials. The properties of materials within each class may vary greatly and may require greater segregation than is reflected in this table. If the § 172.101 Table sets forth particular requirements for segregation, they take precedence over these general requirements.

TABLE § 176.83(b)—GENERAL SEGREGATION REQUIREMENTS FOR HAZARDOUS MATERIALS

[Segregation must also take account of a single secondary hazard label, as required by paragraph (a)(6) of this section.]

Class	1.1 1.2 1.5	1.3	1.4 1.6	2.1	2.2	2.3	3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	7	8	9
Explosives, 1.1, 1.2, 1.5	(*)	(*)	(*)	4	2	2	4	4	4	4	4	4	2	4	2	4	X
Explosives, 1.3	(*)	(*)	(*)	4	2	2	4	3	3	4	4	4	2	4	2	2	X
Explosives, 1.4, 1.6	(*)	(*)	(*)	2	1	1	2	2	2	2	2	2	X	4	2	2	X
Flammable gases 2.1	4	4	2	X	X	X	2	1	2	X	2	2	X	4	2	1	X
Non-toxic, non-flammable gases 2.2	2	2	1	X	X	X	1	X	1	X	X	1	X	2	1	X	X
Poisonous gases 2.3	2	2	1	X	X	X	2	X	2	X	X	2	X	2	1	X	X
Flammable liquids 3	4	4	2	2	1	2	X	X	2	1	2	2	X	3	2	X	X
Flammable solids 4.1	4	3	2	1	X	X	X	X	1	X	1	2	X	3	2	1	X
Spontaneously combustible substances 4.2	4	3	2	2	1	2	2	1	X	1	2	2	1	3	2	1	X
Substances which are dangerous when wet 4.3	4	4	2	X	X	X	1	X	1	X	2	2	X	2	2	1	X
Oxidizing substances 5.1	4	4	2	2	X	X	2	1	2	2	X	2	1	3	1	2	X
Organic peroxides 5.2	4	4	2	2	1	2	2	2	2	2	2	X	1	3	2	2	X
Poisons 6.1	2	2	X	X	X	X	X	X	1	X	1	1	X	1	X	X	X
Infectious substances 6.2	4	4	4	4	2	2	3	3	3	2	3	3	1	X	3	3	X
Radioactive materials 7	2	2	2	2	1	1	2	2	2	2	1	2	X	3	X	2	X
Corrosives 8	4	2	2	1	X	X	X	1	1	1	2	2	X	3	2	X	X
Miscellaneous dangerous substances 9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

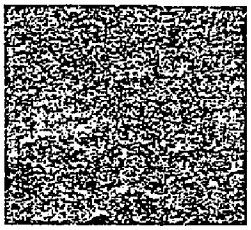
Numbers and symbols relate to the following terms as defined in this section:
1—"Away from."
2—"Separated from."
3—"Separated by a complete compartment or hold from."
4—"Separated longitudinally by an intervening complete compartment or hold from."
X—The segregation, if any, is shown in the § 172.101 Table.
*—See § 176.144 of this Part for segregation within Class 1.

(c) *Segregation requirements for breakbulk cargo.* (1) The requirements of this paragraph apply to the segregation of packages containing hazardous materials and stowed as breakbulk cargo;

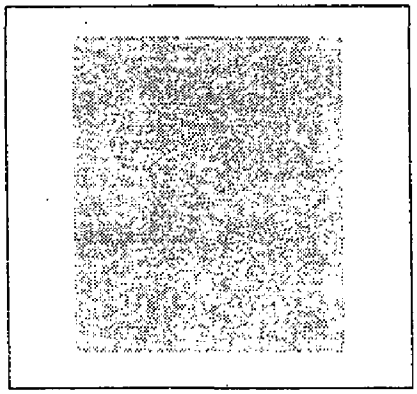
(2) Definition of the segregation terms:

(i) Legend:

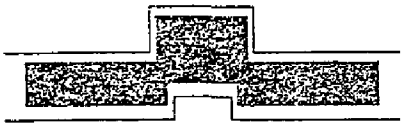
[A] Reference package.



[B] Package containing incompatible goods.

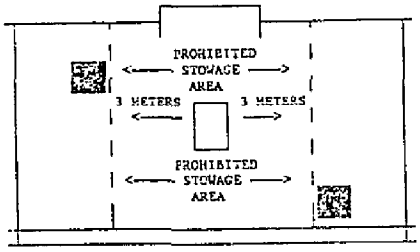


(C) Deck resistant to fire and liquid.

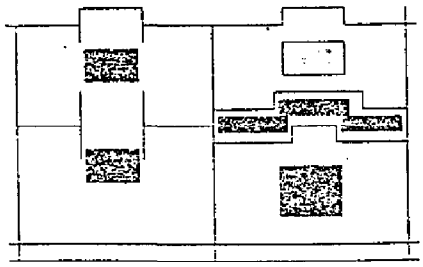


Note: Full vertical lines represent transverse bulkheads between compartments or holds resistant to fire and liquid.

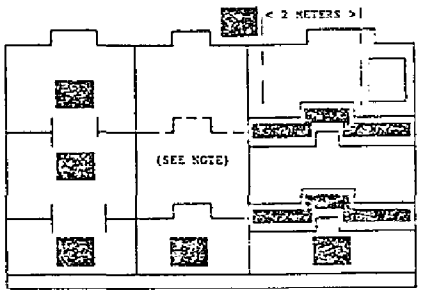
(ii) *"Away from"*: Effectively segregated so that the incompatible materials cannot interact dangerously in the event of an accident but may be carried in the same compartment or hold or on deck provided a minimum horizontal separation of 3 meters (10 feet) projected vertically is obtained.



(iii) *"Separated From"*: In different compartments or holds when stowed under deck. If the intervening deck is resistant to fire and liquid, a vertical separation (i.e., in different compartments) may be accepted as equivalent to this segregation. For "on deck" stowage, this segregation means a separation by a distance of at least 6 meters (20 feet) horizontally.

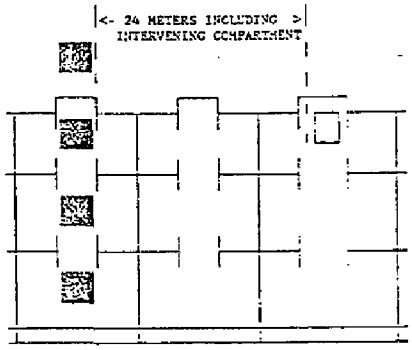


(iv) *"Separated by a complete compartment or hold from"*: Either a vertical or horizontal separation. If the intervening decks are not resistant to fire and liquid, then only a longitudinal separation (i.e., by a intervening complete compartment or hold) is acceptable. For "on deck" stowage, this segregation means a separation by a distance of at least 12 meters (39 feet) horizontally. The same distance must be applied if one package is stowed "on deck, and the other one in an upper compartment.



Note: One of the two decks must be resistant to fire and liquid.

(v) *"Separated longitudinally by an intervening complete compartment or hold from"*: Vertical separation alone does not meet this requirement. Between a package "under deck" and one "on deck" a minimum distance of 24 meters (79 feet) including a complete compartment must be maintained longitudinally. For "on deck" stowage, this segregation means a separation by a distance of at least 24 meters (79 feet) longitudinally.



(d) *Segregation in transport units:* Two hazardous materials for which any segregation is required may not be stowed in the same transport unit.

(e) *Segregation of hazardous materials stowed as breakbulk cargo from those packed in transport units:* (1) Hazardous materials stowed as breakbulk cargo must be segregated from materials packed in open transport units in accordance with paragraph (c) of this section.

(2) Hazardous materials stowed as breakbulk cargo must be segregated from materials packed in closed transport units in accordance with

paragraph (c) of this section, except that:

(i) Where "away from" is required, no segregation between packages and the closed transport units is required; and

(ii) Where "separated from" is required, the segregation between the packages and the closed transport units may be the same as for "away from".

(f) *Segregation of containers on board container vessels:* (1) This paragraph applies to the segregation of freight containers which are carried on board container vessels, or on other types of vessels provided these cargo spaces are properly fitted for permanent stowage of freight containers during transport.

(2) For container vessels which have cargo spaces used for breakbulk cargo or any other method of stowage, the appropriate paragraph of this section applies to the relevant cargo space.

(3) *Segregation Table:* Table § 176.83(f) sets forth the general requirements for segregation between freight containers on board container vessels.

(4) In Table § 176.83(f), a "container space" means a distance of not less than 6 m (20 feet) fore and aft or not less than 2.5 m (8 feet) athwartship.

TABLE 176.83(f).—SEGREGATION OF CONTAINERS ON BOARD CONTAINER SHIPS

Segregation requirement	Vertical			Horizontal						
					Closed versus closed		Closed versus open		Open versus open	
	Closed versus closed	Closed versus open	Open versus open		On deck	Under deck	On deck	Under deck	On deck	Under deck
1 "Away from"	One on top of the other permitted.	Open on top of closed permitted.	Not in the same vertical line unless segregated by a deck.	Fore and aft	No restriction	No restriction	No restriction	No restriction	One container space.	One container space or one bulkhead.
		Otherwise as for open versus open.		Athwartships	No restriction	No restriction	No restriction	No restriction	One container space.	One container space.
2 "Separated from"	Not in the same vertical line unless segregated by a deck.	As for open versus open.	Not in the same vertical line unless segregated by a deck.	Fore and aft	One container space.	One container space or one bulkhead.	One container space	One container space or one bulkhead.	One container spaces.	One bulkhead
				Athwartships	One container space.	One container space.	One container space	Two container spaces.	Two container spaces.	One bulkhead.
3 "Separated by a complete compartment or hold from".	Not in the same vertical line unless segregated by a deck.	As for open versus open.	Not in the same vertical line unless segregated by a deck.	Fore and aft	One container space.	One bulkhead	One container space.	One bulkhead	Two container spaces.	Two bulkheads.
				Athwartships	Two container spaces.	One bulkhead	Two container spaces.	One bulkhead	Three container spaces.	Two bulkheads.
4 "Separated longitudinally by an intervening complete compartment or hold from".	Prohibited			Fore and aft	Four container spaces.	One bulkhead and four container spaces*.	Four container spaces.	Two bulkheads.	Four container spaces.	Two bulkheads.
				Athwartships	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited.

* Containers not less than 6 meters (20 feet) from intervening bulkhead.

Note: All bulkheads and decks must be resistant to fire and liquid.

(g) *Segregation of transport units on board trailerships:* (1) The requirements of this paragraph apply to the segregation of transport units which are carried on board trailerships or in "roll-on/roll-off" cargo spaces.

(2) for trailerships which have spaces suitable for breakbulk cargo, containers, or any other method of stowage, the appropriate paragraph of this section applies to the relevant cargo space.

(3) *Segregation Table.* Table § 176.83(g) sets forth the general requirements for segregation between transport units on board trailerships.

TABLE 176.83(g)—SEGREGATION OF TRANSPORT UNITS ON BOARD TRAILERSHIPS AND TRAINSHIPS.

Segregation requirement		Closed versus closed		Closed versus open		Open versus open	
		On deck	Under deck	On deck	Under deck	On deck	Under deck
1 "Away From"	Fore and aft	No restriction	No restriction	No restriction	No restriction	No restriction	At least 3 meters
	Athwartships	No restriction	No restriction	No restriction	No restriction	No restriction	At least 3 meters.
2. "Separated from"	Fore and aft	At least 6 meters.	At least 6 meters or one bulkhead.	At least 6 meters.	At least 6 meters or one bulkhead.	At least 6 meters or one bulkhead.	At least 12 meters or one bulkhead
	Athwartships	At least 3 meters.	At least 3 meters or one bulkhead.	At least 3 meters.	At least 6 meters.	At least 6 meters.	At least 12 meters or one bulkhead
3 "Separated by a complete compartment or hold from".	Fore and aft	At least 12 meters.	At least 24 meters + deck.	At least 24 meters.	At least 24 meters + deck.	At least 36 meters.	Two decks or two bulkheads.
	Athwartships	At least 12 meters.	At least 24 meters + deck.	At least 24 meters.	At least 24 meters + deck.	At least 36 meters.	Prohibited.

TABLE 176.83(g)—SEGREGATION OF TRANSPORT UNITS ON BOARD TRAILERSHIPS AND TRAINSHIPS.—Continued

Segregation requirement		Closed versus closed		Closed versus open		Open versus open	
		On deck	Under deck	On deck	Under deck	On deck	Under deck
4. "Separated longitudinally by an intervening complete compartment or hold from".	Fore and aft	At least 36 meters.	Two bulkheads or at least 36 meters + two decks.	At least 36 meters.	At least 48 meters including two bulkheads.	At least 48 meters.	Prohibited.
	Athwartships	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited.

Note: All bulkheads and decks must be resistant to fire and liquid.

(h) *Segregation on board barge carrying vessels:* (1) The requirements of this section apply to the segregation in shipborne barges as well as to the segregation between shipborne barges carried on board vessels specially designed and equipped to carry such barges.

(2) On barge-carrying vessels which incorporate other stowage spaces or any other method of stowage, barges containing hazardous materials must be segregated from hazardous materials not stowed in barges as prescribed in paragraphs (b) and (j) of this section.

(i) *Segregation in shipborne barges:* Hazardous materials transported in shipborne barges must be segregated as prescribed in paragraphs (a), (b), and (c) of this section.

(j) *Segregation between shipborne barges on barge-carrying vessels:* (1) When a shipborne barge is loaded with two or more hazardous materials with different requirements for segregation, the most stringent applicable segregation requirement must be applied.

(2) "Away from" and "separated from" require no segregation between shipborne barges.

(3) *For barge-carrying vessels with vertical holds.* "Separated by a complete compartment or hold from" means that separate holds are required. On barge-carrying vessels having horizontal barge levels, separate barge levels are required and the barges may not be in the same vertical line.

(4) "Separated longitudinally by an intervening complete compartment or hold from" means, for barge-carrying vessels with vertical holds, that separation by an intervening hold or engine room is required. On barge-carrying vessels having horizontal barge levels, separate barge levels and a longitudinal separation by at least two intervening barge spaces are required.

(k) *Segregation requirements for ferry vessels:* A ferry vessel (when operating either as a passenger or cargo vessel) that cannot provide the separation required in this section may carry incompatible hazardous materials in separate transport vehicles if they are stowed to give the maximum possible separation.

256. Section 176.84 is added to read as follows:

§ 176.84 Other requirements for stowage and segregation, for cargo vessels and passenger vessels.

(a) *General.* When Column 10B of the § 172.101 Table refers to a numbered or alpha-numeric stowage provision for water shipments, the meaning and requirements of that provision are as set forth in this section. Terms in quotation marks are defined in § 176.83.

(b) *Table of provisions:*

Code	Provisions
1	(Reserved).
2	Temperature controlled material.
3	Do not stow with high explosives.
4	(Reserved).
5	(Reserved).
6	Emergency temperature material.
7	(Reserved).
8	Glass carboys not permitted on passenger vessels.
9	Glass carboys not permitted under deck.
10	Glass bottles not permitted under deck.
11	Keep away from heat and open flame.
12	Keep as cool as reasonably practicable.
13	Keep as dry as reasonably practicable.
14	For metal drums, stowage permitted under deck on cargo vessels.
15	May be stowed in portable magazine or metal locker.
16	No other cargo may be stowed in the same hold with this material.
17	(Reserved).
18	Prohibited on any vessel carrying explosives (except explosives in Division 1.4, Compatibility group S).
19	Protect from sparks and open flames.
20	Segregation same as for corrosives.
21	Segregation same as for flammable liquids.
22	Segregation same as for flammable liquids if flash point below 61 °C (142 °F).
23	Segregation same as for flammable liquids if flash point between 23 °C (73 °F) and 61 °C (142 °F).
24	Segregation same as for flammable solids.
25	Shade from radiant heat.
26	Stow "away from" acids.
27	Stow "away from" alkaline compounds.
28	Stow "away from" flammable liquids.
29	Stow "away from" ammonium compounds.
30	Stow "away from" animal or vegetable oils.
31	Stow "away from" combustible materials.
32	Stow "away from" copper, its alloys and its salts.
33	Stow "away from" fluorides.
34	Stow "away from" foodstuffs.
35	Stow "away from" all odor-absorbing cargo.
36	Stow "away from" heavy metals and their compounds.
37	Stow "away from" hydrazine.
38	Stow "away from" all other corrosives.
39	Stow "away from" liquid halogenated hydrocarbons.
40	Stow "clear of living quarters".
41	Stow "away from" mercury and its compounds.
42	Stow "away from" nitric acids and perchloric acids not exceeding 50 percent acid by weight.
43	Stow "away from" organic materials.
44	Stow "away from" oxidizers.
45	Stow "away from" permanganates.
46	Stow "away from" powdered metals.
47	Stow "away from" sodium compounds.
48	Stow "away from" sources of heat.
49	Stow "away from" corrosives.
50	Stow "away from" sources of heat where temperatures in excess of 55 °C (131 °F) for a period of 24 hours or more will be encountered.
51	Stow "separated from" acetylene.
52	Stow "separated from" acids.
53	Stow "separated from" alkaline compounds.
54	Stow "separated from" animal or vegetable oils.
55	Stow "separated from" ammonia.
56	Stow "separated from" ammonium compounds.
57	Stow "separated from" chlorine.
58	Stow "separated from" cyanides.
59	Stow "separated from" combustible materials.
60	Stow "separated from" chlorates, chlorites, hypochlorites, nitrites, perchlorates, permanganates, and metallic powders.
61	Stow "separated from" corrosive materials.
62	Stow "separated from" diborane.

Code	Provisions
63	Stow "separated from" diethylene triamine.
64	Stow "separated from" explosives.
65	Stow "separated from" flammable substances.
66	Stow "separated from" flammable solids.
67	Stow "separated from" halides.
68	Stow "separated from" hydrogen.
69	Stow "separated from" hydrogen peroxide.
70	Stow "separated from" mercury salts.
71	Stow "separated from" nitric acid.
72	Stow "separated from" nitrogen compounds.
73	Stow "separated from" chlorates.
74	Stow "separated from" oxidizers.
75	Stow "separated from" permanganates.
76	Stow "separated by a complete compartment or hold from" organic peroxides.
77	Stow "separated longitudinally by a complete compartment or hold from" explosives.
78	Stow "separated longitudinally by an intervening complete compartment or hold from" explosives.
79	The maximum net quantity in one package for this material shipped aboard a passenger vessel is limited to 22.7 kg (50 pounds).
80	Toy torpedoes must not be packed with other special fireworks.
81	Under deck stowage permitted only if an indicating substance such as chloropicrin has been added.
82	Under deck stowage is permitted only if containing not more than 35 percent by weight of hydrazine.
83	(Reserved).
84	Under deck stowage must be in well-ventilated space.
85	Under deck stowage must be in mechanically ventilated space.
86	Stow "separated by a complete compartment or hold from" explosives Division 1.3.
87	Stow "separated from" Class 1 (explosives) except Division 1.4.
88	Stow "separated by a complete compartment or hold from" Class 1 (explosives) except Division 1.4.
89	Segregation same as for oxidizers.
90	Stow "separated from" radioactive materials.
91	Stow "separated from" flammable liquids.
92	Stow "separated from" powdered materials.
93	Stow not accessible to unauthorized persons on passenger vessels.
94	Plastic jerricans and plastic drums not permitted under deck.
95	Stow "separated from" foodstuffs.
96	Class carboys not permitted under deck on passenger vessels.
97	Stow "away from" azides.
98	Stow "away from" all flammable materials.
99	Only new metal drums permitted on passenger vessels.
100	Stow "away from" flammable solids.
101	Stow "separated from" iron oxide.
102	Stow "separated from" all odor absorbing cargoes.
103	Only to be loaded under dry weather conditions.
104	Stow "separated from" bromine
105	As approved by the Competent Authority of the country concerned
106	Stow "separated from" powdered metal.
107	Stow "separated from" peroxides and superoxides.
108	The transport temperature should be indicated on the tank.
109	Label as a flammable liquid if flash point is 61 °C (142 °F) or below.
110	Packaging Group II if concentration does not exceed 70 percent acid.
111	If concentration exceeds 50 percent acid, notes 66, 74, 89, and 90 apply.
112	Packaging Group II for concentrations not less that 50 percent and Packaging Group III for concentrations less than 50 percent.
113	Packaging Group II if concentrations does not exceed 60 percent acid.
114	Corrosive subsidiary risk label required unless concentration is less than 80 percent.
115	If packaged in glass bottles, the maximum quantity in packing method 1 on any ship is 500 kg (equivalent to 450 liters).
116	In a cargo space capable of being opened up in an emergency. The possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency and the consequent risk to the stability of the ship through flooding of the cargo space should be considered before loading.
117	In a clean cargo space capable of being opened up in an emergency. In the case of bagged fertilizer in freight containers, it is sufficient if in the case of an emergency, the cargo is accessible through free approaches (hatch entries) and mechanical ventilation enables the master to exhaust any gases or fumes resulting from decomposition. The possible need to open hatches in case of fire to provide maximum ventilation and to apply water in an emergency and the consequent risk to the stability of the ship through flooding of the cargo space should be considered before loading.
118	Stowage—Category D. Category E freight containers and pallet boxes only. Ventilation may be required. The possible need to open hatches in a case of fire to provide maximum ventilation and to supply water in an emergency, and the consequent risk to the stability of the ship through flooding of the cargo space, should be considered before loading.
119	Double strip stowage recommended.
120	Provide good surface and through ventilation.
121	Packaging group III when the flash point of the flammable liquid is 23 °C (73 °F) or above.
122	Stow "separated from" infectious substances.
123	Stow "away from" infectious substances.
M1—M6	(Reserved).

(c) *Provisions for the stowage of Class 1 (explosive) materials:* (1) Unless otherwise specified in Column 10B of the § 172.101 Table, explosive substances and explosive articles must be stowed as follows:

(i) *On deck:* In containers or the like.

(ii) *Under deck:* Ordinary stowage.

(2) The following notes in Column 10B of the § 172.101 Table apply to the transport of Class 1 (explosive) materials by vessel:

Note	Provision
1E	Cargo vessel, on deck, in containers or the like.
2E	Cargo vessel, on deck, in portable magazines.
3E	Cargo vessel, on deck, secured to the vessel's structure.
4E	Cargo vessel, under deck, Magazine, Type A.
5E	Cargo vessel, under deck, Magazine, Type B.
6E	Cargo vessel, under deck, Magazine, Type C.
7E	Cargo vessel, under deck, Ordinary Stowage.
8E	Cargo vessel, under deck, Special Stowage.
9E	Passenger vessel, stowage as for cargo vessel.
10E	Magazine, Type B, if in effectively sealed dust-tight packages; otherwise, Magazine, Type A.
11E	On-deck portable magazine must be steel.
12E	Stowage as specified by Competent Authority.
13E	On deck, in containers not exceeding 2.5 metric ton gross per container or group. There may not be more than 2 such containers or groups; they must be separated from each other, and from any other explosive substance or article by at least 9 m (30 feet). Containers or groups must be at least 9 m (30 feet) from the bridge or accommodation.
14E	On deck, in steel portable magazines or steel freight containers.
15E	On-deck, containers must be leak-proof.
16E	On deck, in containers or sheeted stacks. The gross weight of each stack or group of containers may not exceed 2.5 metric ton. There may not be more than 2 stacks or groups of containers; they must be separated from each other, and from any other explosive substances or articles by at least 9 m (30 feet). Stacks or containers must be at least 9 m (30 feet) from the bridge or accommodation.
17E	On deck stowage is recommended.
18E	For international shipments, stow in the same manner as is required for "cartridges for weapons' inert projectile" UN 0012, Division 1.4S.
19E	Substances which contain ammonium nitrate or other ammonium salts must be stowed "away from" Explosives, Blasting, Type C, UN 0083
20E	Stow in accordance with § 172.84(c)(5) of this subchapter
21E	Cargo space ventilation must be carefully controlled to avoid excessive condensation
22E	May not be stowed together with explosive substances containing ammonium nitrate or other ammonium salts.

Note	Provision
23E	Segregate from other Class 1 (explosive) materials in the same manner as is required for flammable liquids.
24E	Passenger vessels, on deck or under deck, in portable magazines only.
25E	Passenger vessels, in containers or the like, on deck only.
26E	Cargo vessel, on deck, in containers or the like (non-metallic lining is necessary if not in sealed dust tight packages).
27E	Cargo vessel, on deck, in containers or the like (non-metallic lining is necessary).
28E	Cargo vessel, when items are transported as projectiles or cartridges for guns, cannons, or mortars, notes 1E and 7E are applicable. All other times, notes 14E, 15E, and 8E are applicable.

(3) Explosive articles designated by special provision "20E" in Column 10B of the 172.101 Table must be stowed as follows:

(i) Projectiles for guns, cannon, or mortars:

(A) *On deck:* in containers or the like.

(B) *Under deck:* ordinary stowage.

(ii) All other types:

(A) *On deck:* in steel portable magazines or steel portable magazines which are capable of preventing leakage of their contents.

(B) *Under deck:* Special stowage.

§ 176.90 [Amended]

257. In § 176.90, the word "explosive" is revised to read "Class 1 (explosive) material".

§ 176.91 [Amended]

258. In § 176.91, the words "six gallons" are revised to read "23 L (six gallons)".

§ 176.92 [Amended]

259. In § 176.92, the words "compressed gas" are revised to read "Class 2 (compressed gas) material".

260. In § 176.93, paragraph (a) introductory text is revised to read as follows:

§ 176.93 Vehicles having refrigerating or heating equipment.

(a) A transport vehicle fitted with refrigerating or heating equipment using a flammable liquid or Division 2.1 (flammable gas) material, or diesel oil as fuel, may be transported on a ferry vessel. However, the refrigerating or heating equipment may not be operated while the vehicle is on the vessel, unless the equipment complies with the following requirements:

* * * * *

261. Section 176.96 is revised to read as follows:

§ 176.96 Materials of construction.

Barges used to transport hazardous materials must be constructed of steel.

§ 176.98 [Amended]

262. In § 176.98, the words "Column (7)" are amended to read "Column (10)".

263. Section 176.99 is revised to read as follows:

§ 176.99 Permit requirements for certain hazardous materials.

The permits required by §§ 176.100 and 176.415 for loading, unloading, and handling Divisions 1.1 and 1.2 (Class A explosive) materials, Division 1.5 (blasting agents) materials, ammonium nitrate and certain ammonium nitrate mixtures and fertilizers must be obtained before these materials may be loaded on, unloaded from, or handled on board a barge or barge-carrying vessel. However, a barge loaded with these materials being placed on, removed from, or handled on board a barge-carrying vessel is not subject to these permit requirements.

264–267. Subparts G through J of part 176 are revised to read as follows:

Subpart G—Detailed Requirements for Class 1 (Explosive) Materials

Sec.

176.100 Permit for Divisions 1.1 and 1.2 (Classes A and B explosive) materials.
176.102 Supervisory detail.
176.104 Loading and unloading Class 1 (explosive) materials.
176.108 Supervision of Class 1 (explosive) materials during loading, unloading, handling and stowage.

Stowage

176.112 Application of stowage provisions.
176.116 General stowage conditions for Class 1 (explosive) materials.
176.118 Electrical requirements.
176.120 Lightning protection.
176.122 Stowage arrangements under deck.
176.124 Ordinary stowage.
176.128 Magazine stowage, general.
176.130 Magazine stowage Type A.
176.132 Magazine stowage Type B.
176.133 Magazine stowage Type C.
176.134 Vehicles.
176.136 Special stowage.
176.137 Portable magazine.
176.138 Deck stowage.

Segregation

176.140 Segregation from other classes of hazardous materials.
176.142 Hazardous materials of extreme flammability.
176.144 Segregation of Class 1 (explosive) materials.
176.145 Segregation in single hold vessels.
176.146 Segregation from non-hazardous materials.

Precautions During Loading and Unloading

176.148 Artificial lighting.
176.150 Radio and radar.
176.154 Fueling (bunkering).
176.156 Defective packages.
176.160 Protection against weather.
176.162 Security.
176.164 Fire precautions and firefighting

Passenger Vessels

176.166 Transport of Class 1 (explosive) materials on passenger vessels.

Transport Units and Shipborne Barges

176.168 Transport of Class 1 (explosive) materials in vehicle spaces.
176.170 Transport of Class 1 (explosive) materials in freight containers.
176.172 Structural serviceability of freight containers and vehicles carrying Class 1 (explosive) materials on ships.
176.174 Transport of Class 1 (explosive) materials in shipborne barges.

Handling Class 1 (Explosive) Materials in Port

176.176 Signals.
176.178 Mooring lines.
176.180 Watchkeeping.
176.182 Conditions for handling on board ship.
176.184 Class 1 (explosive) materials of Compatibility Group L.
176.190 Departure of vessel.
176.192 Cargo handling equipment for freight containers carrying Class 1 (explosive) materials.

Magazine Vessels

176.194 Stowage of Class 1 (explosive) materials on magazine vessels.

Subpart H—Detailed Requirements for Class 2 (Compressed Gas) Materials

176.200 General stowage requirements.
176.205 Under deck stowage requirements.
176.210 On deck stowage requirements.
176.220 Smoking or open flame and posting of warning signs.
176.225 Stowage of chlorine.
176.230 Stowage of Division 2.1 (flammable gases) materials.

Subpart I—Detailed Requirements for Class 3 (Flammable) and Combustible Liquid Materials

176.305 General stowage requirements.
176.315 Fire protection requirements.
176.320 Use of hand flashlights.
176.325 Smoking or open flame and posting of warning signs.
176.331 Transportation of Class 3 (flammable) liquids with foodstuffs.
176.340 Combustible liquids in portable tanks.

Subpart J—Detailed Requirements for Class 4 (Flammable Solids), Class 5 (Oxidizers and Organic Peroxides), and Division 1.5 (Blasting Agents) Materials

176.400 Stowage of Division 1.5 (blasting agents), Class 4 (Flammable Solids) and Class 5 (oxidizers and organic peroxides) materials.
176.405 Stowage of charcoal.
176.410 Division 1.5 (blasting agents) materials, ammonium nitrate and ammonium nitrate mixtures.

176.415 Permit requirements for Division 1.5 (blasting agents), ammonium nitrates, and certain ammonium nitrate fertilizers.
176.419 Class 4 (flammable solids) or Class 5 (oxidizers and organic peroxides) materials transported with foodstuffs.

Subpart G—Detailed Requirements for Class 1 (Explosive) Materials

§ 176.100 Permit for Divisions 1.1 and 1.2 (Classes A and B explosive) materials.

Before Divisions 1.1 and 1.2 (Classes A and B explosive) materials may be discharged from, loaded on, handled or restowed on board a vessel at any place in the United States, the carrier must obtain a permit from the COTP in accordance with the procedures in 33 CFR 126.9. Exceptions to this permit requirement may be authorized by the COTP.

§ 176.102 Supervisory detail.

(a) Except as provided in paragraph (c) of this section, the COTP may assign a USCG supervisory detail to any vessel to supervise the loading, handling or unloading of Class 1 (explosive) materials.

(b) The owner, agent, charterer, master or person in charge of the vessel, and all persons engaged in the handling, loading, unloading, and stowage of Class 1 (explosive) materials shall obey all orders that are given by the officer in charge of the supervisory detail.

(c) If Class 1 (explosive) materials are loaded onto or unloaded from a vessel at a facility operated or controlled by the Department of Defense, the Commanding Officer of that facility may decline the USCG supervisory detail. Whenever the supervisory detail is declined, the Commanding Officer of the facility shall ensure compliance with the regulations in this part.

§ 176.104 Loading and unloading Class 1 (explosive) materials.

(a) Packages of Class 1 (explosive) materials may not be thrown, dropped, rolled, dragged, or slid over each other or over a deck.

(b) When Class 1 (explosive) materials are stowed in a hold below one in which any cargo is being handled, the hatch in the deck dividing the two holds must have all covers securely in place.

(c) Drafts of Class 1 (explosive) materials must be handled in accordance with the following:

(1) A draft may not be raised, lowered, or stopped by sudden application of power or brake.

(2) A draft may not be released by tripping or freeing one side of the cargo-handling equipment and tumbling the Class 1 (explosive) materials off.

(3) All drafts, beams, shackles, bridles, slings, and hoods must be manually freed before the winch takes control.

(4) Slings may not be dragged from under a draft by winching except for the topmost layer in the hold when power removal is the only practical method and when the cargo cannot be toppled.

(5) Handles or brackets on packages in a draft may not be used for slinging purposes.

(d) A combination woven rope and wire sling or a sling that is formed by use of an open hook may not be used in handling Class 1 (explosive) materials.

(e) Only a safety hook or a hook that has been closed by wire may be used in handling drafts of Class 1 (explosive) materials.

(f) Wire rope or wire rope assemblies, including splices and fittings, used in handling Class 1 (explosive) materials must be unpainted and kept bare to permit inspection of their safe working condition. A mechanical end fitting (pressed fitting) may be used in place of a eye splice, if the efficiency of the mechanical end fitting is at least equal to the efficiency of an eye splice prepared as prescribed in 29 CFR 1918.51(c)(1).

(g) Packages of Division 1.1 and 1.2 (Class A and B explosive) materials which are not part of a palletized unit must be loaded and unloaded from a vessel using a chute or conveyor as described in § 176.163, or a mechanical hoist and a pallet, skipboard, tray, or pie plate fitted with a cargo net or sideboards.

(h) Packages of Division 1.1 and 1.2 (Class A and B explosive) materials must be loaded or unloaded in accordance with the following:

(1) A cargo net with a pallet, skipboard, tray, or pie plate, must be loaded so that no more than a minimum displacement of packages occurs when it is lifted.

(2) A cargo net must completely encompass the bottom and sides of the draft. The mesh of the cargo net must be of a size and strength that will prevent a package in the draft from passing through the net.

(3) When a tray is used in handling packages, no package may extend more than one-third its vertical dimension above the sideboard of the tray.

(i) A landing mat must be used when a draft of Division 1.1 or 1.2 (Class A and B explosive) materials is deposited on deck. The landing mat must have dimensions of at least 1 m (3 feet) wide, 2 m (7 feet) long, and 10 cm (3.9 inches) thick, and be made of woven hemp, sisal, or similar fiber, or foam rubber, polyurethane or similar resilient material.

(j) In addition to the other requirements of this section, packages of Division 1.1 and 1.2 (Class A and B explosive) materials must be handled in accordance with the following:

(1) Packages may not be loaded or unloaded through a hatch at the same time that other cargo is being handled in any hold served by that hatch.

(2) Packages may not be loaded or unloaded from the same hatch by using two pieces of cargo equipment unless the equipment is positioned at the forward and aft ends of the hatch.

(3) Packages may not be lifted over any hazardous materials.

(4) The height of any structure, equipment, or load on a deck over which packages must be lifted may not be higher than the hatch coaming or bulwark, or 1 m (3 feet), whichever is greater.

(k) Unpackaged explosive devices may not be handled by their lifting lugs or suspension lugs.

(l) A chute may not be used when loading or unloading Class 1 (explosive) materials in compatibility group A or B.

§ 176.108 Supervision of Class 1 (explosive) material during loading, unloading, handling and stowage.

(a) During the loading, unloading, handling and stowage of Class 1 (explosive) materials, a responsible person shall be in constant attendance during the entire operation to direct the loading, unloading, handling and stowage of Class 1 (explosive) materials, including the preparation of the holds. The responsible person must be aware of the hazards involved and the steps to be taken in an emergency, and must maintain sufficient contact with the master to ensure proper steps are taken in an emergency.

(b) Each person involved in the handling of Class 1 (explosive) materials on a vessel shall obey the orders of the responsible person.

(c) The responsible person must inspect all cargo-handling equipment to determine that it is in safe operating condition before it is used to handle Class 1 (explosive) materials.

Stowage

§ 176.112 Application of stowage provisions.

The provisions of §§ 176.116(e), 176.118, and 176.120 of this subpart do not apply to Division 1.4 (Class C explosive) materials, compatibility group S. Such materials may be stowed together with all other Class 1 (explosive) materials except those of

compatibility group A or L. They must be segregated from other hazardous materials in accordance with Table 176.83(b) of this part.

§ 176.115 General stowage conditions for Class 1 (explosive) materials.

(a) *Heat and sources of ignition:* (1) Class 1 (explosive) materials must be stowed in a cool part of the ship and must be kept as cool as practicable while on board. Stowage must be well away from all sources of heat, including steam pipes, heating coils, sparks, and flame.

(2) Except where the consignment of Class 1 (explosive) materials consists only of explosive *articles*, the wearing of shoes or boots with unprotected metal nails, heels, or tips of any kind is prohibited.

(b) *Wetness:* (1) Spaces where Class 1 (explosive) materials are stowed below deck must be dry. In the event of the contents of packages being affected by water when on board immediate advice must be sought from the shippers; pending this advice handling of the packages must be avoided.

(2) Bilges and bilge sections must be examined and any residue of previous cargo removed before Class 1 materials (explosive) are loaded onto the vessel.

(c) *Security:* All compartments, magazines, and transport units containing Class 1 (explosive) materials must be locked or suitably secured in order to prevent unauthorized access.

(d) *Secure stowage:* Class 1 (explosive) materials must be securely stowed to prevent movement in transit; where necessary, precautions must be taken to prevent cargo sliding down between the frames at the ship's sides.

(e) *Separation from accommodation spaces and machinery spaces:* (1) Class 1 (explosive) materials must be stowed as far away as practicable from any accommodation spaces or any machinery space and may not be stowed directly above or below such a space. The requirements in paragraphs (e)(2) through (e)(4) of this section are minimum requirements in addition to the applicable requirements of 46 CFR chapter I. Where the requirements of this subpart are less stringent than those of 46 CFR chapter I, the 46 CFR chapter I requirements must be satisfied for ships to which they are applicable.

(2) There must be a permanent A Class steel bulkhead between any accommodation space and any compartment containing Class 1 (explosive) materials. Division 1.1 and 1.2 (Class A and B explosive) materials, 1.3 (Class B explosive) materials, or 1.5 (blasting agents) materials may not be stowed within 3 m (10 feet) of this bulkhead; in the decks immediately above or below an accommodation space they must be stowed at least 3 m (10 feet) from the line of this bulkhead projected vertically.

(3) There must be a permanent A Class steel bulkhead between a compartment containing Class 1 (explosive) materials and any machinery space. Class 1 (explosive) materials, except those in Division 1.4 (Class C explosive), may not be stowed within 3 m (10 feet) of this bulkhead; and in the decks above or below the machinery space they must be stowed at least 3 m (10 feet) from the line of this bulkhead projected vertically. In addition to this separation, there must be insulation to Class A60 standard as defined in 46 CFR 72.05–10(a)(1) if the machinery space is one of Category 'A' unless the only Class 1 (explosive) materials carried are in Division 1.4S (Class C explosive).

(4) Where Class 1 (explosive) materials are stowed away from bulkheads bounding any accommodation space or machinery space, the intervening space may be filled with cargo that is not readily combustible.

§ 176.118 Electrical requirement.

(a) Electrical equipment and cables installed in compartments in which Class 1 (explosive) materials are stowed which do not need to be energized during the voyage must be isolated from the supply so that no part of the circuit within the compartment is energized. The method of isolation may be by withdrawal of fuses, opening of switches or circuit breakers, or disconnection from bus bars. The means, or access to the means, of disconnection/reconnection must be secured by a locked padlock under the control of a responsible person.

(b) Electrical equipment and cables in a cargo space in which Class 1 (explosive) materials are stowed which are energized during the voyage for the safe operation of the ship must meet the requirements of subchapter J of 46 CFR chapter I. Before Class 1 (explosive) materials are loaded aboard a vessel, all cables must be tested by a skilled person to ensure that they are safe and to determine satisfactory grouping; insulation resistance, and continuity of the cable cores, metal sheathing or armoring.

(c) All Class 1 (explosive) materials must be stowed in a safe position relative to electrical equipment and cables. Additional physical protection must be provided where necessary to minimize possible damage to the electrical equipment or cables, especially during loading and unloading.

(d) Cable joints in the compartments must be enclosed in metal-clad junction boxes.

(e) All lighting equipment and cables must be of the fixed type, and must meet the relevant inspection, test, and installation standards of 46 CFR chapter I, subchapter J.

§ 176.120 Lightning protection.

A lightning conductor grounded to the sea must be provided on any mast or similar structure on a vessel on which Class 1 (explosive) materials are stowed unless effective electrical bonding is provided between the sea and the mast or structure from its extremity and throughout to the main body of the hull structure. (Steel masts in ships of all welded construction comply with this requirement).

§ 176.122 Stowage arrangements under deck.

When stowed under deck, Class 1 (explosive) materials must be in conformance with one of the stowage arrangements described in §§ 176.124 through 176.136 of this subpart.

§ 176.124 Ordinary stowage.

(a) Ordinary stowage is authorized for most explosive articles carried by vessel. The exceptions are those for which this subpart prescribes "magazine" or "special" stowage.

(b) Class 1 (explosive) materials requiring ordinary stowage must be stowed in accordance with § 176.116 of this subpart.

§ 176.126 Magazine stowage, general.

(a) Magazine stowage is sub-divided into three different types of magazines designated by the letters A, B, and C. A magazine may be a fixed structure in the vessel, a closed freight container, or a portable magazine unit. Freight containers, portable magazines, and vehicles must be properly secured in position. Magazines may be positioned in any part of the vessel conforming to the general stowage conditions for Class 1 (explosive) materials, except magazines which are fixed structures must be constructed in a location in which their doors, where fitted, are easily accessible.

(b) Magazine stowage is required for all explosive substances, except "Explosive Substances, n.o.s." in compatibility groups G, L, or S. Magazine stowage type A is required for those substances which must be kept clear of steelwork. All other explosive substances must be given magazine stowage type B, except those in

compatibility group A for which magazine stowage type C is prescribed.

(c) Magazine stowage type B is required for Charges, propelling, for cannon, UN 0279, UN 0414, and UN 0242, and Charges, supplemental, explosive, UN 0600, in compatibility group C or D; and magazine stowage type C is required for detonators and similar articles in divisions and compatibility group 1.1B and 1.2B (Class A and B explosive).

§ 176.130 Magazine stowage Type A.

(a) In addition to protecting the Class 1 (explosive) materials and preventing unauthorized access, magazine stowage type A guards against friction between any spilled contents of packages and the vessel's sides and bulkheads.

(b) Class 1 (explosive) materials requiring magazine stowage type A must be stowed in a magazine which is tightly sheathed with wood on its inner sides and floor.

(c) When utilized as part of the magazine structure, the vessel's sides and bulkheads must be clean, free from rust or scale, and protected by battening or sweatboards spaced not more than 150 mm (6 inches) apart. All stanchions and other unprotected structural members must be similarly clean and battened. The underside of the deck above the magazine must be clean and free of rust and scale, but need not be battened.

(d) The top of the stow within the magazine must be at least 30 cm (12 inches) from the underside of the deck above.

(e) A type A magazine constructed in the square of a cargo space may not be loaded from the top.

(f) When other Class 1 (explosive) materials are stowed with Class 1 (explosive) materials for which magazine stowage type A is required, they or their packagings may have no exposed external parts made of ferrous metal or aluminum alloy.

§ 176.132 Magazine stowage Type B.

(a) Magazine stowage type B is the same as magazine stowage type A as prescribed in § 176.130 of this Part, except:

(1) The floor need not be tightly sheathed with wood but must be sparred or protected by wooden pallets or dunnage; and

(2) battening of the vessel's sides, bulkheads, and stanchions is not required.

(b) A compartment may be used for magazine stowage type B without a magazine structure provided that:

(1) The Class 1 (explosive) materials are stowed on wooden gratings, pallets, or dunnage, directly on the deck and not on other cargo;

(2) Other cargo stowed in the same compartment is not readily combustible material; and

(3) The position of the stowage is such that there is direct access to the hatchway.

(c) Class 1 (explosive) materials and other cargo in the same compartment must be secured to eliminate the possibility of significant movement. Where an entire deck is used as a magazine, the stowage must be so arranged that the Class 1 (explosive) materials stowed therein will be removed from the ship before working any cargo in any decks above or below the space in the same hatch.

§ 176.133 Magazine stowage Type C.

The construction requirements for magazine stowage type C are the same as for magazine stowage Type B as prescribed in § 176.132 of this part, except that the magazine must be located as near as practicable to the centerline of the vessel and must not be closer to the vessel's side than a distance equal to one-eighth of the vessel's beam or 2.5 m (8.2 feet), whichever is less.

§ 176.134 Vehicles.

Closed vehicles may be used to transport Class 1 (explosive) materials requiring magazine stowage when carried by vessel if they meet the requirements of the appropriate magazine stowage type. See § 176.166 of this subpart for additional requirements relating to the transport of Class 1 (explosive) materials in vehicles.

§ 176.135 Special stowage.

(a) Special stowage is required for certain articles presenting both explosive and chemical hazards, such as smoke or lachrymatory (compatibility group G or H), toxic (compatibility group K), or substances and articles which present a special risk (compatibility group L). Except as permitted in paragraph (c) of this section, Class 1 (explosive) materials requiring special stowage must be stowed on deck unless such stowage is impracticable and the COTP authorizes special stowage below deck.

(b) Class 1 (explosive) materials for which special stowage is required must be stowed as far away as practicable from living, accommodation, and working areas, and may not be overstowed. Steel portable magazines and freight containers in which such Class 1 (explosive) materials are stowed may not be located closer to the vessel's side than a distance equal to one-eighth of the vessel's beam or 2.5 m (8.2 feet), whichever is less.

(c) Explosive articles having UN number 0015, 0016, 0018, 0019, 0301, or 0303 may be given ordinary stowage in a lower hold or 'tween deck. Other Class 1 (explosive) materials in compatibility groups G and H may be in open stowage out to the ship's side on a floodable lower hold or deep tank in such a position that other cargo cannot be contaminated by leakage; in all other cases such Class 1 (explosive) materials must be stowed in steel portable magazines or in freight containers. If a freight container is used for this purpose, the floor of the freight container must be leakproof; for example, an all-metal container may be used and a fillet of cement or other material worked across the bottom of the door opening.

(d) Class 1 (explosive) materials stowed in one compartment may not be of more than one compatibility group, except the COTP may allow Class 1 (explosive) materials of compatibility groups G and H in separate steel portable magazines to be stowed in the same compartment, not less than 3 m (10 feet) apart.

(e) Class 1 (explosive) materials in compatibility groups K and L must be stowed in a steel portable magazine regardless of the stowage position in the vessel.

§ 176.137 Portable magazine.

(a) Each portable magazine used for the stowage of Class 1 (explosive) materials on board vessels must meet the following requirements:

(1) It must be weather-tight, constructed of wood or metal lined with wood at least 2 cm (0.787 inch) thick, and with a capacity of no more than 3.1 cubic m (110 cubic feet).

(2) All inner surfaces must be smooth and free of any protruding nails, screws or other projections.

(3) If constructed of wood, a portable magazine must be framed of nominal 5 cm X 10 cm (2 X 4 inch) lumber, and sheathed with nominal 20 mm (0.787 inch) thick boards or plywood.

(4) When constructed of metal, the metal must be not less than 3.2 mm (0.126 inch) thick.

(5) Runners, bearers, or skids must be provided to elevate the magazine at least 10 cm (3.9 inches) from the deck. Padeyes, ring bolts, or other suitable means must be provided for securing.

(6) If the portable magazine has a door or hinged cover, the door or cover must have a strong hasp and padlock or equally effective means of securing.

(7) The portable magazine must be marked on its top and four sides, in letters at least 8 cm (3 inches) high, as follows:

"EXPLOSIVES—HANDLE CAREFULLY—KEEP LIGHTS AND FIRE AWAY"

(b) A portable magazine which meets the requirements for a type 2 or type 3 magazine under 27 CFR part 55 subpart K may be used for the stowage of Class 1 (explosive) materials on board vessels.

(c) A portable magazine with a capacity exceeding 3.1 m^3, (110 cubic feet) may be used for the stowage of Class 1 (explosive) materials under such construction, handling, and stowage requirements as the COTP approves.

§ 176.138 Deck stowage.

(a) Class 1 (explosive) materials stowed on deck must be carried as close to the vessel's centerline as practicable.

(b) Class 1 (explosive) materials may not be stowed within a horizontal distance of 6 m (20 feet) from any fire, machinery exhaust, galley uptake, locker used for combustible stores, or other potential sources of ignition. They must be clear of walkways and cargo working areas, fire hydrants, steam pipes, and means of access; away from all other facilities necessary for the safe working of the vessel, and not less than a horizontal distance of 8 m (26 feet) from the bridge, accommodation areas, and lifesaving appliances.

(c) Where vessels are fitted with container fastening arrangements, freight containers containing Class 1 (explosive) materials may be overstowed by containers of compatible Class 1 (explosive) materials or non-hazardous cargo. Where vessels are not fitted with container fastening arrangements, freight containers loaded with Class 1 (explosive) materials may be stowed only on the bottom tier of the stowage.

Segregation

§ 176.140 Segregation from other classes of hazardous materials.

(a) Class 1 (explosive) materials must be segregated from other packaged hazardous materials in accordance with § 176.83.

(b) Class 1 (explosive) materials must be segregated from bulk solid dangerous cargoes in accordance with the General Introduction to the IMDG Code. Notwithstanding § 176.83(b), ammonium nitrate and sodium nitrate may be stowed together with blasting explosives, except those containing chlorates, provided the mixed stowage is treated as blasting explosives (see § 176.410(e)).

§ 176.142 Hazardous materials of extreme flammability.

(a) Except as allowed by paragraph (b) of this section, certain hazardous materials of extreme flammability may not be transported in a vessel carrying Class 1 (explosive) materials. This prohibition applies to the following hazardous materials:

Carbon disulfide	UN 1131	Class 3.
Diethyl zinc	UN 1366	Division 4.2.
Dimethyl zinc	UN 1370	Division 4.2.
Magnesium alkyls	UN 3053	Division 4.2.
Nickel carbonyl	UN 1259	Division 6.1.
Pyrophoric liquids, n.o.s.	UN 2845	Division 4.2.

(b) The hazardous materials listed in paragraph (a) of this section may be transported in a vessel carrying the following Class 1 (explosive) materials as cargo:

(1) Division 1.4 (Class C explosive) materials, compatibility group S.

(2) Explosive articles having the following proper shipping names and identification numbers (see Column (4) of the § 172.101 Table) if designed for lifesaving purposes and their total net explosive mass (weight) does not exceed 50 kg (110 lbs) per vessel:

(i) ARTICLES, PYROTECHNIC: UN Nos. 0428, 0429, 0430, 0431.

(ii) CARTRIDGES, FLASH: UN Nos. 0049, 0050.

(iii) CARTRIDGES, SIGNAL: UN Nos. 0054, 0312.

(iv) SIGNAL DEVICES, HAND: UN No. 0191.

(v) SIGNALS, DISTRESS: UN Nos. 0194, 0195.

(vi) SIGNALS, SMOKE: UN Nos. 0196, 0197, 0313.

(3) Class 1 (explosive) materials in compatibility groups C, D, and E if the total net explosive mass (weight) does not exceed 10 kg (22 pounds) per vessel.

(4) Explosive articles in compatibility group G, except fireworks and Class 1 (explosive) materials requiring special stowage if the total net explosive mass (weight) does not exceed 10 kg (22 pounds) per vessel.

(c) When a vessel carrying Class 1 (explosive) materials allowed under paragraph (b) of this section also carries a hazardous material of extreme flammability, that hazardous material must be stowed in a part of the vessel as remote as practicable from the Class 1 (explosive) materials.

§ 176.144 Segregation of Class 1 (explosive) materials.

(a) Except as provided in § 176.145 of this subpart, Class 1 (explosive) materials may be stowed within the same compartment, magazine, portable magazine, or transport unit as indicated in Table 176.144(a).

TABLE 176.144(a)—AUTHORIZED MIXED STOWAGE FOR EXPLOSIVES

[An "X" indicates that explosives in the two different compatibility groups reflected by the location of the "X" may not be stowed in the same compartment, portable magazine, or transport unit]

Compatibility groups	A	B	C	D	E	F	G	H	J	K	L	N	S
A		X	X	X	X	X	X	X	X	X	X	X	X
B	X		X	X	X	X	X	X	X	X	X	X	
C	X	X				X	1	X	X	X	X		
D	X	X				X	1	X	X	X	X		
E	X	X				X	1	X	X	X	X		
F	X	X	X	X	X		X	X	X	X	X	X	
G	X	X	1	1	1	X		X	X	X	X	X	
H	X	X	X	X	X	X	X		X	X	X	X	
J	X	X	X	X	X	X	X	X		X	X	X	
K	X	X	X	X	X	X	X	X	X		X	X	
L	X	X	X	X	X	X	X	X	X	X	2	X	X
N	X	X				X	X	X	X	X	X		
S	X										X		

Notes: 1. Explosive articles in compatibility group G, other than fireworks and those requiring special stowage, may be stowed with articles of compatibility groups C, D, and E, provided no explosive substances are carried in the same compartment, portable magazine or transport unit.

2. Explosives in compatibility group L may only be stowed in the same compartment, magazine or transport unit with identical explosives within compatibility group L.

(b) Where Class 1 (explosive) materials of different compatibility groups are allowed to be stowed in the same compartment, magazine, portable magazine, or transport unit, the stowage arrangements must conform to the most stringent requirements for the entire load.

(c) Where a mixed load of Class 1 (explosive) materials of different hazard divisions and/or stowage arrangements is carried within a compartment, magazine, or transport unit, the entire load must be treated as belonging to the hazard division having the greatest hazard. (For example, if a load of Division 1.1 (Class A explosive) materials is mixed with Division 1.3 (Class B explosive) materials, the load is treated as a Division 1.1 (Class A explosive) material as defined in § 173.50(b) of this subchapter and the stowage must conform to the most stringent requirements for the entire load).

(d) If some of the Class 1 (explosive) materials in a stowage mixture require magazine stowage, Class 1 (explosive) materials requiring ordinary stowage may be stowed in the same magazine. When the magazine is used for substances requiring Type A stowage, the other Class 1 (explosive) materials stowed therein must have no exposed parts of any ferrous metal or aluminum alloy, unless separated by a partition.

(e) Segregation on deck: When Class 1 (explosive) materials in different compatibility groups are carried on deck, they must be stored not less than 6 m (20 feet) apart unless they are allowed under Table 176.144(a) to be stowed in the same compartment, magazine, or transport unit.

(f) On a barge used to transfer class 1 (explosive) materials from a waterfront facility to a vessel at an explosives anchorage (or from the vessel to the water front facility), if compliance with paragraph (e) of this section is not practicable, a sandbag barrier at least 0.6 m (2 feet) in thickness may be substituted for the 6 m (20 feet) separation.

§ 176.145 Segregation in single hold vessels.

(a) On board a vessel having a single cargo hold, Class 1 (explosive) materials in hazard division/compatibility group 1.1B and 1.2B may be stowed in the same compartment with substances of compatibility group D, provided:

(1) The net explosive weight of the compatibility group B explosive does not exceed 50 kg (110 pounds); and

(2) The compatibility group B explosive materials are stowed in a steel portable magazine that is stowed at least 6 m (20 feet) from the compatibility group D substances.

(b) Division/compatibility group 1.4B (Class C explosive) materials may be stowed in the same compartment with substances of compatibility group D provided the Class 1 (explosive) materials of different compatibility groups are separated by either a distance of at least 6 m (20 feet) or by a steel partition.

§ 176.146 Segregation from non-hazardous materials.

(a) Except as required by paragraphs (b) and (c) of this section, Class 1 (explosive) materials need not be segregated from other cargo of a non-dangerous nature.

(b) Mail, baggage, and personal and household effects may not be stowed in the same compartment as, or in compartments immediately above or below, Class 1 (explosive) materials other than those in compatibility group S.

(c) Where Class 1 (explosive) materials are stowed against an intervening bulkhead, any mail on the other side of the bulkhead must be stowed away from it.

(d) In order to avoid contamination:

(1) an explosive substance or article which has a secondary POISON hazard label must be stowed "separated from" all foodstuffs, except when such materials are stowed in separate closed transport units, the requirements for "away from" segregation apply.

(2) an explosive substance or article which has a secondary CORROSIVE hazard label must be stowed "away from" foodstuffs.

Precautions During Loading and Unloading

§ 176.148 Artificial lighting.

Electric lights, except arc lights, are the only form of artificial lighting permitted when loading and unloading Class 1 (explosive) materials.

§ 176.150 Radio and radar.

(a) Except as provided in paragraph (b) of this section, when Class 1 (explosive) materials (other than explosive articles in Division 1.4 (Class C explosive) or any explosive substance) are loaded, unloaded, or handled, the responsible person must ensure that all sources of electromagnetic radiation such as radio and radar transmitters are deenergized by opening the main switches controlling the sources and tagging them to warn that the devices are not to be energized until loading or unloading has ceased.

(b) During the loading or unloading of all explosive articles (except those in Division 1.4 (Class C explosive)), no radio or radar transmitter may be used within 50 m (164 feet) of such articles except for VHF transmitters the power output of which does not exceed 25 watts and of which no part of the antenna system is within 2 m (7 feet) of the Class 1 (explosive) materials.

(c) Explosive articles which are sensitive to electromagnetic radiation from external sources must be stowed at a safe distance from the vessel's radio cabin, receiving and transmitting apparatus radio antenna or lead-in, and radar installation, with due regard to the character of the vessel and the degree of screening-off of the explosive articles.

§ 176.154 Fueling (bunkering).

(a) Class 1 (explosive) materials, except those in compatibility group S, may not be loaded or unloaded when fueling (bunkering) is in progress except with the prior authorization of the COTP, and under conditions prescribed by that officer.

(b) Vessels containing Class 1 (explosive) materials may not be fueled (bunkered) with the hatches open unless authorized by the COTP.

§ 176.156 Defective packages.

(a) No leaking, broken, or otherwise defective package containing Class 1 (explosive) materials, including packages which have been adversely affected by moisture, may be accepted for shipment. The master or person in charge of a vessel on which there is a defective package containing Class 1 (explosive) materials must seek advice from the shipper concerning withdrawal, repair, or replacement. No repair of damaged or defective package containing Class 1 (explosive) materials may be performed on board a vessel.

(b) No Class 1 (explosive) material, which for any reason has deteriorated or undergone a change of condition that increases the hazard attendant upon its conveyance or handling, may be moved in the port area, except as directed by the COTP.

(c) If any package of Class 1 (explosive) materials, or seal of a package of Class 1 (explosive) materials, appears to be damaged, that package must be set aside for examination and

repair or otherwise legally disposed of as directed by the shipper.

(d) If any Class 1 (explosive) materials are spilled or released from a package, the responsible person must ensure that an appropriate emergency response is undertaken in accordance with the emergency response information required under §172.602 of this subchapter. The master of the vessel must report each incident involving spillage or release of Class 1 (explosive) materials to the COTP as soon as practicable.

§ 176.160 Protection against weather.

Any person loading or unloading packages containing Class 1 (explosive) materials shall take adequate measures to prevent these packages from becoming wet.

§ 176.162 Security.

A responsible person must be present at all times when the hatches of spaces containing Class 1 (explosive) materials are open. No unauthorized person may be permitted to access spaces in which Class 1 (explosive) materials are stowed. Magazines must be secured against unauthorized entry when loading has been completed, or when loading or unloading is stopped. Packages containing Class 1 (explosive) materials may not be opened on board ship.

§ 176.164 Fire precautions and firefighting.

(a) Matches, lighters, fire, and other ignition sources are prohibited on and near any vessel on which Class 1 (explosive) materials are being loaded, unloaded, or handled except in places designated by the master or the COTP.

(b) A fire hose of sufficient length to reach every part of the loading area with an effective stream of water must be laid and connected to the water main, ready for immediate use.

(c) No repair work may be carried out in a cargo space containing Class 1 (explosive) materials other than those of Division 1.4 (Class C explosive). No welding, burning, cutting, or riveting operations involving the use of fire, flame, spark, or arc-producing equipment may be conducted on board except in an emergency; and, if in port, with the consent of the COTP.

(d) Each compartment, including a closed vehicle deck space, which contains Class 1 (explosive) materials must be provided with a fixed fire extinguishing system. Each adjacent cargo compartment either must be protected by a fixed fire extinguishing installation or must be accessible for firefighting operations.

(e) A vessel must have two sets of breathing apparatus and a power-operated fire pump, which, together with its source of power and sea connections, must be located outside the machinery space.

Passenger Vessels

§ 176.166 Transport of Class 1 (explosive) materials on passenger vessels.

(a) Only the following Class 1 (explosive) materials may be transported as cargo on passenger vessels:

(1) Division 1.4 (Class C explosive) materials, compatibility group S.

(2) Explosive articles designed for lifesaving purposes as identified in § 176.143(b)(2), if the total net explosive mass (weight) does not exceed 50 kg (110 pounds).

(3) Class 1 (explosive) materials in compatibility groups C, D, and E, if the total net explosive mass (weight) does not exceed 10 kg (22 pounds) per vessel.

(4) Articles in compatibility group G other than those requiring special stowage, if the total net explosive mass (weight) does not exceed 10 kg (22 pounds) per vessel.

(5) Articles in compatibility group B, if the total net explosive mass (weight) does not exceed 5 kg (11 pounds).

(b) Class 1 (explosive) materials which may be carried on passenger vessels are identified in Column (10) of the § 172.101 Table. They must be stowed in accordance with Table 176.166(b).

TABLE 176.166(b).—STOWAGE ARRANGEMENTS IN PASSENGER VESSELS

Class/Division	Samples, explosive	Goods, N.O.S. Class 1	Goods shipped under a specific proper shipping name												
			Compatibility group												
			A	B	C	D	E	F	G	H	J	K	L	N	S
1.1	d	d	c	e	e	e	e	c	e	—	c	—	c	—	—
1.2	d	d	—	c	e	e	e	c	e	c	c	c	c	—	—
1.3	d	d	—	—	e	e	—	c	e	c	c	c	c	—	—
1.4	d	d	—	b	b	b	b	c	b	—	—	—	—	—	a
1.5	d	d	—	—	e	—	—	—	—	—	—	—	—	—	—
1.6	d	d	—	—	—	—	—	—	—	—	—	—	—	e	—

a—As for cargo ships, on deck or under deck.
b—As for cargo ships, on deck or under deck, in portable magazines only.
c—Prohibited.
d—As specified by the Associate Administrator for Hazardous Materials Safety, or the competent authority of the country in which the Class 1 (explosive) materials are loaded on the vessel.
e—In containers or the like, on deck only.

(c) Notwithstanding the provisions of paragraph (a) of this section, a combination of the substances and articles listed in paragraphs (a)(1) through (a)(5) of this section may be transported on the same passenger vessel provided the total net explosive mass (weight) of the combination of Class 1 (explosive) materials carried does not exceed the smallest quantity specified for any one of the substances or articles in the combination.

Transport Units and Shipborne Barges

§ 176.168 Transport of Class 1 (explosive) materials in vehicle spaces.

(a) All transport vehicles and cargo must be properly secured.

(b) All transport vehicles used for the carriage of Class 1 (explosive) materials must be structurally serviceable as defined in § 176.172(a)(2).

(c) Vehicles used to transport Class 1 (explosive) materials must conform to the requirements in §§ 177.834 and 177.835 of this subchapter.

(d) Class 1 (explosive) materials which require special stowage must be transported in transport vehicles approved for the purpose by the Associate Administrator for Hazardous Materials Safety except that Class 1 (explosive) materials in compatibility group G or H may be carried in steel portable magazines or freight containers. Closed transport vehicles

may be used as magazines; transport vehicles of other types may be used to transport Class 1 (explosive) materials which require ordinary stowage.

(e) Class 1 (explosive) materials of different compatibility groups may not be stowed in the same vehicle except as allowed in § 176.144 of this subpart.

(f) Vehicles containing different Class 1 (explosive) materials require no segregation from each other, except that these materials may be carried together under the provisions of § 176.144 of this subchapter. In all other instances, the vehicles must be "separated from" one another.

(g) All transport vehicles used for the transport of Class 1 (explosive) materials must have lashing arrangements for securing the vehicle on the ship and preventing the movement of the vehicle on its springs during the sea passage.

(h) Where a portable magazine or closed freight container is carried on a chassis, twist locks or other suitable securing arrangements must be provided and made secure.

§ 176.170 Transport of Class 1 (explosive) materials in freight containers.

(a) When Class 1 (explosive) materials are stowed in a freight container, the freight container, for the purposes of this subpart, may be regarded a magazine but not as a separate compartment.

(b) Freight containers exceeding 6 m (20 feet) in length may not carry more than 5000 kg (11,023 pounds) net explosive weight of explosive substances, except explosive substances in Division 1.4.

(c) Freight containers used to transport Class 1 (explosive) materials for which magazine stowage type A is required must have a floor consisting of tightly fitted wooden boards, plywood or equivalent non-metallic material.

(d) Class 1 (explosive) materials of different compatibility groups may not be stowed within the same freight container except as allowed in § 176.144 of this subpart.

(e) On vessels other than specially fitted container ships, freight containers containing Class 1 (explosive) materials must be stowed only in the lowest tier.

(f) Freight containers carrying different Class 1 (explosive) materials require no segregation from each other, if the provisions of § 176.144 of this subpart allow the Class 1 (explosive) materials to be carried together in the same compartment. In all other instances, the containers must be "separated from" one another in accordance with § 176.83(f) of this part.

(g) Freight containers carrying Class 1 (explosive) materials may not be handled on board a vessel with fork lift trucks unless approved by the COTP. This does not preclude the use of front-loading trucks using side-frame lifting equipment.

§ 176.172 Structural serviceability of freight containers and vehicles carrying Class 1 (explosive) materials on ships.

(a) A freight container may not be offered for the carriage of Class 1 (explosive) materials unless the container is structurally serviceable as evidenced by a current CSC (International Convention for Safe Containers) approval plate and verified by a detailed visual examination as follows:

(1) Before a freight container or transport vehicle is packed with Class 1 (explosive) materials, it must be visually examined by the shipper to ensure it is structurally serviceable, free of any residue of previous cargo, and its interior walls and floors are free from protrusions.

(2) *Structurally serviceable* means the freight container or the vehicle cannot have major defects in its structural components, such as top and bottom side rails, top and bottom end rails, door sill and header, floor cross members, corner posts, and corner fittings in a freight container. Major defects include—

(i) Dents or bends in the structural members greater than 19 mm (0.75 inch) in depth, regardless of length;

(ii) Cracks or breaks in structural members;

(iii) More than one splice or an improper splice (such as a lapped splice) in top or bottom end rails or door headers;

(iv) More than two splices in any one top or bottom side rail;

(v) Any splice in a door sill or corner post;

(vi) Door hinges and hardware that are seized, twisted, broken, missing, or otherwise inoperative;

(vii) Gaskets and seals that do not seal; or

(viii) For freight containers, any distortion of the overall configuration great enough to prevent proper alignment of handling equipment, mounting and securing chassis or vehicle, or insertion into ships' cells.

(3) In addition, deterioration of any component of the freight container or vehicle, regardless of the material of construction, such as rusted-out metal in sidewalls or disintegrated fiberglass, is prohibited. Normal wear, however, including oxidation (rust), slight dents and scratches, and other damage that does not affect serviceability or the weather-tight integrity of the units, is not prohibited.

(b) As used in paragraph (a) of this section, *splice* means any repair of a freight container main structural member which replaces material, except complete replacement of the member.

(c) All shipments of Class 1 (explosive) materials except those in Division 1.4 (Class C explosive) must be accompanied by a statement, which may appear on the shipping paper, certifying that the freight container or the vehicle is structurally serviceable as defined in paragraph (a)(2) of this section.

§ 176.174 Transport of Class 1 (explosive) materials in shipborne barges.

(a) Fixed magazines may be built within a shipboard barge. Portable magazines and freight containers may be used as magazines with a barge.

(b) Shipborne barges may be used for the carriage of all types of Class 1 (explosive) materials. When carrying Class 1 (explosive) materials requiring special stowage, the following requirements apply:

(1) Class 1 (explosive) materials in compatibility group G or H must be stowed in steel portable magazines or freight containers.

(2) Class 1 (explosive) materials in compatibility group K or L must be stowed in steel portable magazines.

(c) Class 1 (explosive) materials of different compatibility groups may not be stowed within the same shipborne barge unless under § 176.144(b) of this subpart they are authorized to be stowed in the same compartment.

Handling Class 1 (Explosive) Materials in Port

§ 176.175 Signals.

When Class 1 (explosive) materials are being loaded, handled, or unloaded on a vessel, the vessel must exhibit the following signals:

(a) By day, flag "B" (Bravo) of the international code of signals; and

(b) By night, an all-round fixed red light.

§ 176.178 Mooring lines

(a) All lines used in mooring the vessel must be of sufficient strength, type, and number for the size of the vessel and local conditions.

(b) While the vessel is moored or anchored in a port area, towing wires of adequate size and length must be properly secured to mooring bits at the bow and stern ready for immediate use with the towing eyes passed outboard and kept at about water level.

(c) The mooring arrangements must be such that the vessel can be released quickly in an emergency.

§ 176.180 Watchkeeping.

Whenever Class 1 (explosive) materials are on board a vessel in port, there must be sufficient crew on board to maintain a proper watch and to operate the propulsion and firefighting equipment in case of an emergency.

§ 176.182 Conditions for handling on board ship.

(a) *Weather conditions.* Class 1 (explosive) materials may not be handled in weather conditions which may seriously increase the hazards presented by the Class 1 (explosive) materials. During electrical storms, cargo operations must be halted and all hatches containing Class 1 (explosive) materials must be closed.

(b) *Darkness.* Class 1 (explosive) materials may not be handled on board a vessel during the hours of darkness unless prior consent has been obtained from the COTP.

(c) *Lighting.* The area where Class 1 (explosive) materials are handled, or where preparations are being made to handle Class 1 (explosive) materials, must be illuminated with lighting that is sufficient to safely perform the handling operation.

(d) *Protective equipment.* (1) A sufficient quantity of appropriate protective equipment must be provided for the personnel involved in handling Class 1 (explosive) materials.

(2) The protective equipment must provide adequate protection against the hazards specific to the Class 1 (explosive) materials handled.

(e) *Intoxicated persons.* No person under the influence of alcohol or drugs to such an extent that the person's judgment or behavior is impaired may participate in any operation involving the handling of Class 1 (explosive) materials. The master of the vessel must keep any such person clear of any areas where Class 1 (explosive) materials are being handled.

(f) *Smoking.* (1) Smoking is prohibited on the vessel while Class 1 (explosive) materials are being handled or stowed except in places designated by the master of the vessel.

(2) Conspicuous notices prohibiting smoking must be posted and clearly visible at all locations where Class 1 (explosive) materials are handled or stored.

(g) All hatches and cargo ports opening into a compartment in which Class 1 (explosive) materials are stowed must be kept closed except during loading and unloading of the compartment. After loading, hatches must be securely closed.

§ 176.184 Class 1 (explosive) materials of Compatibility Group L.

Class 1 (explosive) materials in compatibility group L may not be handled in a port area without the special permission of, and subject to any special precautions required by, the COTP.

§ 176.190 Departure of vessel.

When loading of Class 1 (explosive) materials is completed, the vessel must depart from the port area as soon as is reasonably practicable.

§ 176.192 Cargo handling equipment for freight containers carrying Class 1 (explosive) materials.

(a) Except in an emergency, only cargo handling equipment that has been specifically designed or modified for the handling of freight containers may be used to load, unload, or handle freight containers containing Division 1.1 or 1.2 (Class A and B explosive) materials.

(b) The gross weight of a freight container containing Class 1 (explosive) materials may not exceed the safe working load of the cargo handling equipment by which it is handled.

Magazine Vessels

§ 176.194 Stowage of Class 1 (explosive) materials on magazine vessels.

(a) *General.* The requirements of this section are applicable to magazine vessels and are in addition to any other requirements in this subchapter.

(b) *Type vessel authorized.* A single deck vessel with or without a house on deck is the only type vessel that may be used as a magazine vessel. A magazine vessel may not be moved while Class 1 (explosive) materials are on board.

(c) *Location of explosives.* Division 1.1, 1.2, or 1.3 (Class A and B explosive) materials, in excess of 2268 kg (5000 pounds), stored in any magazine vessel must be stowed below deck. No Class 1 (explosive) materials may be stowed on deck unless the vessel is fitted with a deck house having a stowage area which meets the requirements in this subpart for the stowage of Class 1 (explosive) materials. Detonators, Division 1.1 (Class A explosive), and detonating primers, Division 1.1 (Class A explosive), may not be stored on the same magazine vessel with other Division 1.1, 1.2, and 1.3 (Class A or B explosive) materials.

(d) *Class 1 (explosive) materials storage spaces.* Any compartment on a magazine vessel used for the stowage of Class 1 (explosive) materials must be completely sealed with wood so as to provide a smooth interior surface. Each metal stanchion in the compartment must be boxed in the same manner. An overhead ceiling is not required when the overdeck is weather tight. All nail and bolt heads must be countersunk and any exposed metal must be covered with wood.

(e) *Initiating explosives, detonators and boosters with detonators.* No explosive substance in Division 1.1, compatibility group A may be stowed in the same compartment with any other Class 1 (explosive) materials when there are explosive substances in Division 1.1 or 1.2 (Class A explosive) on the same magazine vessel. Detonators and detonating primers must be stowed at least 8 m (26 feet) from any bulkhead forming a boundary of a compartment containing any other Class 1 (explosive) materials.

(f) *Dry storage spaces.* A magazine vessel having a dry storage space capable of being used for any purpose whatsoever must have a cofferdam at least 61 cm (24 inches) wide fitted between the dry storage space and each adjacent compartment containing Class 1 (explosive) materials. The cofferdam must be constructed of wood or steel, formed by two tight athwartship bulkheads extending from the skin of the vessel to the overdeck. If the cofferdam extends to the weather deck, a watertight hatch must be fitted in the deck to provide access to the cofferdam.

(g) *Lighting.* Non-sparking, battery-powered, self-contained electric lanterns or non-sparking hand flashlights are the only means of artificial light authorized.

(h) *Living quarters.* Living quarters must be fitted on the inside with a non-combustible material approved by the Commandant, USCG. Bracketed ship's lamps are the only lighting fixtures authorized to be used in the living quarters. Any stove used for heating or cooking must be securely fastened and may not be mounted closer than 15 cm (5.9 inches) to the deck or sides of the house. Any smoke pipe for the stove which passes through the roof of the house must be kept at least 8 cm (3 inches) away from any woodwork. Each smoke pipe must be protected by a layer of non-combustible material approved by the Commandant, USCG, an air space of at least 2.54 cm (1 inch), and a metal collar of at least 1.5 mm (0.059 inch) sheet secured only on the weather side of the roof. There may be no opening from any living quarters into any stowage compartment.

(i) *Storage of other hazardous materials.* Magazine vessels having Class 1 (explosive) materials on board

may not be used for the storage of any other hazardous material.

(j) *Magazine vessel's stores.* Hazardous materials used as stores on board any magazine vessel must comply with the requirements of 46 CFR part 147.

(k) *Matches.* Safety matches requiring a prepared surface for ignition are the only type of matches authorized to be possessed or used on board a magazine vessel. They must be kept in a metal box or can with a metal cover and stored in the custodian's living quarters.

(l) *Firearms.* Firearms and ammunition (other than cargo) are not permitted on board a magazine vessel.

(m) *Fire extinguishing equipment.* No Class 1 (explosive) materials may be loaded or stowed in, unloaded from, or handled on any magazine vessel unless four fire extinguishers that meet the requirements for Type A Size II or Type B Size III in 46 CFR part 95, subpart 95.50 are near and accessible to the magazines.

(n) *Supervision.* A magazine vessel containing Class 1 (explosive) materials must be continuously attended by a custodian employed for that purpose by the vessel's owner.

(o) *Unauthorized persons on magazine vessels.* The custodian of a magazine vessel shall prevent unauthorized persons from coming on board unless it is necessary to abate a hazard to human life or a substantial hazard to property.

(p) *Repacking of Class 1 (explosive) materials on board.* No Class 1 (explosive) materials may be repacked on board a magazine vessel. Broken or damaged packages must be handled in accordance with the requirements of § 176.156. Packages requiring an emergency response must be handled in accordance with the emergency response information required under § 172.602 of this subchapter.

(q) *Work boat.* Each magazine vessel must be equipped with a work boat.

(r) *Life preservers.* One approved personal flotation device must be available for each person employed on a magazine vessel.

(s) *Fenders.* Each magazine vessel must be fitted with fenders in sufficient number and size to prevent any vessel tieing up alongside from coming in contact with the hull.

Subpart H—Detailed Requirements for Class 2 (Compressed Gas) Materials

§ 176.200 General stowage requirements.

(a) Each package of Class 2 (compressed gas) material being transported by vessel must be prevented from making direct contact with the vessel's deck, side, or bulwark by dunnage, shoring, or other effective means.

(b) When cylinders of Class 2 (compressed gas) materials being transported by vessel are stowed in a horizontal position, each tier must be stowed in the cantlines of the tier below it, and the valves on cylinders in adjacent tiers must be at alternate ends of the stow. Each tier may be stepped back and the ends alternated in order to clear the flange. Lashing must be provided to prevent any movement.

(c) When cylinders of Class 2 (compressed gas) materials being transported by vessel are stowed in a vertical position they must be stowed upright in a block and cribbed or boxed in with suitable dunnage. The box or crib must be dunnaged at least 10 cm (3.9 inches) off any metal deck. The cylinders in the box or crib must be braced to prevent any movement. The box or crib must be securely chocked and lashed to prevent any movement.

(d) Any package containing Division 2.3 (poison gas) materials must be stowed separate from all foodstuffs.

(e) Class 2 (compressed gas) materials may not be stowed "on deck" over a hold or compartment containing coal.

(f) Class 2 (compressed gas) material must be kept as cool as practicable and be stowed away from all sources of heat and ignition.

§ 176.205 Under deck stowage requirements.

(a) When a Class 2 (compressed gas) material is stowed below deck, it must be stowed in a mechanically ventilated cargo space with no source of artificial heat and clear of living quarters. No bulkhead or deck of that hold or compartment may be a common boundary with any boiler room, engine room, coal bunker, galley or boiler room uptake.

(b) When Division 2.1 (flammable gas) materials are stowed below deck, they must be stowed in a hold or compartment which complies with paragraph (a) of this section and the following requirements:

(1) Each hold or compartment must be ventilated.

(2) Each hold or compartment must be equipped with an overhead water sprinkler system or fixed fire extinguishing system.

(3) Each electrical power line in the hold or compartment must be protected by a strong metal covering to prevent crushing by cargo being stowed against it.

(4) Except when fitted with electrical fixtures of the explosion-proof type, each electrical circuit serving the hold or compartment must be disconnected from all sources of power. No circuit may be energized until the Division 2.1 (flammable gas) cargo and any vapors have been removed from the hold or compartment. Explosion-proof portable lighting may be used if the source of power is from electrical outlets outside the hold or compartment and above the weather deck.

(5) Any opening in a common bulkhead of an adjacent hold or compartment must be securely closed off and made gas-tight, unless the adjacent hold or compartment is also used for the stowage of Division 2.1 (flammable gas) materials.

(6) Full and efficient hatch covers must be used. Tarpaulins, if fitted, must be protected by dunnaging before overstowing with any cargo. Each tarpaulin must be in one piece and free of rents, tears, and holes.

(7) A fire screen must be fitted at the weather end of each vent duct leading from the hold or compartment. The fire screen must completely cover the open area. It must consist of two layers of fine brass wire screen at least 50×50 cm (20×20 inches) mesh or finer, spaced not less than 1 cm (0.4 inch) or more than 4 cm (2 inches) apart. The screen may be removable if means for securing it in place when in service are provided.

(8) The hold or compartment may not be fitted with any gooseneck type vent trunk head.

(9) Any electrical apparatus located in the hold or compartment must be capable of being disconnected from its power source by a positive means located outside the hold or compartment.

§ 176.210 On deck stowage requirements.

Cylinders of Class 2 (compressed gas) materials being transported by vessel must be protected from radiant heat which, including the direct rays of the sun by structural erections or awnings. A tarpaulin covering the cylinders is not acceptable if it comes in contact with them.

§ 176.220 Smoking or open flame and posting of warning signs.

(a) Smoking or the use of open flame is prohibited in any hold or compartment containing a Division 2.1 (flammable gas) material, near any Division 2.1 (flammable gas) material stowed on deck, or near any ventilator leading to a hold containing this material.

(b) A sign carrying the legend:

FLAMMABLE VAPORS
KEEP LIGHTS AND FIRE AWAY
NO SMOKING

must be conspicuously posted at each approach to an "on deck" Division 2.1 (flammable gas) material stowage area and near each cargo hold ventilator leading to a hold containing this material. The sign must be painted on a white background using red letters. The letters may not be less than 8 cm (3 inches) high.

§ 176.225 Stowage of chlorine.

Chlorine (UN 1017) must be stowed separate from copper or brass leaf sheets and from finely divided organic material.

§ 176.230 Stowage of Division 2.1 (flammable gas) materials.

Division 2.1 (flammable gas) materials transported in Specification 106A or 110A multi-unit car tanks must be stowed on deck only, and must be shaded from radiant heat.

Subpart I—Detailed Requirements for Class 3 (Flammable) and Combustible Liquid Materials

§ 176.305 General stowage requirements.

(a) A Class 3 (flammable) or combustible liquid must be kept as cool as reasonably practicable and be stowed away from all sources of heat and ignition.

(b) Except as otherwise provided in § 176.76(g), a package containing a Class 3 (flammable) liquid and equipped with a vent or safety relief device must be stowed "on deck" only.

(c) The following requirements apply to each hold or compartment in which any Class 3 (flammable) or combustible liquids are being transported:

(1) The hold or compartment must be ventilated except that the stowage of non-bulk packages of Class 3 (flammable) liquids with a flash point above 23 °C (73 °F) (see 49 CFR 171.8 definitions) may be in non-ventilated holds.

(2) Stowage of a Class 3 (flammable) or combustible liquid within 6 m (20 feet) of a bulkhead which forms a boundary or deck of a boiler room, engine room, coal bunker, galley, or boiler room uptake is not permitted. If the amount of the liquid to be stowed in a hold will not permit compliance with the requirement for a 6 m (20 foot) separation, less separation distance is authorized if at least one of the following conditions exists:

(i) The bulkhead or deck is covered with at least 8 cm (3 inches) of insulation on the entire area subject to heat;

(ii) A temporary wooden bulkhead at least 5 cm (2 inches) thick is constructed in the hold at least 8 cm (3 inches) off an engine room or 15 cm (5.9 inches) off a boiler room bulkhead, covering the entire area of the bulkhead that is subject to heat, and the space between the permanent bulkhead and the temporary wooden bulkhead is filled with mineral wool or equivalent bulk noncombustible insulating material; or

(iii) A temporary wooden bulkhead is constructed of at least 2.5 cm (1 inch) thick tongue and groove sheathing, located 1 m (3 feet) from the boiler room or engine room bulkhead, and filled with sand to a height of 2 m (7 feet) above the tank top, or, if the cargo compartment is located between decks, 1 m (3 feet) of sand.

(3) Combustible liquids may not be stowed in a hold within 6 m (20 feet) of a common bulkhead with the engine room unless the means of vessel propulsion is internal combustion engines.

(4) Each cargo opening in a bulkhead of an adjacent hold must be securely closed off and made gas-tight, unless the adjacent hold is also used for the stowage of a Class 3 (flammable) or combustible liquid.

(d) In addition to the requirements specified in paragraph (b) of this section, the following requirements apply to each hold or compartment in which a Class 3 (flammable) liquid is transported:

(1) Full and effective hatch covers must be used. Tarpaulins, if fitted, must be protected by dunnaging before overstowing with any cargo. Each tarpaulin must be in one piece and free of rents, tears, and holes;

(2) If Class 3 (flammable) liquids in excess of 1016 kg (2240 pounds) are stowed under deck in any one hold or compartment, a fire screen must be fitted at the weather end of each vent duct leading from that hold or compartment. The fire screen must completely cover the open area. It must consist of two layers of fine brass wire screen at least 20×20 mesh or finer spaced not less than 1 cm (0.4 inch) or more than 1 cm (0.4 inch) apart. The screen may be removable only if means for securing it in place when in service are provided;

(3) Each electrical power line in the hold or compartment must be protected by a strong metal covering to prevent crushing by cargo being stowed against it;

(4) Except when fitted with explosion-proof type electrical fixtures, each electrical circuit serving the hold or compartment must be disconnected from all sources of power from a point outside the hold or compartment containing flammable liquids. No circuit may be energized until the flammable liquids and any vapors have been removed from the hold or compartment. Explosion-proof type portable lighting may be used if the source of power is from electrical outlets outside the hold or compartment and above the weather deck; and

(5) A Class 3 (flammable) liquid in excess of 1016 kg (2240 pounds) may not be transported in any hold or compartment that is fitted with a gooseneck type of vent head.

(e) On a passenger vessel, each hold or compartment used to transport a Class 3 (flammable) liquid must be equipped with an overhead water sprinkler system or fixed fire-extinguishing system.

(f) On a passenger vessel, each hold or compartment used to transport Class 3 (flammable) liquids under a passenger space must have an overdeck of an A–60 type construction (see 46 CFR 72.05–10(c)(1)) or equivalent or have its underside covered with at least 8 cm (3 inches) of noncombustible insulation.

(g) No Class 3 (flammable) liquid in a drum or wooden case, having inside packagings of more than 1 L (0.3 gallon) capacity each, may be stowed as a beam filler. A wooden barrel, a wooden box or a fiberboard box, with any Class 3 (flammable) liquid material in inside packagings of not more than 1 L (0.3 gallon) capacity each, may only be stowed as a beam filler if it is possible to stow and observe any "THIS SIDE UP" marking.

§ 176.315 Fire protection requirements.

(a) For each 79,800 liters (21,081 U.S. gallons) or part thereof of any Class 3 (flammable) or combustible liquid being transported on board a vessel in a portable tank, rail tank car, or a motor vehicle cargo tank, there must be provided at least one B–V semiportable foam (152 liter/40 gallon capacity) (see 46 CFR 95.50), dry chemical (45.4 kg (100 pounds) minimum capacity) or equivalent fire extinguisher, or a fire hose fitted with an approved portable mechanical foam nozzle with pick-up tube and two 19 liter (5 gallon) cans of foam liquid concentrate. Each foam system must be suitable for use with each Class 3 (flammable) or combustible liquid for which it is required. Each fire extinguisher must be accessible to the tank it is intended to cover.

(b) The fire hose at each fire hydrant in the vicinity of Class 3 (flammable)

and combustible liquids stowage areas must be fitted with an approved combination solid stream and water spray nozzle.

(c) The pressure must be maintained in the vessel's fire mains during the loading and unloading of any Class 3 (flammable) or combustible liquids.

(d) Two 7 kg (15-pound) capacity hand portable dry chemical or two portable 10 L (2.6 gallons) foam-type extinguishers must be accessible to any packaged Class 3 (flammable) or combustible liquid and suitable for use with the lading.

(e) The requirements of this section do not apply to portable tanks and their contents authorized under 46 CFR part 98 or 46 CFR part 64.

§ 176.320 Use of hand flashlights.

Each hand flashlight used on deck near or in any hold or compartment containing a Class 3 (flammable) liquid, must be suitable for use in hazardous locations where fire or explosion hazards may exist.

§ 176.325 Smoking or open flame and posting of warning signs.

(a) Smoking or the use of open flame is prohibited in any hold or compartment containing a Class 3 (flammable) or combustible liquid, near any Class 3 (flammable) or combustible liquid stowed on deck, or near any ventilator leading to a hold containing such material.

(b) A sign carrying the legend:

FLAMMABLE VAPORS
KEEP LIGHTS AND FIRE AWAY
NO SMOKING

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must be conspicuously posted at each approach to a Class 3 (flammable) or combustible liquid stowed "on deck" and near each cargo hold ventilator leading to a hold or compartment containing this material. This sign must be painted on a white background using red letters. The letters may not be less than 8 cm (3 inches) high.

§ 176.331 Transportation of Class 3 (flammable) liquids with foodstuffs.

Each package containing a Class 3 (flammable) liquid which bears a POISON label must be stowed separate from foodstuffs. Each package containing a Class 3 (flammable) liquid which bears a CORROSIVE or KEEP AWAY FROM FOOD label must be stowed away from foodstuffs.

§ 176.340 Combustible liquids in portable tanks.

Combustible liquids, having a flash point of 38 °C (100 °F) or higher, may be transported by vessel only in one of the portable tanks as specified below:

(a) Portable tanks authorized in § 173.241 of this subchapter.

(b) In nonspecification portable tanks, subject to the following conditions:

(1) Each portable tank must conform to §§ 178.251 and 178.253 of this subchapter, except as otherwise provided in this paragraph;

(2) The rated capacity of the tank may not exceed 4,542 liters (1,200 gallons), and the rated gross weight may not exceed 13,608 kg (30,000 pounds);

(3) The vibration test in § 178.253–5 of this subchapter need not be performed;

(4) When the total surface area of the tank exceeds 14.9 square meters (160 square feet), the total emergency venting capacity must be determined in accordance with Table III in § 178.341–4 of this subchapter;

(5) In place of a specification identification marking required by § 178.251–7 of this subchapter, the tank must be marked, on two sides in letters at least 5 cm (2 inches) high on contrasting background: "FOR COMBUSTIBLE LIQUIDS ONLY" and "49 CFR 176.340". This latter marking constitutes certification by the person offering the combustible liquid materials for transportation that the portable tank conforms to this paragraph;

(6) Each tank must be made of steel;

(7) The design pressure of the tank must be not less than 62 kPa (9 psi);

(8) No pressure relief device may open at less than 34.4 kPa (5 psi);

(9) Each tank must be retested and marked at least once every 2 years in accordance with the requirements applicable to a DOT specification 57 portable tank in § 173.32(e) (2), (3), and (4) of this subchapter; and

(10) Each tank must conform to the provisions of § 173.24 of this subchapter and paragraphs (g), (h), (i), and (k) of § 173.32 of this subchapter.

(c) Portable tanks approved by the Commandant, USCG (G–MTH).

Subpart J—Detailed Requirements for Class 4 (Flammable Solids), Class 5 (Oxidizers and Organic Peroxides), and Division 1.5 (Blasting Agents) Materials

§ 176.400 Stowage of Division 1.5 (blasting agents), Class 4 (flammable solids) and Class 5 (oxidizers and organic peroxides) materials.

(a) Class 4 (flammable solid) material and Division 5.2 (organic peroxide) material must be kept as cool as reasonably practicable and be stowed away from all sources of heat and ignition.

(b) Division 5.2 (organic peroxide) material must be stowed away from living quarters or access to them. Division 5.2 (organic peroxide) material not requiring temperature control should be protected from radiant heat, which includes direct rays of the sun, and stowed in a cool, well-ventilated area.

(c) No Division 1.5 (blasting agents) or Class 5 (oxidizers and organic peroxides) material being transported by vessel may be stowed in the same hold or compartment with any readily combustible material such as a combustible liquid, a textile product, or with a finely divided substance, such as an organic powder.

(d) No Division 1.5 (blasting agents) or Class 5 (oxidizers and organic peroxides) material being transported by vessel may be stowed in a hold or compartment containing sulfur in bulk, or in any hold or compartment above, below, or adjacent to one containing sulfur in bulk.

§ 176.405 Stowage of charcoal.

(a) Before stowing charcoal Division 4.2 (flammable solid), UN 1361, NA 1361, or UN 1362 on a vessel for transportation, the hold or compartment in which it is to be stowed must be swept as clean as practicable. All residue of any former cargo, including especially a petroleum product, a vegetable or animal oil, nitrate, or sulfur, must be removed.

(b) Charcoal packed in bags and offered for transportation on board a vessel in a quantity over 1016 kg (2240 pounds) must be loaded so that the bags are laid horizontally and stacked with space for efficient air circulation. If the bags are not compactly filled and closed to avoid free space within, vertical and horizontal dunnage strips must be laid between the bags. Space for ventilating must be maintained near bulkheads, the shell of the vessel, the deck, and the overhead. No more than 40,600 kg (89,508 pounds) of charcoal may be stowed in a hold or compartment when other stowage space is available. If the unavailability of hold or compartment space requires the stowage of a larger amount, the arrangement of the stow for ventilation must be adjusted to ensure a sufficient venting effect.

(c) Any loose material from bags broken during loading must be removed. Broken bags may be repacked or have the closures repaired and the repaired bags restowed.

(d) Charcoal "screenings" packed in bags must be stowed to provide spaces

for air circulation between tiers regardless of the quantity stowed.

§ 176.410 Division 1.5 (blasting agents) materials, ammonium nitrate and ammonium nitrate mixtures.

(a) This section prescribes requirements to be observed with respect to transportation of each of the following hazardous materials by vessel:

(1) Explosives, blasting, type E, and Explosives, blasting, type B, Division 1.5 (blasting agent) compatibility group D, UN 0331 and UN 0332.

(2) Ammonium nitrate fertilizer, Division 5.1 (oxidizer), UN 1942.

(3) Ammonium nitrate fertilizer, Division 5.1 (oxidizer), UN 2068.

(4) Ammonium nitrate fertilizer, Division 5.1 (oxidizer), UN 2067.

(5) Ammonium nitrate fertilizer, Division 5.1 (oxidizer), UN 2069 or UN 2072.

(6) Ammonium nitrate fertilizer, Division 5.1 (oxidizer), UN 2070.

(b) This section does not apply to Ammonium nitrate fertilizer, Class 9 (miscellaneous hazardous materials), UN 2071 or to any non-acidic ammonium nitrate mixed fertilizer containing 13 percent or less ammonium nitrate, less than 5 percent organic material, and no other oxidizing material, and which does not meet the criteria for any other hazard set forth in part 173 of this subchapter.

(c) When Division 1.5 (blasting agents) compatibility group D materials, ammonium nitrate, or any of the ammonium nitrate fertilizers listed in paragraph (a) of this section are transported by vessel:

(1) They must be stowed well away from any steam pipe, electric circuit, or other source of heat;

(2) Smoking is prohibited except in designated areas away for the material and "No-Smoking" signs must be posted in accordance with § 176.60;

(3) Fire hoses must be connected, laid out, and tested before loading or unloading commences; and

(4) A fire watch must be posted in the hold or compartment where the material is being loaded or unloaded.

(d) When any of the hazardous materials listed in paragraph (a) of this section is transported in bags by vessel:

(1) The requirements specified in paragraph (c) of this section must be complied with;

(2) The temperature of the bagged material may not exceed 54°C (130°F);

(3) Minimum dunnage and sweatboards must be used to prevent any friction or abrasion of bags, and to allow for the circulation of air and access of water in the event of fire;

(4) The bags must be stowed from side to side, out to the sweatboards;

(5) A space of 46 cm (18 inches) must be provided between any transverse bulkhead and the bags;

(6) The bags must be stowed so as to provide a 46 cm (18 inch) athwartship trench along the centerline of the compartment, continuous from top to bottom;

(7) The bags must be stowed so as to provide a 46 cm (18 inch) amidship trench running fore and aft from bulkhead to bulkhead;

(8) The bags may not be stowed less than 46 cm (18 inches) from any overhead deck beam;

(9) The bags must be stowed so as to provide vent flues 36 cm (14 inches) square at each corner of the hatch continuous from top to bottom;

(10) Trenching must be accomplished by alternating the direction of the bags in each tier (bulkheading); and

(11) The bags must be blocked and braced as necessary to prevent shifting of the bagged cargo adjacent to any trench area.

(e) Notwithstanding § 176.83(b) of this part, ammonium nitrate and ammonium nitrate fertilizers classed as Division 5.1 (oxidizers) materials, may be stowed in the same hold, compartment, magazine, or freight container with Class 1 materials (explosive), except those containing chlorates, in accordance with the segregation and separation requirements of § 176.144 of this part applying to Explosives, blasting, type B, and Explosives, blasting, type E, Division 1.5 compatibility group D.

(f) No mixture containing ammonium nitrate and any ingredient which would accelerate the decomposition of ammonium nitrate under conditions incident to transportation may be transported by vessel.

§ 176.415 Permit requirements for Division 1.5 (blasting agents), ammonium nitrates, and certain ammonium nitrate fertilizers.

(a) Except as provided in paragraph (b) of this section, before any of the following material is loaded on or unloaded from a vessel at any waterfront facility, the owner/operator must obtain written permission from the nearest COTP:

(1) Ammonium nitrate UN 1942, ammonium nitrate fertilizers containing more than 60 percent ammonium nitrate, ammonium nitrate fertilizer, Division 5.1 (oxidizer) UN 2070, or Division 1.5 (blasting agent) compatibility group D materials packaged in a paper bag, burlap bag, or other nonrigid combustible packaging, or any rigid container with combustible inside packagings.

(2) Any other ammonium nitrate or ammonium nitrate fertilizer not listed in § 176.410 (a) or (b) except ammonium nitrate fertilizer, Class 9 (miscellaneous hazardous materials) material, UN 2071.

(b) Any of the following may be loaded on or unloaded from a vessel at any waterfront facility without a permit:

(1) Ammonium nitrate fertilizer, Division 5.1 (oxidizer) UN 1942, in a rigid container with noncombustible inside packaging.

(2) Ammonium nitrate fertilizer, Division 5.1 (oxidizer) UN 2067, if the nearest COTP is notified at least 24 hours in advance of any loading or unloading or unloading in excess of 454 kg (1,000 pounds).

(3) Ammonium nitrate fertilizer, n.o.s., Division 5.1 (oxidizer) UN 2072, containing 40 percent or more fine calcium carbonate or dolomite.

(4) Non-acidic ammonium nitrate fertilizer, n.o.s., Division 5.1 (oxidizer) UN 2072, containing less than 5 percent organic material and 60 percent or less ammonium nitrate.

(5) Division 1.5 (blasting agents) compatibility group D material in a rigid container with non-combustible inside packaging.

(6) Ammonium nitrate fertilizer, Class 9 (miscellaneous hazardous materials), UN 2071.

(c) Before a permit may be issued, the following requirements must be met in addition to any others the COTP may impose:

(1) If the material is ammonium nitrate Division 1.1 (Class A explosive) compatibility group D, UN 0222; ammonium nitrate fertilizer Division 5.1 (oxidizer), UN 2070; or Explosives, blasting, type E, Division 1.5 (blasting agents) compatibility group D, UN 0332 in combustible packaging or in a rigid container with combustible inside packaging, it must be loaded or unloaded at a facility remote from populous areas or high value or high hazard industrial facilities so that in the event of fire or explosion loss of lives and property may be minimized;

(2) If the material is ammonium nitrate Division 1.1 (Class A explosive) compatibility group D, UN 0222 in rigid metal drums with non-combustible inside packagings; an ammonium nitrate fertilizer, Division 5.1 (oxidizer) UN 2070, containing more than 60 percent ammonium nitrate; or ammonium nitrate fertilizer, Division 5.1 (oxidizer), UN 2070 in rigid containers with combustible inside packagings, it must be loaded or unloaded at a facility removed from congested areas or high value or high hazard industrial facilities;

(3) Each facility at which the material is to be loaded or unloaded must conform with the requirements of the port security and local regulations and must have an abundance of water readily available for fire fighting; and

(4) Each facility at which the material is to be loaded or unloaded must be located so that each vessel to be loaded or unloaded has an unrestricted passage to open water. Each vessel must be moored bow to seaward, and must be maintained in a mobile status during loading, unloading, or handling operations by the presence of tugs or the readiness of engines. Each vessel must have two wire towing hawsers, each having an eye spice, lowered to the water's edge, one at the bow and the other at the stern.

(5) If the material is ammonium nitrate, Division 1.1 (Class A explosive) compatibility group D, UN 0222; ammonium nitrate fertilizer, Division 5.1 (oxidizer) UN 2070; an ammonium nitrate fertilizer, Division 5.1 (oxidizer) containing more than 60 percent ammonium nitrate; or a Division 1.5 (blasting agents) compatibility group D material in non-rigid combustible packaging and loaded in freight containers or transport vehicles, it may be loaded or unloaded at a non-isolated facility provided that facility is approved by the COTP.

§ 176.419 Class 4 (flammable solids) or Class 5 (oxidizers and organic peroxides) materials transported with foodstuffs.

Each package containing a Class 4 (flammable solids) or Class 5 (oxidizers and organic peroxides) material, bearing a POISON label and being transported on a vessel must be stowed separate from foodstuffs. Each package containing Class 4 (flammable solids) or Class 5 (oxidizers or organic peroxides) materials which bears a CORROSIVE or KEEP AWAY FROM FOOD label must be stowed away from foodstuffs.

268. Subpart L is revised to read as follows:

Subpart L—Detailed Requirements for Division 2.3 (Poisonous Gas) and Division 6.1 (Poisonous) Materials

Sec.

176.600 General stowage requirement.
176.605 Care following leakage or sifting of Division 2.3 (poisonous gas) and Division 6.1 (poisonous) materials.

Subpart L—Detailed Requirements for Division 2.3 (Poisonous Gas) and Division 6.1 (Poisonous) Materials

§ 176.600 General stowage requirement.

(a) Each package required to have a POISON GAS or POISON label thereon being transported on a vessel must be stowed clear of living quarters and any ventilation ducts serving living quarters and separate from foodstuffs.

(b) Each package required to have both a POISON GAS label and a FLAMMABLE GAS label thereon must be segregated as a Division 2.1 (flammable gas) material.

(c) Each package required to have a KEEP AWAY FROM FOOD label must be stowed away from foodstuffs.

(d) Each package of Division 2.3 (Poison A) material or Division 6.1 (Poison B) material which also bears a FLAMMABLE LIQUID or FLAMMABLE GAS label must be stowed in a mechanically ventilated space, kept as cool a reasonably practicable, and be stowed away from all sources of heat and ignition.

§ 176.605 Care following leakage or sifting of Division 2.3 (poisonous gas) and Division 6.1 (poisonous) materials.

A hold or compartment containing a package of a Division 2.3 (poisonous gas) or Division 6.1 (poisonous) material which has leaked or sifted must be thoroughly cleaned and decontaminated after the cargo is unloaded and before the hold or compartment is used for the stowage of any other cargo.

269.270. Subparts N and O are revised to read as follows:

Subpart N—Detailed Requirements for Class 8 (Corrosive) Materials

Sec.

176.800 General stowage requirements.
176.805 On deck stowage.

Subpart O—Detailed Requirements for Cotton and Vegetable Fibers, Motor Vehicles, and Asbestos

Sec.

176.900 Packaging and stowage of cotton and vegetable fibers; general.
176.901 Stowage of cotton or vegetable fibers with rosin or pitch.
176.903 Stowage of cotton or vegetable fibers with coal.
176.905 Motor vehicles or mechanical equipment powered by internal combustion engines.
176.908 Stowage and handling of asbestos.

Subpart N—Detailed Requirements for Class 8 (Corrosive Materials) Materials

§ 176.800 General stowage requirements.

(a) Each package of a Class 8 (corrosive material) material being transported on a vessel must be stowed clear of living quarters, and away from foodstuffs and cargo of an organic nature. Each package of Class 8 (corrosive material) which bears a POISON label must be stowed separate from foodstuffs.

(b) A package of Class 8 (corrosive material) material may not be stowed over any readily combustible material.

(c) Glass carboys containing Class 8 (corrosive material) material may not be stowed on board any vessel, other than a barge, more than two tiers high unless each carboy is boxed or crated with neck protection extending to the sides of the carboy box. This protective construction must be strong enough to permit stacking one on top of the other.

(d) A Class 8 (corrosive material) material may not be stowed over a hold or compartment containing cotton unless the deck is of steel and the hatch is fitted with a tight coaming. In addition, the deck must be tight against leakage and the Class 8 (corrosive material) material may not be stowed over the square of the hatch.

(e) Each package of Class 8 (corrosive material) which also bears a FLAMMABLE LIQUID label must be stowed away from all sources of heat and ignition.

§ 176.805 On deck stowage.

When break bulk Class 8 (corrosive materials) materials being transported on a vessel are stowed on deck:

(a) Provisions must be made for leakage from any package to drain away from other cargo into an overboard scupper or freeing port. The drainage may not enter an enclosed drainage system other than a direct overboard scupper. If this stowage is not practical, sufficient clean dry sand must be placed under and around the lower tier of packages to absorb any leakage.

(b) Dunnage must be provided on the deck and arranged so that any leakage will be apparent.

(c) Any leakage that occurs must be washed down, using liberal quantities of water.

Subpart O—Detailed Requirements for Cotton and Vegetable Fibers, Motor Vehicles, and Asbestos

§ 176.900 Packaging and stowage of cotton and vegetable fibers; general.

(a) Cotton, Class 9, NA 1365, Cotton, wet, Division 4.2, UN 1365, and other vegetable fibers, Division 4.1, being transported on a vessel must be securely baled and bound. Each bale of cotton or vegetable fibers must be covered with bagging on at least three-fourths of its surface, including both ends. Cut cotton linters may be accepted for transportation by vessel when baled and covered with bagging on the soft sides only if the bale is compressed to a density of at least 512 kg/m^3 (32 pounds per cubic foot) and it is bound with at

least six bands per bale. Any poorly compressed bale or any bale having damaged bindings may not be transported by vessel.

(b) Each bale of Cotton, wet, Division 4.2, UN 1365 must be stowed separately from any bales of dry cotton or vegetable fibers, in a 'tween deck space, and not overstowed. Any bale of cotton or vegetable fibers which is saturated with water may not be transported by vessel.

(c) Bales of cotton or vegetable fibers showing contact with oil or grease may not be accepted for transportation by vessel.

(d) Cotton or vegetable fibers must be stowed in a hold or compartment in accordance with the following requirements:

(1) All traces of oil or residue in the hold or compartment must be removed;

(2) A recently painted hold or compartment may not be used unless it is thoroughly dry;

(3) Each ventilation cowl serving the hold or compartment must be fitted with a spark screen;

(4) When a bulkhead of the hold or compartment is common with a boiler room, engine room, coal bunker, or galley and subjected to heat, a wooden bulkhead must be erected between the bulkhead and any cotton or vegetable fibers. This wooden bulkhead must be at least 15 cm (6 inches) from a boiler room bulkhead, and at least 5 cm (2 inches) from an engine room, coal bunker, or galley bulkhead;

(5) Each 'tween deck hatch must be closed with hatch covers, tarpaulins, and dunnage; however, metal hatch covers which are sealed by other means to provide equivalent protection may be used;

(6) Each hold or compartment must be equipped with a carbon dioxide or overhead water sprinkler system or other approved fixed extinguishing system. Before loading, the extinguishing system must be examined to ensure that it is in good working condition; and

(7) Each hold or compartment must be clear of all debris and swept as clean as practicable before loading.

(e) Naked lights or any fire likely to produce sparks are not permitted on the vessel, dock area, or on any lighters alongside a vessel during loading or unloading of cotton or vegetable fibers.

(f) Upon completion of stowage, each opening must be completely closed. Where required, tarpaulins must be fitted and secured in place to provide a tight hold. During a period of temporary stoppage of loading or unloading, a hatch may be left open. However during that period, a fire watch, designated by the master or officer-in-charge, must be stationed in the hold or compartment in which the cotton or vegetable fibers are stowed.

(g) At least one fire hose must be connected while cotton or vegetable fibers are being loaded or unloaded. Each fire pump must be operated before any loading or unloading. Pressure must be maintained on each fire main during the loading and the fire hose laid out ready for immediate use. Portable fire extinguishers must be placed to be readily available. The fire hose, fire pumps, and fire extinguishers may be the vessel's equipment or shore equipment.

(h) Smoking is not permitted on a vessel during the loading or unloading of cotton or vegetable fibers except at those times and in those places designated by the master. "NO SMOKING" signs must be conspicuously posted in appropriate places, and the responsible person in charge of the loading or unloading (see § 176.57 of this part) must ensure that they are observed.

(i) Cotton or vegetable fibers may be stowed in the same hold over bulk sulfur if the sulfur has been trimmed and leveled and the hold is thoroughly cleaned of sulfur dust. A tight floor of two layers of 2.54 cm (1 inch) crossed clean dunnage boards must be laid on the sulfur before cotton or vegetable fibers are stowed. These substances may be stowed alongside each other in the same hold if they are separated by a tight dustproof wood bulkhead.

(j) Cotton or vegetable fibers may not be stowed in a 'tween deck hold over bulk sulfur in a lower hold unless the 'tween deck hold has been thoroughly cleaned of all sulfur dust and the 'tween deck hatch covers are in place and covered with tarpaulins and dunnage.

§ 176.901 Stowage of cotton or vegetable fibers with rosin or pitch.

(a) Unless impracticable, cotton or vegetable fibers being transported on a vessel may not be stowed in the same hold or compartment with rosin or pitch being transported on the same vessel.

(b) When separate stowage is impracticable, the cotton or vegetable fibers may be stowed in the same hold or compartment with rosin or pitch if they are separated by clean dunnage or a cargo of a non-combustible nature. When such stowage within the same hold or compartment involves large amounts of cotton or fibers or of rosin or pitch, the rosin or pitch must be floored off with at least two layers of 2.54 cm (1 inch) dunnaging and the cotton or vegetable fibers stowed above.

§ 176.903 Stowage of cotton or vegetable fibers with coal.

Cotton or vegetable fibers being transported on a vessel may not be stowed in the same hold with coal. They may be stowed in adjacent holds if the holds are separated by a tight steel bulkhead and the cotton or vegetable fibers are dunnaged at least 5 cm (2 inches) off the bulkhead. Cotton or vegetable fibers may be stowed in a hold above or below one in which coal is stowed if there is a tight steel intervening deck and all hatch covers are in place and covered with tarpaulins.

§ 176.905 Motor vehicles or mechanical equipment powered by internal combustion engines.

(a) A motor vehicle or any mechanized equipment powered by an internal combustion engine is subject to the requirements of this subchapter when carried as cargo on a vessel if the engine or fuel tank contains fuel or if either battery cable is connected. Such vehicles or equipment are excepted from the requirements of this subchapter if the following requirements are met:

(1) For a motor vehicle or mechanical equipment having an internal combustion engine using fuel classed as a flammable liquid by this subchapter: the fuel tank is empty, the engine is run until it stalls for lack of fuel, both battery cables are disconnected, and no hazardous material is stowed in the vehicle or equipment; or

(2) For a motor vehicle or mechanical equipment having an internal combustion engine using liquid fuel classed as a combustible liquid by this subchapter: the fuel tank contains 418 liters (110 gallons) of fuel or less, both battery cables are disconnected and no hazardous material is stowed in the vehicle or equipment.

(b) Before being loaded on a vessel, each vehicle must be inspected for fuel leaks. A vehicle showing any signs of leakage may not be transported.

(c) Each vehicle stowed in a hold or compartment must have the battery cables disconnected and secured away from the battery terminals, unless it is stowed in a hold or compartment designated by the administration of the country in which the vessel is registered to be specially suited for vehicles. See 46 CFR 70.10–44 and 90.10–38 for U.S. vessels.

(d) The fuel tank of a vehicle being transported as cargo on a vessel may not be more than one-fourth full.

(e) All equipment used for handling vehicles must be designed so that the fuel tank and fuel system are protected

from stress that might cause rupture or other damage incident to handling.

(f) Whenever possible each vehicle must be stowed to allow for its inspection during transit.

(g) Two hand-held, portable, dry chemical fire extinguishers of at least 4.5 kg (10 pounds) capacity each must be separately located in an accessible location in each hold or compartment in which any motor vehicle is stowed.

(h) "NO SMOKING" signs must be conspicuously posted at each access opening to the hold or compartment.

(i) Except when being transported in a space specially suited for vehicles, the following additional requirements apply to the stowage of any vehicles containing a flammable or combustible liquid:

(1) Each portable electrical light and hand flashlight used in the stowage area must be an approved, explosion-proof type. All electrical connections for any portable light must be made to outlets outside the space in which any vehicle is stowed;

(2) Each hold or compartment must be ventilated and fitted with an overhead water sprinkler system or fixed fire extinguishing system;

(3) Each hold or compartment must be equipped with a smoke or fire detection system; and

(4) All electrical equipment in the hold or compartment other than fixed explosion-proof lighting must be disconnected from its power source at a location outside the hold or compartment during the handling and transportation of any vehicle. Where the disconnecting means is a switch or circuit breaker, it must be locked in the open position until all vehicles have been discharged.

(j) Motor vehicles may be refueled when necessary in the hold of a vessel in accordance with § 176.78.

(k) Motor vehicles with fuel in their tanks may be stowed in a closed freight container if the battery cables are disconnected and secured away from the battery terminals and the following warning is affixed to the access doors: "WARNING—MAY CONTAIN EXPLOSIVE MIXTURES WITH AIR—KEEP IGNITION SOURCES AWAY WHEN OPENING." The warning must be on a contrasting background and must be readily legible from a distance of 8 m (26 feet).

§ 176.906 Stowage and handling of asbestos.

Asbestos must be stowed, handled, and unloaded, and any asbestos contamination of vessels removed, in a manner that will minimize exposure of personnel to airborne asbestos particles released incident to transportation.

PART 177—CARRIAGE BY PUBLIC HIGHWAY

271. The authority citation for part 177 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 49 CFR part 1.

§ 177.806 [Amended]

272. In § 177.806, paragraph (b), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

§ 177.810 [Amended]

273. In § 177.810, the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials" both places it appears.

§ 177.811 [Amended]

274. In § 177.811, paragraph (a), the phrase "(other than explosives)" is removed and replaced with the phrase "(other than Class 1 (explosive) materials)".

§ 177.816 [Amended]

275. In § 177.816, paragraphs (a) and (b)(2), the phrase "flammable cryogenic liquid" is removed and replaced with the phrase "Division 2.1 (flammable gas) material that is a cryogenic liquid".

§ 177.818 [Amended]

276. In § 177.818, the following changes are made:

a. In the section heading, the phrase "flammable cryogenic liquids" is removed and replaced with the phrase "Division 2.1 (flammable gas) materials that are cryogenic liquids".

b. In paragraph (a) introductory text, the phrase "flammable cryogenic liquid" is removed and replaced with the phrase "Division 2.1 (flammable gas) material that is a cryogenic liquid" and the phrase "exceeding 125 gallons" is removed and replaced with the phrase "exceeding 450 liters (119 gallons)".

§ 177.821 [Amended]

277. In § 177.821, the following changes are made:

a. In paragraph (d), the phrase "high explosive" is removed and replaced with the phrase "Division 1.1 or 1.2 (high explosive) material" both places it appears and the phrase "the explosive" is removed and replaced with the phrase "the Class 1 (explosive) material" both places it appears.

b. In paragraph (f), the phrase "100 pounds net weight" is removed and replaced with the phrase "45 kg (99 pounds) net weight"; in the first sentence of paragraph (f), the phrase "flammable solid" is removed and replaced with the phrase "Class 4 (flammable solid) material"; and the phrase "not exceed 8 pounds" is removed and replaced with the phrase "not exceed 3.6 kg (7.9 pounds)".

§ 177.825 [Amended]

278. In § 177.825, the following changes are made:

a. In the section heading and paragraphs (a)(3), (b) introductory text, (b)(2)(i), (c) introductory text, (d) introductory text, (d)(1)(i), (d)(1)(ii), and (d)(2)(iv), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraphs (a) introductory text, (f) introductory text, and (f)(3), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

§ 177.826 [Amended]

279. In § 177.826, the following changes are made:

a. In the section heading and paragraphs (b)(2) and (b)(3), the phrase "flammable cryogenic liquids" is removed and replaced with the phrase "Division 2.1 (flammable gas) materials that are cryogenic liquids".

b. In paragraphs (a) and (b)(3), the phrase "flammable cryogenic liquid" is removed and replaced with the phrase "Division 2.1 (flammable gas) material that is a cryogenic liquid".

§ 177.834 [Amended]

280. In § 177.834, the following changes are made:

a. In paragraph (a), the phrase "flammable liquid, compressed gas, corrosive material, poisonous material, or radioactive material" is removed and replaced with the phrase "Class 3 (flammable liquid), Class 2 (gases), Class 8 (corrosive), Division 6.1 (poisonous), or Class 7 (radioactive) material".

b. In paragraph (c), the phrase "explosive, flammable liquid, flammable solid, oxidizing material, or flammable compressed gas" is removed and replaced with the phrase "Class 1 (explosive), Class 3 (flammable liquid), Class 4 (flammable solid), Class 5 (oxidizing), or Division 2.1 (flammable gas) materials".

c. In paragraph (d), the phrase "explosive, flammable liquid, flammable solid oxidizing material, or flammable compressed gas" is removed and replaced with the phrase "Class 1 (explosive), Class 3 (flammable liquid), Class 4 (flammable solid), Class 5

(oxidizing), or Division 2.1 (flammable gas) materials".

d. In paragraph (f), the phrase "any explosive" is removed and replaced with the phrase "any Class 1 (explosive) material".

e. In paragraph (g), the phrase "explosives, flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases, and poisonous liquids or gases" is removed and replaced with the phrase "Class 1 (explosive), Class 3 (flammable liquid), Class 4 (flammable solid), Class 5 (oxidizing), Class 8 (corrosive), Class 2 (gases) and Division 6.1 (poisonous) materials".

f. In paragraph (l)(1), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" both places it appears.

g. In paragraphs (l)(2)(i) introductory text and (l)(2)(iii)(A) introductory text, the phrase "flammable liquid or flammable gas" is removed and replaced with the phrase "Class 3 (flammable liquid) or Division 2.1 (flammable gas) materials" and in paragraph (l)(2)(iii)(B) introductory text, the phrase "Flammable liquid or flammable gas" is replaced with "Class 3 (flammable liquid) or Division 2.1 (flammable gas) materials".

h. In paragraph (l)(2)(i)(B), the phrase "130 °F. (54 °C.)" is removed and replaced with the phrase "54 °C (130 °F)", and the phrase "60 °F. (15.6 °C.)" is removed and replaced with the phrase "16 °C (61 °F)".

i. In paragraph (l)(2)(iii)(A)(4), the phrase "130 °F. (54 °C.)" is removed and replaced with the phrase "54 °C (129 °F)".

§ 177.835 [Amended]

281. In § 177.835, the following changes are made:

a. In paragraph (c)(4)(i), the phrase "Initiating explosive" is removed and replaced with the phrase "Substances, explosive, n.o.s., Division 1.1A (explosive) material (Initiating explosive)".

b. In paragraphs (g) introductory text, (g)(2)(i), and (j), the phrase "class A or class B explosive" is removed and replaced with the phrase "Division 1.1, 1.2, or 1.3 (Class A or Class B explosive) material".

c. In paragraph (f), the phrase "class A or class B explosives" is removed and replaced with the phrase "Division 1.1, 1.2, or 1.3 (Class A or Class B explosive) materials".

d. In paragraph (c) introductory text, the phrase "Class A explosives" is removed and replaced with the phrase "Division 1.1 or 1.2 (Class A explosive) materials".

e. In paragraph (g) introductory text, the phrase "class C explosive" is removed and replaced with the phrase "Division 1.4 (Class C explosive) material" both places it appears.

f. In the section heading and paragraphs (c) heading, (f) heading, and (i) heading, the word "Explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

g. In paragraphs (a), (b) heading and introductory text, (b)(1), (e), (f), (h), (j) heading, (k), and (m), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

h. In paragraphs (a), (i), (k), and (m), the word "explosive" is removed and replaced with the phrase "Class 1 (explosive) material" each place it appears.

i. In paragraph (c)(4)(ii), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

j. In paragraph (c)(4)(iii), the phrase "Class A or B poisons" is removed and replaced with the phrase "Division 2.3 (poisonous gas) or Division 6.1 (poisonous) materials".

k. In paragraphs (g)(2) introductory text and (g)(3)(i), the references "§ 173.103(d)" and "§ 173.66", respectively, are removed and replaced with the reference "§ 173.63".

l. In paragraph (g)(2)(ii), the phrase "24 inches" is removed and replaced with the phrase "61 cm (24 inches)".

m. In paragraph (h), the phrase "other than as defined in § 173.53(e) of this subchapter," is removed.

n. In paragraph (k), the phrase "other than as defined in § 173.53(e) of this chapter," is removed.

o. In paragraph (m), the phrase "as defined in § 173.53(e) of this subchapter," is removed.

p. In paragraph (k), the phrase "990 quarts" is removed and replaced with the phrase "950 liters (225 gallons)"; the phrase "10 quarts" is removed and replaced with the phrase "9.5 liters (2.5 gallons)"; and the phrase "7,500 pounds" is removed and replaced with the phrase "3,400 kg (7,496 pounds)".

§ 177.836 [Amended]

282. In § 177.836, the designation is removed from paragraph (a) and the word "explosive" is removed and replaced with the phrase "Class 1 (explosive) material".

§ 177.837 [Amended]

283. In § 177.837, the following changes are made:

a. In the section heading, the phrase "Flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

b. In paragraph (b), the phrase "flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

c. In paragraphs (a) and (b), the phrase "flammable liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) material".

d. Paragraph (d) is removed and paragraph (e) is redesignated as paragraph (d).

e. In newly designated paragraph (d) introductory text, the phrase "flammable liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) material".

284. In § 177.838, the section heading is revised and a new paragraph (h) is added to read as follows:

§ 177.838 Class 4 (flammable solid) materials, Class 5 (oxidizing) materials, and Division 4.2 (pyroforic liquid) materials.

* * * * *

(h) Division 4.2 (pyroforic liquid) materials in cylinders. Cylinders containing Division 4.2 (pyroforic liquid) materials, unless packed in a strong box or case and secured therein to protect valves, must be loaded with all valves and safety relief devices in the vapor space. All cylinders must be secured so that no shifting occurs in transit.

§ 177.838 [Amended]

285–286. In § 177.838, the following changes are made:

a. In paragraphs (a) and (b), the phrase "flammable solids or oxidizing materials" is removed and replaced with the phrase "Class 4 (flammable solid) or Class 5 (oxidizing) materials" each place it appears.

b. In paragraph (c), the phrase "4 inches wide" is removed and replaced with the phrase "10 cm (3.9 inches) wide" and the phrase "6 inches" is removed and replaced with the phrase "15 cm (5.9 inches)".

c. In paragraph (e)(2), the phrase "Flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

d. In paragraph (f), the phrase "listed in § 173.182(b) of this subchapter" is removed.

e. In paragraph (g), the phrase "not exceeding 100 pounds" is removed and replaced with the phrase "not exceeding 45 kg (100 pounds)", the phrase "flammable solid" is removed and replaced with the phrase "Class 4 (flammable solid) material", the phrase "not exceed 8 pounds" is removed and replaced with the phrase "not exceed 3.6 kg (7.9 pounds)", the phrase "DOT-

12A65, 12B65, or 12H65 fiberboard boxes" is removed and replaced with the phrase "UN 4G fiberboard boxes", and the phrase "not exceed 16 pounds" is removed and replaced with the phrase "not exceed 7.26 kg (16 pounds)".

§ 177.839 [Amended]

287. In § 177.839, the following changes are made:

a. In the section heading and paragraphs (b) and (d), the phrases "Corrosive liquids", "corrosive liquids", "corrosives", and "Corrosives" are removed and replaced with the phrase "Class 8 (corrosive) materials" each place they appear.

b. In paragraph (a), the phrases "carboy or other" and "carboys or other" are removed.

c. In paragraph (b), the phrases "Carboys and", "carboys and", and "carboys or" are removed.

d. In paragraphs (a) and (b), the word "container" is removed and replaced with the word "packaging".

e. In paragraphs (a) and (b), the word "containers" is removed and replaced with the word "packagings".

§ 177.840 [Amended]

288. In § 177.840, the following changes are made:

a. In the section heading, the phrase "Compressed gases" is removed and replaced with the phrase "Class 2 (gases) materials".

b. In paragraphs (a) introductory text, (a)(1), and (b) introductory text, the phrase "compressed gases" is removed and replaced with the phrase "Class 2 (gases) materials".

c. In paragraph (d), the phrase "flammable compressed gas" is removed and replaced with the phrase "Division 2.1 (flammable gas) material".

d. In paragraphs (h) introductory text, (i), and (j) introductory text, the phrase "flammable cryogenic liquid" is removed and replaced with the phrase "Division 2.1 (flammable gas) material that is a cryogenic liquid".

e. In paragraph (h) introductory text, the phrase "exceeding 125 gallons" is removed and replaced with the phrase "exceeding 450 liters (119 gallons)".

289. In § 177.841, the section heading and paragraph (e) are revised to read as follows:

§ 177.841 Division 6.1 (poisonous) and Division 2.3 (poisonous gas) materials.

* * * * *

(e) A motor carrier may not transport a package:

(1) Bearing a POISON label in the same motor vehicle with material that is marked as or known to be foodstuffs, feed or any edible material intended for consumption by humans or animals unless the inside package is overpacked in a liquid-tight and dust-proof container identified as package 4000 in the National Motor Freight Classification 100–I or when overpacked in a metal drum as specified in § 173.25(c) of this subchapter;

(2) Bearing or required to bear a POISON or POISON GAS label in the driver's compartment (including a sleeper berth) of a motor vehicle; or

(3) Bearing a KEEP AWAY FROM FOOD label with materials marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals unless the package bearing the KEEP AWAY FROM FOOD label is separated as required in § 177.848(e)(3) for classes identified with the letter "O" in the Segregation Table for Hazardous Materials.

§ 177.841 [Amended]

290. In § 177.841, the following changes are made:

a. Paragraph (a)(1) is removed, the text in paragraph (a)(2) is added as the last sentence in paragraph (a) introductory text, and the designation (a)(2) is removed.

b. Paragraph (b) is removed and reserved.

c. In paragraph (c) heading, the phrase "Class A poisons or irritating materials" is removed and replaced with the phrase "Division 2.3 (poisonous gas) or Division 6.1 (poisonous) materials".

d. In paragraph (c), the phrase "Class A poison or an irritating material" is removed and replaced with the phrase "Division 2.3 (poisonous gas) or Division 6.1 (poisonous) material".

e. In paragraph (d) heading and introductory text, the words "Poisons" and "poisons" are removed and replaced with the phrase "Division 6.1 (poisonous) materials".

§ 177.842 [Amended]

291. In § 177.842, the following changes are made:

a. In the section heading, the phrase "Radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

b. In paragraphs (b) and (f), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material" each place it appears.

c. In paragraphs (a) and (e), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

d. In paragraph (f), the phrase "at least 20 feet" is removed and replaced with the phrase "at least 6 m (20 feet)".

§ 177.843 [Amended]

292. In § 177.843, the following changes are made:

a. In paragraph (a), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In paragraphs (b) and (c), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

c. In paragraph (b), the phrase "3 feet" is removed and replaced with the phrase "1 m (3 feet)", and the phrase "3 inches high" is removed and replaced with the phrase "7.5 cm (3 inches) high".

293. In § 177.844, the section heading is revised to read as follows:

§ 117.844 Class 9 (miscellaneous hazardous) materials.

§ 177.844 [Amended]

294. In § 177.844, the reference "§ 173.1090" is removed and replaced with the reference "§ 173.216".

295. Section 177.848 is revised to read as follows:

§ 177.848 Segregation of hazardous materials.

(a) This section applies to materials which meet one or more of the hazard classes defined in this subchapter and are:

(1) In packages which require labels in accordance with part 172 of this subchapter;

(2) In a compartment within a multi-compartmented cargo tank subject to the restrictions in § 173.33 of this subchapter; or

(3) In a portable tank loaded in a transport vehicle or freight container.

(b) When a transport vehicle is to be transported by vessel, other than a ferry vessel, hazardous materials on or within that vehicle must be stowed and segregated in accordance with § 171.12 of this subchapter.

(c) In addition to the provisions of paragraph (d) of this section, cyanides or cyanide mixtures may not be loaded or stored with acids.

(d) Hazardous materials may not be loaded, transported, or stored together, except as provided in this section, and in accordance with the following Table:

SEGREGATION TABLE FOR HAZARDOUS MATERIALS

Class or division	Notes	1.1 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas Zone A	2.3 gas other than Zone A	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG 1 Zone A	7	8 liquids only
Explosives, 1.1 and 1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives, 1.3		*	*	*	*	*	X		X	X	X	*	X	X	X	X	X		X
Explosives, 1.4		*	*	*	*	*	0		0	0	0		0				0		0
Very insensitive explosives, 1.5		*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives, 1.6.		*	*	*	*	*													
Flammable gases, 2.1		X	X	0	X				X	0			0	0	0	0	0	0	0
Non-toxic, non-flammable gases, 2.2.		X			X														
Poisonous gas Zone A, 2.3		X	X	0	X		X				X	X	X	X	X	X			X
Poisonous as other than Zone A, 2.3.		X	X	0	X		0				0	0	0	0	0	0			0
Flammable liquids, 3	B	X	X	0	X				X	0		0	0	0	0	0	X		
Flammable solids, 4.1	B	X			X				X	0	0						X		0
Spontaneously combustible materials, 4.2.		X	X	0	X		0		X	0	0						X		X
Dangerous when wet materials, 4.3.		X	X		X		0		X	0	0						X		X
Oxidizers, 5.1	A, B	X	X		X		0		X	0	0						X		0
Organic peroxides, 5.2	B	X	X		X		0		X	0	0						X		0
Poisonous liquids PG I zone A. 6.1.		X	X	0	X		0				X	X	X	X	X	X			X
Radioactive materials, 7		X			X		0												
Corrosive liquids, 8	B	X	X	0	X		0		X	0		0	X	X	0	0	X		

(e) Instructions for using the segregation table for hazardous materials are as follows:

(1) The absence of any hazard class or division or a blank space in the Table indicates that no restrictions apply.

(2) The letter "X" in the Table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation.

(3) The letter "O" in the Table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation, unless separated by a distance of 1.2 m (4 feet) in all directions, or separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur. Notwithstanding the methods of separation employed, Class 8 (corrosive) liquid materials may not be loaded above Class 4 (flammable solid) materials or Class 5 (oxidizing) materials.

(4) The "*" in the Table indicates that segregation among different Class 1 (explosive) materials is governed by the compatibility table in paragraph (f) of this section.

(5) The notes in the second column of the Table mean the following:

(i) "A" means that, notwithstanding the requirements of the letter "X", ammonium nitrate fertilizer may be loaded or stored with Division 1.1 (Class A explosive) materials.

(ii) "B" means that, in addition to the requirements of the letter "O", those materials may not be loaded and transported together unless, for each class or division, packages are separately palletized at a minimum height of 10 cm (3.9 inches) off the floor of the transport vehicle, or are separated in a manner that, in the event of leakage under conditions normally incident to transportation, commingling of hazardous materials would not occur.

(6) When the § 172.101 Table or § 172.402 of this subchapter requires a package to bear a subsidiary hazard label, segregation appropriate to the subsidiary hazard must be applied when that segregation is more restrictive than that required by the primary hazard. However, hazardous materials of the same class may be stowed together without regard to segregation required any secondary hazard if the materials are not capable of reacting dangerously with each other and causing combustion or dangerous evolution of heat, evolution of flammable, poisonous, or asphyxiant gases, or formation of corrosive or unstable materials.

(f) Class 1 (explosive) materials shall not be loaded, transported, or stored together, except as provided in this section, and in accordance with the following Table:

COMPATIBILITY TABLE FOR CLASS 1 (EXPLOSIVE) MATERIALS

Compatibility Group	A	B	C	D	E	F	G	H	J	K	L	N	S
A		X	X	X	X	X	X	X	X	X	X	X	X
B	X		X	X	X	X	X	X	X	X	X	X	
C	X	X		2	2	X	X	X	X	X	X	3	
D	X	X	2		2	X	X	X	X	X	X	3	
E	X	X	2	2		X	X	X	X	X	X	3	
F	X	X	X	X	X		X	X	X	X	X	X	
G	X	X	X	X	X	X		X	X	X	X	X	
H	X	X	X	X	X	X	X		X	X	X	X	
J	X	X	X	X	X	X	X	X		X	X	X	
K	X	X	X	X	X	X	X	X	X		X	X	

COMPATIBILITY TABLE FOR CLASS 1 (EXPLOSIVE) MATERIALS—Continued

Compatibility Group	A	B	C	D	E	F	G	H	J	K	L	N	S
L	X	X	X	X	X	X	X	X	X	X	1	X	X
N	X	X	3	3	3	X	X	X	X	X	X		
S	X	⅓	⅓	⅓	⅓	⅓	⅓	⅓	⅓	⅓	X	⅓	

(g) Instructions for using the compatibility table for Class 1 (explosive) materials are as follows:

(1) A blank space in the Table indicates that no restrictions apply.

(2) The letter "X" in the Table indicates that explosives of different compatibility groups may not be carried on the same transport vehicle.

(3) The numbers in the Table mean the following:

(i) "1" means an explosive from compatibility group L shall only be carried on the same transport vehicle with an identical explosive.

(ii) "2" means any combination of explosives from compatibility groups C, D, or E is assigned to compatibility group E.

(iii) "3" means any combination of explosives from compatibility groups C, D, or E with those in compatibility group N is assigned to compatibility group D.

(iv) "4" means § 177.835(g) when transporting detonators.

(v) "5" means Division 1.4S fireworks may not be loaded on the same transport vehicle with Division 1.1 or 1.2 (Class A explosive) materials.

(h) Except as provided in paragraph (i) of this section, explosives of the same compatibility group but of different divisions may be transported together provided that the whole shipment is transported as though its entire contents were of the lower division. For example, a mixed shipment of Division 1.2 (Class A explosive) materials and Division 1.4 (Class C explosive) materials, both of compatibility group D, must be transported as Division 1.2 (Class A explosive) materials.

(i) When Division 1.5 (blasting agent) materials, compatibility group D, are transported in the same freight container as Division 1.2 (Class A explosive) materials, compatibility group D, the shipment must be transported as Division 1.1 (Class A explosive) materials, compatibility group D.

§ 177.853 [Amended]

296. In § 177.853, paragraph (c), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

§ 177.854 [Amended]

297. In § 177.854, the following changes are made:

a. In paragraph (f) introductory text, the phrase "flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases, or poisons" is removed and replaced with the phrase "Class 3 (flammable liquid), Class 4 (flammable solid), Class 5 (oxidizing), Class 8 (corrosive), Class 2 (gases), or Division 6.1 (poisonous) materials".

b. In paragraph (f)(1), the phrase "flammable liquids or flammable compressed gases and not transporting explosives, Class A, or Class B" is removed and replaced with the phrase "Class 3 (flammable liquid) or Division 2.1 (flammable gas) materials and not transporting Division 1.1, 1.2, or 1.3 (Class A or B explosive) materials".

c. In paragraph (f)(2), the phrase "flammable liquids or flammable compressed gases" is removed and replaced with the phrase "Class 3 (flammable liquid) or Division 2.1 (flammable gas) materials", and the phrase "explosives Class A or Class B" is removed and replaced with the phrase "Division 1.1, 1.2, or 1.3 (explosive) materials"

d. In paragraph (g)(2)(iv), the phrase "explosives A or B, flammable liquids or flammable gases" is removed and replaced with the phrase "Division 1.1, 1.2, or 1.3 (Class A or B explosive), Class 3 (flammable liquid), or Division 2.1 (flammable gas) materials".

e. In paragraph (h), the phrase "flammable liquid or poisonous liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) or Division 6.1 (poisonous liquid) material".

§ 177.855 [Amended]

298. In § 177.855, the following changes are made:

a. In the section heading and paragraphs (a), (b), (c), and (f), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials" each place it appears.

b. In paragraphs (c) and (e), the word "Explosives" is removed and replaced with the phrase Class 1 (explosive) materials" both places it appears.

c. In paragraphs (a), (b), (c), and (f), the word "explosive" is removed and replaced with the phrase "Class 1 (explosive) material".

d. In paragraph (e), the phrase "200 feet" is removed and replaced with the phrase "61 m (200 feet)" both places it appears.

e. In paragraph (d), Note 1, the phrase "1 ounce" is removed and replaced with the phrase "30 g (1.1 ounce)"; the phrase "7½ fluid ounces" is removed and replaced with the phrase "222 ml (8 fluid ounces); the phrase "2 fluid ounces" is removed and replaced with the phrase "60 ml (2 fluidounces)"; and the phrase "3 fluid ounces" is removed and replaced with the phrase "90 ml (3 fluid ounces)".

§ 177.856 [Amended]

299. In § 177.856, the following changes are made:

a. In the section heading and paragraph (d), the phrase "flammable liquids" is removed and replaced with the phrase "Class 3 (flammable liquid) materials".

b. In paragraphs (a), (b), and (d), the phrase "flammable liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) material".

§ 177.857 [Amended]

300. In § 177.857, the following changes are made:

a. In the section heading and paragraph (b), the phrases "flammable solids and oxidizing materials" and "flammable solids or oxidizing materials" are removed and replaced with the phrases "Class 4 (flammable solid) and Class 5 (oxidizing) materials" and "Class 4 (flammable solid) or Class 5 (oxidizing) materials" respectively.

b. In paragraphs (a) and (c), the phrase "flammable solid or oxidizing material" is removed and replaced with the phrase "Class 4 (flammable solid) or Class 5 (oxidizing) material".

§ 177.858 [Amended]

301. In § 177.858, the following changes are made:

a. In the section heading and paragraph (a), the phrase "corrosive materials" is removed and replaced with the phrase "Class 8 (corrosive) materials".

b. In paragraphs (a) and (b)(2), the phrase "corrosive liquid" is removed

and replaced with the phrase "Class 8 (corrosive) material".

c. In paragraph (b) introductory text, the phrase "corrosive liquids" is removed and replaced with the phrase "Class 8 (corrosive) materials".

§ 177.859 [Amended]

302. In § 177.859, the following changes are made:

a. In the section heading, the phrase "compressed gases" is removed and replaced with the phrase "Class 2 (gases) materials".

b. In paragraph (a), the phrase "compressed gas" is removed and replaced with the phrase "Class 2 (gases) material".

c. In paragraph (b), the phrase "flammable gas" is removed and replaced with the phrase "Division 2.1 (flammable gas) material".

d. In paragraph (b), the phrase "flammable compressed gas" is removed and replaced with the phrase "Division 2.1 (flammable gas) material" each place it appears.

§ 177.860 [Amended]

303. In § 177.860, the following changes are made:

a. In the section heading, the word "poisons" is removed and replaced with the phrase "Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials".

b. In paragraph (a) introductory text, the phrase "any poison", is removed and replaced with the phrase "any Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials"; the phrase "poison, whether flammable or nonflammable" is removed and replaced with the phrase "Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials, whether flammable or non-flammable"; and the phrase "poison in powdered form" is removed and replaced with the phrase "Division 6.1 (poisonous) materials in powdered form".

c. In paragraph (a)(1), the phrase "poison (class A or B)" is removed and replaced with the phrase "Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials", and the phrase "such poisons" is removed and replaced with the phrase "such Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials".

d. In paragraph (b), the phrase "poison which is also flammable" is removed and replaced with the phrase "Division 6 1 (poisonous) or Division 2.3 (poisonous gas) material which is also flammable"; the phrase "flammable liquid" is removed and replaced with the phrase "Class 3 (flammable liquid) material"; the phrase "any poison" is removed and replaced with the phrase "any Division 6.1 (poisonous) or Division 2.3 (poisonous gas) material"; the phrase "compressed gas" is removed and replaced with the phrase "Class 2 (gases) material"; the phrase "flammable liquids and compressed gases" is removed and replaced with the phrase "Class 3 (flammable liquid) and Class 2 (gases) materials"; and the phrase "the poison" is removed and replaced with the phrase "the Division 6.1 (poisonous) or Division 2.3 (poisonous gas) material".

§ 177.861 [Amended]

304. In § 177.861, the following changes are made:

a. In the section heading, paragraph (a), and Note 2 of paragraph (a), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

b. In Note 1 of paragraph (a), the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

§ 177.870 [Amended]

305. In § 177.870, the following changes are made:

a. In paragraph (d), the phrase "100 pounds gross weight" is removed and replaced with the phrase "45 kg (99 pounds) gross weight", and the phrase "Class C explosives" is removed and replaced with the phrase "Division 1.4 (Class C explosive) materials".

b. In paragraph (e), the phrase "100 pounds" is removed and replaced with the phrase "45 kg (99.2 pounds)"; the phrase "500 pounds" is removed and replaced with the phrase "225 kg (496 pounds)"; and the phrase "250 pounds" is removed and replaced with the phrase "113 kg (250 pounds)".

c. In paragraph (c), the word "Explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

d. In paragraphs (b), (d), and (e), the word "explosives" is removed and replaced with the phrase "Class 1 (explosive) materials".

e. In paragraph (c), the word "explosive" is removed and replaced with the phrase "Class 1 (explosive) material".

f. In paragraph (f), the word "Poisons" is removed and replaced with the phrase "Division 6.1 (poisonous) or Division 2.3 (poisonous gas) materials"; the phrase "poison, class A, any tear gas or irritating substance, class C, any less dangerous poison, class B, which is a liquid" is removed and replaced with the phrase "Division 6.1 (poisonous) or Division 2.3 (poisonous gas) material"; the phrase "poison, class B" is removed and replaced with the phrase "Division 6.1 (poisonous) material"; and the phrase "100 pounds" is removed and replaced with the phrase "45 kg (99 pounds)".

g. In paragraph (g), the phrase "Radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials".

h. In paragraph (g), the phrase "radioactive materials" is removed and replaced with the phrase "Class 7 (radioactive) materials", and the phrase "radioactive material" is removed and replaced with the phrase "Class 7 (radioactive) material".

PART 178—[AMENDED]

306. The authority citation for part 178 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1806, 1808; 49 CFR part 1, unless otherwise noted.

PART 178—SPECIFICATIONS FOR PACKAGINGS

307. The title to part 178 is revised to read as set forth above:

Subpart A [Removed and Reserved]

308. Subpart A of part 178 is removed and reserved.

§ 178.0 [Removed]

309. Section 178.0, consisting of a title, is removed.

§ 178.0–1 [Redesignated as § 178.1]

310. Section 178.0.1 is redesignated as § 178.1.

§ 178.0–2 [Redesignated as § 178.2]

311. Section 178.0–2 is redesignated as § 178.2 and is revised to read as follows:

§ 178.2 Applicability and manufacturers' responsibility.

(a) Applicability. Any person who performs a function prescribed in this part shall perform that function in accordance with this part.

(b) Specification markings. When this part requires that a packaging be marked with a DOT specification or U.N. standard marking (for example, DOT–3AL 1800–1234–XY, UN 1A1/Y1.4/150/85) compliance with that requirement is the responsibility of the manufacturer (as defined in § 171.8 of this subchapter) of the packaging. Except as otherwise provided in this section, marking of the packaging by the manufacturer with the appropriate DOT or UN markings is the certification by the manufacturer that—

(1) All requirements of the DOT specification or the UN standard, including performance tests, are met; and

(2) All functions performed by the manufacturer conform to requirements specified in this part.

(c) Notification. Except as specifically provided in §§ 178.337–18 and 178.345–10 of this part, the manufacturer and each subsequent distributor of a packaging shall:

(1) Notify in writing each person to whom that packaging is transferred—

(i) Of all requirements in this part not met at the time of transfer, and

(ii) Of the type and dimensions of any closures needed to satisfy performance test requirements.

(2) Retain copies of each written notification for at least one year from date of issuance; and

(3) Make copies of all written notifications available for inspection by a representative of the Department.

(d) Except as provided in paragraph (c) of this section, a packaging not conforming to the applicable specifications or standards in this part may not be marked to indicate such conformance.

§ 178.0–3 [Redesignated as § 178.3]

312. Section 178.0–3 is redesignated as § 178.3 and is revised to read as follows:

§ 178.3 Marking of packagings.

(a) Each packaging manufactured to a DOT specification or a UN standard shall be marked as follows:

(1) In an unobstructed area, with letters, and numerals identifying the standards or specification (e.g. UN 1A1, DOT 4B240ET, etc.).

(2) Unless otherwise specified in this part, with the name and address or symbol of the manufacturer, or, for a UN standard packaging, the approval agency certifying compliance with the UN standard. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety. Duplicative symbols are not authorized.

(3) The markings must be stamped, embossed, burned, printed or otherwise marked on the packaging to provide adequate accessibility, permanency, contrast, and legibility so as to be readily apparent and understood.

(4) Unless otherwise specified, letters and numerals must be at least 12.0 mm (0.47 inches) in height except that for packagings of less than or equal to 30 L (7.9 gallons) capacity for liquids or 30 kg (66 pounds) capacity for solids the height must be at least 6.0 mm (0.2 inches).

(b) Packagings may be marked with the United Nations symbol and packaging identification code as provided in this subchapter, in the ICAO Technical Instructions or in Annex 1 to the IMDG Code, provided the person applying these marks has established that the packaging conforms to the applicable provisions of this subchapter, the ICAO Technical Instructions or Annex 1 to the IMDG Code, respectively.

(1) If an indication of the State in whose territory the specified tests are carried out, or of the State authorizing the allocation of the mark, is required by this part (see § 178.503 of this part), the letters "USA" shall be used if the manufacturing and testing occurs in the United States.

(2) If an indication of the name of the manufacturer or other identification of the packaging as specified by the competent authority is required, the name and address or symbol of the person making the mark shall be entered. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety. Duplicate symbols are not authorized.

(3) Packagings manufactured to UN standards in accordance with this subchapter shall be marked as prescribed in § 178.503 of this part.

Subpart B [Amended]

313. In subpart B, §§ 178.34 through 178.34–3 are redesignated as §§ 178.360 through 178.360–3, respectively, and transferred to subpart K. Sections 178.21 through 178.32–4 and §§ 178.35 through 178.35a–4 are removed.

314. The title of § 178.33 is revised to read as follows:

§ 178.33 Specification 2P; inner nonrefillable metal receptacles.

315. The title of § 178.33a is revised to read as follows:

§ 178.33a Specification 2Q; inner nonrefillable metal receptacles.

Subpart D [Amended]

316. In subpart D, §§ 178.103 through 178.103–6, §§ 178.104 through 178.104–5, §§ 178.120 through 178.120–5, and §§ 178.121 through 178.121–6 are redesignated as §§ 178.352 through 178.352–6, §§ 178.354 through 178.354–5, §§ 178.356 through 178.356–5, and §§ 178.358 through 178.358–6, respectively, and transferred to subpart K. Subpart D is removed and reserved.

Subpart E [Amended]

317. In subpart E, §§ 178.194 through 178.194–7 and §§ 178.195 through 178.195–6 are redesignated as §§ 178.362 through 178.362–7 and §§ 178.364 through 178.364–6, respectively, and transferred to subpart K. Subpart E is removed and reserved.

Subparts F and G [Removed and Reserved]

318. Subparts F and G are removed and reserved.

Subpart H—Specifications for Portable Tanks

319. In § 178.270–11, paragraphs (c) (1) and (2) are revised to read as follows:

§ 178.270–11 Pressure and vacuum relief devices.

* * * * *

(c) *Pressure settings of relief devices*—(1) *Primary pressure relief devices.* The primary relief device required by paragraph (a) of this section must be set to function in the range of—

(i) No less than 67 percent and no greater than 83 percent of test pressure for tanks hydrostatically tested under § 178.270–13(a) of this subpart at a gauge pressure below 455 kPa (66 psi). Spring-loaded pressure relief valves must close after discharge at a pressure not less than 80 percent of start-to-discharge pressure.

(ii) No less than 67 percent and no greater than 74 percent of test pressure for tanks hydrostatically tested under § 178.270–13(a) of this subpart at a gauge pressure of 455 kPa (66 psi) or higher. Spring-loaded pressure relief valves must close after discharge at a pressure not less than 90 percent of start to discharge pressure.

(2) *Emergency pressure relief devices.* Each frangible disc, other than one used as a primary relief device in accordance with paragraph (b)(2) of this section, must be designed to burst at a pressure greater than 83 percent of and less than or equal to tank hydrostatic test pressure. Each spring-loaded pressure relief valve used as an emergency pressure relief device must be set to operate at no less than 83 percent of hydrostatic test pressure and be fully open at test pressure.

* * * * *

Subpart K—Specifications for Packagings for Class 7 (Radioactive) Materials

320. The title to subpart K is revised to read as set forth above.

321. Subparts L and M are added to read as follows:

Subpart L—Non-bulk Performance-oriented Packaging Standards

Sec.

178.500 Purpose, scope and definitions.
178.502 Identification codes for packagings.
178.503 Marking of packagings.
178.504 Standards for steel drums.
178.505 Standards for aluminum drums.

Sec.

178.508 Standards for metal drums other than steel or aluminum.
178.507 Standards for plywood drums.
178.508 Standards for fiber drums.
178.509 Standards for plastic drums and jerricans.
178.510 Standards for wooden barrels.
178.511 Standards for steel jerricans.
178.512 Standards for steel or aluminum boxes.
178.513 Standards for boxes of natural wood.
178.514 Standards for plywood boxes.
178.515 Standards for reconstituted wood boxes.
178.516 Standards for fiberboard boxes.
178.517 Standards for plastic boxes.
178.518 Standards for woven plastic bags.
178.519 Standards for plastic film bags.
178.520 Standards for textile bags.
178.521 Standards for paper bags.
178.522 Standards for composite packagings with inner plastic receptacles.
178.523 Standards for composite packagings with inner glass, porcelain, or stoneware receptacles.

Subpart M—Testing of Non-bulk Packagings and Packages

178.600 Purpose and scope.
178.601 General requirements.
178.602 Preparation of packagings and packages for testing.
178.603 Drop test.
178.604 Leakproofness test.
178.605 Hydrostatic pressure test.
178.606 Stacking test.
178.607 Cooperage test for bung-type wooden barrels.
178.608 Vibration standard.
178.609 Test requirements for packagings for infectious substances (etiologic agents).

Subpart L—Non-bulk Performance-oriented Packaging Standards

§ 178.500 Purpose, scope and definitions.

(a) This subpart prescribes certain requirements for non-bulk packagings for hazardous materials. Standards for these packagings are based on the UN Recommendations.

(b) Terms used in this subpart are defined in § 171.8 of this subchapter.

§ 178.502 Identification codes for packagings.

(a) Identification codes for designating types of packagings consist of the following:

(1) A numeral indicating the type of packaging, as follows:

(i) "1" means a drum.
(ii) "2" means a wooden barrel.
(iii) "3" means a jerrican.
(iv) "4" means a box.
(v) "5" means a bag.
(vi) "6" means a composite packaging.
(vii) "7" means a pressure receptacle.

(2) A capital letter indicating the material of construction, as follows:

(i) "A" means steel (all types and surface treatments).
(ii) "B" means aluminum.
(iii) "C" means natural wood.
(iv) "D" means plywood.
(v) "F" means reconstituted wood.
(vi) "G" means fiberboard.
(vii) "H" means plastic.
(viii) "L" means textile.
(ix) "M" means paper, multi-wall.
(x) "N" means metal (other than steel or aluminum).
(xi) "P" means glass, porcelain or stoneware.

(3) A numeral indicating the category of packaging within the type to which the packaging belongs. For example, for steel drums ("1A"), "1" indicates a non-removable head drum (i.e., "1A1") and "2" indicates a removable head drum (i.e., "1A2").

(b) For composite packagings, two capital letters are used in sequence in the second position of the code, the first indicating the material of the inner receptacle and the second, that of the outer packaging. For example, a plastic receptacle in a steel drum is designated "6HA1".

(c) For combination packagings, only the code number for the outer packaging is used.

(d) Identification codes are set forth in the standards for packagings in §§ 178.504 through 178.523 of this subpart.

§ 178.503 Marking of packagings.

(a) The manufacturer shall mark every package that is required to conform to a UN standard of this subpart in a durable and clearly visible manner, with the following information and in the sequence presented:

(1) The United Nations symbol as illustrated in paragraph (d) of this section (for metal receptacles, the letters UN may be applied in place of the symbol);

(2) A packaging identification code designating the type of packaging, the material of construction and, when appropriate, the category of packaging under § § 178.504 through 178.523 of this subpart within the type to which the packaging belongs. The letter "W" must follow the packaging identification code on packagings when required by an approval under the provisions of § 178.601(h) of this part;

(3) A letter identifying the performance standard under which the packaging design type has been successfully tested, as follows:

(i) X—for packagings meeting Packing Group I, II and III tests;

(ii) Y—for packagings meeting Packing Group II and III tests; or

(iii) Z—for packagings only meeting Packing Group III tests;

(4) A designation of the specific gravity or mass for which the packaging design type has been tested, as follows:

(i) For packagings without inner packagings intended to contain liquids, the designation shall be the specific gravity rounded down to the first decimal but may be omitted when the specific gravity does not exceed 1.2; and

(ii) For packagings intended to contain solids or inner packagings, the designation shall be the maximum gross mass in kilograms;

(5)(i) For single and composite packagings intended to contain liquids, the test pressure in kilopascals rounded off to the nearest 10 kPa of the hydrostatic pressure test that the packaging design type has successfully passed;

(ii) For packagings intended to contain solids or inner packagings, the letter "S";

(6) The last two digits of the year of manufacture. Packagings of types 1H and 3H shall also be marked with the month of manufacture in any appropriate manner; this may be marked on the packaging in a different place from the remainder of the markings;

(7) The letters "USA" (indicating that the packaging was marked pursuant to the provisions of this subchapter);

(8) The name and address or symbol of the manufacturer or the approval agency certifying compliance with the UN standard. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety;

(9) For a packaging tested in accordance with § 178.601(g) (2) of this part, the letters "SP"; and

(10) For metal or plastic drums or jerricans intended for reuse as single packagings or the outer packagings of a composite packaging, the minimum thickness of the packaging material, expressed in millimeters and abbreviated "mm".

(b) For a packaging with a removable head, the markings may not be applied to the removable head.

(c) If a package is reconditioned, it shall be marked by the reconditioner near the marks required in paragraphs (a) (1) through (8) of this section with the following additional information:

(1) The name of the country in which the reconditioning was performed (in the United States, use the letters "USA");

(2) The name and address or symbol of the reconditioner. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety;

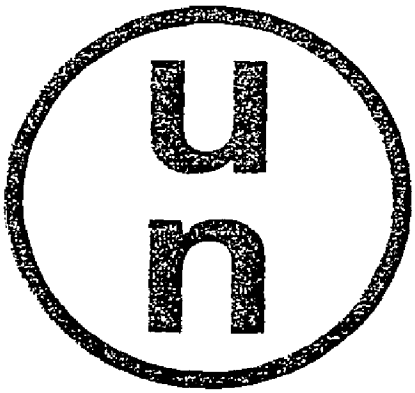
(3) The month and last two digits of the year of reconditioning;

(4) The letter "R"; and

(5) For every packaging successfully passing a leakproofness test, the additional letter "L".

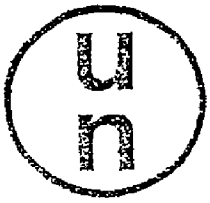
(d) The following are examples of symbols and required markings:

(1) The United Nations symbol is:



(2) Examples of markings for a new packaging are as follows:

(i) For a fiberboard box designed to contain an inner packaging:



4G/Y145/S/83

USA/RA

(as in § 178.503 (a)(1) through (a)(6) of this subpart).

(ii) For a steel drum designed to contain liquids:

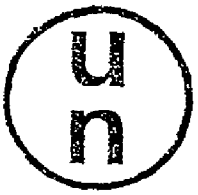
1A1/Y1.4/150/83

USA/VL824

1MM

(as in § 178.503 (a)(1) through (a)(10) of this subpart).

(iii) For a steel drum to transport solids or inner packagings:



1A2/Y150/S/83

USA/VL825

(as in § 178.503 (a)(1) through (a)(8) of this subpart).

(3) Examples of markings for reconditioned packagings are as follows:

1A1/Y1.4/150/83

USA/VL824 1mm

USA/RB/10-85RL

(as in § 178.503(c) (1), (2), (3), (4), and (5)).

§ 178.504 Standards for steel drums.

(a) The following are identification codes for steel drums:

(1) 1A1 for a non-removable head steel drum; and

(2) 1A2 for a removable head steel drum.

(b) Construction requirements for steel drums are as follows:

(1) Body and heads must be constructed of steel sheet of suitable type and adequate thickness in relation to the capacity and intended use of the drum. Minimum thickness and marking requirements in §§ 173.28(b)(4) and 178.503(a)(10) of this subchapter apply to drums intended for reuse.

(2) Body seams must be welded on drums designed to contain more than 40 L (11 gallons) of liquids. Body seams must be mechanically seamed or welded on drums intended to contain only solids or 40 L (11 gallons) or less of liquids.

(3) Chimes must be mechanically seamed or welded. Separate reinforcing rings may be applied.

(4) The body of a drum of a capacity greater than 60 L (16 gallons) must have at least either two expanded rolling hoops or two separate rolling hoops. If there are separate rolling hoops, they must be fitted tightly on the body and so secured that they cannot shift. Rolling hoops may not be spot-welded.

(5) Openings for filling, emptying and venting in the bodies or heads of non-removable head (1A1) drums may not exceed 7.0 cm (3 inches) in diameter. Drums with larger openings are considered to be of the removable head type (1A2). Closures for openings in the bodies and heads of drums must be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges must be mechanically seamed or welded in place. Gaskets or other sealing elements must be used with closures unless the closure is inherently leakproof.

(6) Closure devices for removable head drums must be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of transport. Gaskets or other sealing elements must be used with all removable heads.

(7) If materials used for body, heads, closures, and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments must be applied. These coatings or treatments must retain their protective properties under normal conditions of transport.

(8) Maximum capacity of drum: 450 L (119 gallons).

(9) Maximum net mass: 400 kg (882 pounds).

§ 178.505 Standards for aluminum drums.

(a) The following are the identification codes for aluminum drums:

(1) 1B1 for a non-removable head aluminum drum; and

(2) 1B2 for a removable head aluminum drum.

(b) Construction requirements for aluminum drums are as follows:

(1) Body and heads must be constructed of aluminum at least 99 percent pure or an aluminum base alloy. Material must be of suitable type and adequate thickness in relation to the capacity and the intended use of the drum. Minimum thickness and marking requirements in §§ 173.28(b)(4) and 178.503(a)(10) of this subchapter apply to drums intended for reuse.

(2) All seams must be welded. Chime seams, if any, must be reinforced by the application of separate reinforcing rings.

(3) The body of a drum of a capacity greater than 60 L (16 gallons) must have at least either two expanded rolling hoops or two separate rolling hoops. If there are separate rolling hoops, the hoops must be fitted tightly on the body and so secured that they cannot shift. Rolling hoops may not be spot-welded.

(4) Openings for filling, emptying, or venting in the bodies or heads of non-removable head (1B1) drums may not exceed 7.0 cm (3 inches) in diameter.

type (1B2). Closures for openings in the bodies and heads of drums must be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges must be welded in place so that the weld provides a leakproof seam. Gaskets or other sealing elements must be used with closures unless the closure is inherently leakproof.

(5) Closure devices for removable head drums must be so designed and applied that they remain secure and drums remain leakproof under normal conditions of transport. Gaskets or other sealing elements must be used with all removable heads.

(6) Maximum capacity of drum: 450 L (119 gallons).

(7) Maximum net mass: 400 kg (882 pounds).

§ 178.506 Standards for metal drums other than steel or aluminum.

(a) The following are the identification codes for metal drums other than steel or aluminum:

(1) 1N1 for a non-removable head metal drum; and

(2) 1N2 for a removable head metal drum.

(b) Construction requirements for metal drums other than steel or aluminum are as follows:

(1) Body and heads must be constructed of metal (other than steel or aluminum) of suitable type and adequate thickness in relation to the capacity and the intended use of the drum. Minimum thickness and marking requirements in §§ 178.28(b)(4) and 178.503(a)(10) of this subchapter apply to drums intended for reuse.

(2) All seams must be welded. Chime seams, if any, must be reinforced by the application of separate reinforcing rings.

(3) The body of a drum of a capacity greater than 60 L (16 gallons) must have at least either two expanded rolling hoops or two separate rolling hoops. If there are separate rolling hoops, the hoops must be fitted tightly on the body and so secured that they cannot shift. Rolling hoops may not be spot-welded.

(4) Openings for filling, emptying, or venting in the bodies or heads of non-removable head (1N1) drums may not exceed 7.0 cm (3 inches) in diameter. Drums with larger openings are considered to be of the removable head type (1N2). Closures for openings in the bodies and heads of drums must be so designed and applied that they will remain secure and leakproof under normal conditions of transport. Closure flanges must be welded in place so that the weld provides a leakproof seam. Gaskets or other sealing elements must be used with closures unless the closure is inherently leakproof.

(5) Closure devices for removable head drums must be so designed and applied that they remain secure and drums remain leakproof under normal conditions of transport. Gaskets or other sealing elements must be used with all removable heads.

(6) Maximum capacity of drum: 450 L (119 gallons).

(7) Maximum net mass: 400 kg (882 pounds).

§ 178.507 Standards for plywood drums.

(a) The identification code for a plywood drum is 1D.

(b) Construction requirements for plywood drums are as follows:

(1) The wood used must be well-seasoned, commercially dry and free from any defect likely to lessen the effectiveness of the drum for the purpose intended. A material other than plywood, of at least equivalent strength and durability, may be used for the manufacture of the heads.

(2) At least two-ply plywood must be used for the body and at least three-ply plywood for the heads; the plies must be firmly glued together, with their grains crosswise.

(3) The body and heads of the drum and their joints must be of a design appropriate to the capacity of the drum and its intended use.

(4) In order to prevent sifting of the contents, lids must be lined with kraft paper or some other equivalent material which must be securely fastened to the lid and extend to the outside along its full circumference.

(5) Maximum capacity of drum: 250 L (66 gallons).

(6) Maximum net mass: 400 kg (882 pounds).

§ 178.508 Standards for fiber drums.

(a) The identification code for a fiber drum is 1G.

(b) Construction requirements for fiber drums are as follows:

(1) The body of the drum must be constructed of multiple plies of heavy paper or fiberboard (without corrugations) firmly glued or laminated together and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastic material, or similar materials.

(2) Heads must be of natural wood, fiberboard, metal, plywood or plastic material and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastic material, or similar material.

(3) The body and heads of the drum and their joints must be of a design appropriate to the capacity and intended use of the drum.

(4) The assembled packaging must be sufficiently water-resistant so as not to delaminate under normal conditions of transport.

(5) Maximum capacity of drum: 450 L (119 gallons).

(6) Maximum net mass: 400 kg (882 pounds).

§ 178.509 Standards for plastic drums and jerricans.

(a) The following are identification codes for plastic drums and jerricans:

(1) 1H1 for a non-removable head plastic drum;

(2) 1H2 for a removable head plastic drum;

(3) 3H1 for a non-removable head jerrican; and

(4) 3H2 for a removable head jerrican.

(b) Construction requirements for plastic drums and jerricans are as follows:

(1) The packaging must be manufactured from suitable plastic material and be of adequate strength in relation to its capacity and intended use. No used material other than production residues or regrind from the same manufacturing process may be used. The packaging must be adequately resistant to aging and to degradation caused either by the substance contained or by ultra-violet radiation. Any permeation of the substance contained may not constitute a danger under normal conditions of transport.

(2) If protection against ultra-violet radiation is required, it must be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives must be compatible with the contents and remain effective throughout the life of the packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the design type, retesting may be omitted if the carbon black content does not exceed 2 percent by mass or if the pigment content does not exceed 3 percent by mass; the content of inhibitors of ultra-violet radiation is not limited.

(3) Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastic material provided they do not adversely affect the chemical and physical properties of the packaging material.

(4) The wall thickness at every point of the packaging must be appropriate to its capacity and its intended use, taking into account the stresses to which each point is liable to be exposed. Minimum

thickness and marking requirements in §§ 173.28(b)(4) and 178.503(a)(10) of this subchapter apply to drums intended for reuse.

(5) Openings for filling, emptying and venting in the bodies or heads of non-removable head (1H1) drums and jerricans (3H1) may not exceed 7.0 cm (3 inches) in diameter. Drums and jerricans with larger openings are considered to be of the removable head type (1H2 and 3H2). Closures for openings in the bodies or heads of drums and jerricans must be so designed and applied that they remain secure and leakproof under normal conditions of transport. Gaskets or other sealing elements must be used with closures unless the closure is inherently leakproof.

(6) Closure devices for removable head drums and jerricans must be so designed and applied that they remain secure and leakproof under normal conditions of transport. Gaskets must be used with all removable heads unless the drum or jerrican design is such that when the removable head is properly secured, the drum or jerrican is inherently leakproof.

(7) Maximum capacity of drums and jerricans: 1H1, 1H2: 450 L (119 gallons); 3H1, 3H2: 60 L (16 gallons).

(8) Maximum net mass: 1H1, 1H2: 400 kg (882 pounds); 3H1, 3H2: 120 kg (265 pounds).

§ 178.510 Standards for wooden barrels.

(a) The following are identification codes for wooden barrels:

(1) 2C1 for a bung type wooden barrel; and

(2) 2C2 for a slack type (removable head) wooden barrel.

(b) Construction requirements for wooden barrels are as follows:

(1) The wood used must be of good quality, straight-grained, well-seasoned and free from knots, bark, rotten wood, sapwood or other defects likely to lessen the effectiveness of the barrel for the purpose intended.

(2) The body and heads must be of a design appropriate to the capacity and intended use of the barrel.

(3) Staves and heads must be sawn or cleft with the grain so that no annual ring extends over more than half the thickness of a stave or head.

(4) Barrel hoops must be of steel or iron of good quality. The hoops of 2C2 barrels may be of a suitable hardwood.

(5) For wooden barrels 2C1, the diameter of the bung-hole may not exceed half the width of the stave in which it is placed.

(6) For wooden barrels 2C2, heads must fit tightly into crozes.

(7) Maximum capacity of barrel: 250 L (66 gallons).

(8) Maximum net mass: 400 kg (882 pounds).

§ 178.511 Standards for steel jerricans.

(a) The following are identification codes for steel jerricans:

(1) 3A1 for a non-removable head jerrican; and

(2) 3A2 for a removable head jerrican.

(b) Construction requirements for steel jerricans are as follows:

(1) Body and heads must be constructed of steel sheet of suitable type and adequate thickness in relation to the capacity of the jerrican and intended use. Minimum thickness and marking requirements in §§ 173.28(b)(4) and 178.503(a)(10) of this subchapter apply to drums intended for reuse.

(2) Chimes of all jerricans must be mechanically seamed or welded. Body seams of jerricans intended to carry more than 40 L (11 gallons) of liquid must be welded. Body seams of jerricans intended to carry 40 L (11 gallons) or less must be mechanically seamed or welded.

(3) Openings in jerricans (3A1) may not exceed 7.0 cm (3 inches) in diameter. Jerricans with larger openings are considered to be of the removable head type. Closures must be so designed that they remain secure and leakproof under normal conditions of transport. Gaskets or other sealing elements must be used with closures, unless the closure is inherently leakproof.

(4) If materials used for body, heads, closures and fittings are not in themselves compatible with the contents to be transported, suitable internal protective coatings or treatments must be applied. These coatings or treatments must retain their protective properties under normal conditions of transport.

(5) Maximum capacity of jerrican: 60 L (16 gallons).

(6) Maximum net mass: 120 kg (265 pounds).

§ 178.512 Standards for steel or aluminum boxes.

(a) The following are identification codes for steel or aluminum boxes:

(1) 4A1 for an unlined and uncoated steel box;

(2) 4A2 for a steel box with inner liner or coating;

(3) 4B1 for an unlined and uncoated aluminum box; and

(4) 4B2 for an aluminum box with inner liner or coating.

(b) Construction requirements for steel or aluminum boxes are as follows:

(1) The strength of the metal and the construction of the box must be appropriate to the capacity and intended use of the box.

(2) Boxes 4A2 and 4B2 must be lined with fiberboard or felt packing pieces, as required, or must have an inner liner or coating of suitable material. If a double seamed metal liner is used, steps must be taken to prevent the ingress of substances, particularly explosives, into the recesses of the seams.

(3) Closures may be of any suitable type, and must remain secure under normal conditions of transport.

(4) Maximum net mass: 400 kg (882 pounds).

§ 178.513 Standards for boxes of natural wood.

(a) The following are the identification codes for boxes of natural wood:

(1) 4C1 for an ordinary box; and

(2) 4C2 for a box with sift-proof walls.

(b) Construction requirements for boxes of natural wood are as follows:

(1) The wood used must be well-seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the box. The strength of the material used and the method of construction must be appropriate to the capacity and intended use of the box. The tops and bottoms may be made of water-resistant reconstituted wood such as hard board, particle board or other suitable type.

(2) Each part of the 4C2 box must be one piece or equivalent. Parts are considered equivalent to one piece when one of the following methods of glued assembly is used: Linderman joint, tongue and groove joint, ship lap or rabbet joint, or butt joint with at least two corrugated metal fasteners at each joint.

(3) Maximum net mass: 400 kg (882 pounds).

§ 178.514 Standards for plywood boxes.

(a) The identification code for a plywood box is 4D.

(b) Construction requirements for plywood boxes are as follows:

(1) Plywood used must be at least 3 ply. It shall be made from well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the box. The strength of the material used and the method of construction must be appropriate to the capacity and intended use of the box. All adjacent plies must be glued with water-resistant adhesive. Other suitable materials may be used together with plywood in the construction of boxes. Boxes must be nailed or secured to corner posts or ends or assembled with other equally suitable devices.

(2) Maximum net mass: 400 kg (882 pounds).

§ 178.515 Standards for reconstituted wood boxes.

(a) The identification code for a reconstituted wood box is 4F.

(b) Construction requirements for reconstituted wood boxes are as follows:

(1) The walls of boxes must be made of water-resistant, reconstituted wood such as hardboard, particle board, or other suitable type. The strength of the material used and the method of construction must be appropriate to the capacity of the boxes and their intended use.

(2) Other parts of the box may be made of other suitable materials.

(3) Boxes must be securely assembled by means of suitable devices.

(4) Maximum net mass: 400 kg (882 pounds).

§ 178.516 Standards for fiberboard boxes.

(a) The identification code for a fiberboard box is 4G.

(b) Construction requirements for fiberboard boxes are as follows:

(1) Strong, solid or double-faced corrugated fiberboard (single or multi-wall) must be used, appropriate to the capacity and intended use of the box. The water resistance of the outer surface must be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g per square meter (0.0316 pounds per square foot)—see ISO International Standard 535–1976(E). Fiberboard must have proper bending qualities. Fiberboard must be cut, creased without cutting through any thickness of fiberboard, and slotted so as to permit assembly without cracking, surface breaks, or undue bending. The fluting of corrugated fiberboard must be firmly glued to the facings.

(2) The ends of boxes may have a wooden frame or be entirely of wood. Reinforcements of wooden battens may be used.

(3) Manufacturing joints. (i) Manufacturing joints in the bodies of boxes must be—

(A) Taped;

(B) Lapped and glued; or

(C) Lapped and stitched with metal staples.

(ii) Lapped joints must have an appropriate overlap.

(iii) Where closing is effected by gluing or taping, a water resistant adhesive must be used.

(4) Boxes must be designed so as to provide a snug fit to the contents.

(5) Maximum net mass: 400 kg (882 pounds).

§ 178.517 Standards for plastic boxes.

(a) The following are identification codes for plastic boxes:

(1) 4H1 for an expanded plastic box; and

(2) 4H2 for a solid plastic box.

(b) Construction requirements for plastic boxes are as follows:

(1) The box must be manufactured from suitable plastic material and be of adequate strength in relation to its capacity and intended use. The box must be adequately resistant to aging and to degredation caused either by the substance contained or by ultra-violet radiation.

(2) An expanded plastic box must consist of two parts made of a molded expanded plastic material: a bottom section containing cavities for the inner receptacles, and a top section covering and interlocking with the bottom section. The top and bottom sections must be so designed that the inner receptacles fit snugly. The closure cap for any inner receptacle may not be in contact with the inside of the top section of the box.

(3) For transportation, an expanded plastic box must be closed with a self-adhesive tape having sufficient tensile strength to prevent the box from opening. The adhesive tape must be weather-resistant and its adhesive compatible with the expanded plastic material of the box. Other closing devices at least equally effective may be used.

(4) For solid plastic boxes, protection against ultra-violet radiation, if required, must be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives must be compatible with the contents and remain effective throughout the life of the box. Where use is made of carbon black pigment or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if the carbon black content does not exceed 2 percent by mass or if the pigment content does not exceed 3 percent by mass; the content of inhibitors of ultra-violet radiation is not limited.

(5) Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastic material if they do not adversely affect the material of the box. Addition of these additives does not change the design type.

(6) Solid plastic boxes must have closure devices made of a suitable material of adequate strength and so designed as to prevent the box from unintentionally opening.

(7) Maximum net mass 4H1: 60 kg (132 pounds); 4H2: 400 kg (882 pounds).

§ 178.518 Standards for woven plastic bags.

(a) The following are identification codes for woven plastic bags:

(1) 5H1 for an unlined or non-coated woven plastic bag;

(2) 5H2 for a sift proof woven plastic bag; and

(3) 5H3 for a water-resistant woven plastic bag.

(b) Construction requirements for woven plastic fabric bags are as follows:

(1) Bags must be made from stretched tapes or monofilaments of a suitable plastic material. The strength of the material used and the construction of the bag must be appropriate to the capacity and intended use of the bag.

(2) If the fabric is woven flat, the bags must be made by sewing or some other method ensuring closure of the bottom and one side. If the fabric is tubular, the bag must be closed by sewing, weaving, or some other equally strong method of closure.

(3) Bags, sift-proof, 5H2 must be made sift-proof by appropriate means such as use of paper or a plastic film bonded to the inner surface of the bag or one or more separate inner liners made of paper or plastic material.

(4) Bags, water-resistant, 5H3: To prevent the entry of moisture, the bag must be made waterproof by appropriate means, such as separate inner liners of water-resistant paper (e.g., waxed kraft paper, double-tarred kraft paper or plastic-coated kraft paper), or plastic film bonded to the inner or outer surface of the bag, or one or more inner plastic liners.

(5) Maximum net mass: 50 kg (110 pounds).

§ 178.519 Standards for plastic film bags.

(a) The identification code for a plastic film bag is 5H4.

(b) Construction requirements for plastic film bags are as follows:

(1) Bags must be made of a suitable plastic material. The strength of the material used and the construction of the bag must be appropriate to the capacity and the intended use of the bag. Joints and closures must be capable of withstanding pressures and impacts liable to occur under normal conditions of transportation.

(2) Maximum net mass: 50 kg (110 pounds).

§ 178.520 Standards for textile bags.

(a) The following are identification codes for textile bags:

(1) 5L1 for an unlined or non-coated textile bag;

(2) 5L2 for a sift-proof textile bag; and

(3) 5L3 for a water-resistant textile bag.

(b) Construction requirements for textile bags are as follows:

(1) The textiles used must be of good quality. The strength of the fabric and the construction of the bag must be appropriate to the capacity and intended use of the bag.

(2) Bags, sift-proof, 5L2: The bag must be made sift-proof, by appropriate means, such as by the use of paper bonded to the inner surface of the bag by a water-resistant adhesive such as bitumen, plastic film bonded to the inner surface of the bag, or one or more inner liners made of paper or plastic material.

(3) Bags, water-resistant, 5L3: To prevent entry of moisture, the bag must be made waterproof by appropriate means, such as by the use of separate inner liners of water-resistant paper (e.g., waxed kraft paper, tarred paper, or plastic-coated kraft paper), or plastic film bonded to the inner surface of the bag, or one or more inner liners made of plastic material.

(4) Maximum net mass: 50 kg (110 pounds).

§ 178.521 Standards for paper bags.

(a) The following are identification codes for paper bags:

(1) 5M1 for a multi-wall paper bag; and

(2) 5M2 for a multi-wall water-resistant paper bag.

(b) Construction requirements for paper bags are as follows:

(1) Bags must be made of a suitable kraft paper, or of an equivalent paper with at least three plies. The strength of the paper and the construction of the bag must be appropriate to the capacity and intended use of the bag. Seams and closures must be sift-proof.

(2) Paper bags 5M2: To prevent the entry of moisture, a bag of four plies or more must be made waterproof by the use of either a water-resistant ply as one of the two outermost plies or a water-resistant barrier made of a suitable protective material between the two outermost plies. A 5M2 bag of three plies must be made waterproof by the use of a water-resistant ply as the outermost ply. When there is danger of the lading reacting with moisture, or when it is packed damp, a water-resistant ply or barrier must be placed next to the substance. Seams and closures must be waterproof.

(3) Maximum net mass: 50 kg (110 pounds).

§ 178.522 Standards for composite packagings with inner plastic receptacles.

(a) The following are the identification codes for composite packagings with inner plastic receptacles:

(1) 6HA1 for a plastic receptacle within a protective steel drum;

(2) 6HA2 for a plastic receptacle within a protective steel crate or box;

(3) 6HB1 for a plastic receptacle within a protective aluminum drum.

(4) 6HB2 for a plastic receptacle within a protective aluminum crate or box.

(5) 6HC for a plastic receptacle within a protective wooden box.

(6) 6HD1 for a plastic receptacle within a protective plywood drum;

(7) 6HD2 for a plastic receptacle within a protective plywood box;

(8) 6HG1 for a plastic receptacle within a protective fiber drum;

(9) 6HG2 for a plastic receptacle within a protective fiberboard box; and

(10) 6HH for a plastic receptacle within a protective plastic drum.

(b) Construction requirements for composite packagings with inner receptacles of plastic are as follows:

(1) Inner receptacles must be constructed under the applicable construction requirements prescribed in § 178.509(b) (1) through (7) of this subpart.

(2) The inner plastic receptacle must fit snugly inside the outer packaging, which must be free of any projections which may abrade the plastic material.

(3) Outer packagings must be constructed as follows:

(i) 6HA1 or 6HB1: Protective packaging must conform to the requirements for steel drums in § 178.504(b) of this subpart, or aluminum drums in § 178.505(b) of this subpart.

(ii) 6HA2 or 6HB2: Protective packagings with steel or aluminum crate must conform to the requirements for steel or aluminum boxes found in § 178.512(b) of this subpart.

(iii) 6HC protective packaging must conform to the requirements for wooden boxes in § 178.513(b) of this subpart.

(iv) 6HD1: Protective packaging must conform to the requirements for plywood drums, in § 178.507(b) of this subpart.

(v) 6HD2: Protective packaging must conform to the requirements of plywood boxes, in § 178.514(b) of this subpart.

(vi) 6HG1: Protective packaging must conform to the requirements for fiber drums, in § 178.508(b) of this subpart.

(vii) 6HG2: protective packaging must conform to the requirements for fiberboard boxes, in § 178.516(b) of this subpart.

(viii) 6HH: Protective packaging must conform to the requirements for plastic drums, in § 178.509(b) of this subpart.

(4) Maximum capacity of inner receptacles is as follows: 6HA1, 6HB1, 6HD1, 6HG1, 6HH—250 L (66 gallons); 6HA2, 6HB2, 6HC, 6HD2, 6HG2—60 L (16 gallons).

(5) Maximum net mass is as follows: 6HA1, 6HB1, 6HD1, 6HG1, 6HH—400kg (882 pounds); 6HB2, 6HC, 6HD2, 6HG2—75 kg (165 pounds).

§ 178.523 Standards for composite packagings with inner glass, porcelain, or stoneware receptacles.

(a) The following are identification codes for composite packagings with inner receptacles of glass, porcelain, or stoneware:

(1) 6PA1 for glass, porcelain or stoneware receptacles within a protective steel drum;

(2) 6PA2 for glass, porcelain or stoneware receptacles within a protective steel crate or box;

(3) 6PB1 for glass, porcelain or stoneware receptacles within a protective aluminum drum;

(4) 6PB2 for glass, porcelain, or stoneware receptacles within a protective aluminum crate or box;

(5) 6PC for glass, porcelain, or stoneware receptacles within a protective wooden box;

(6) 6PD1 for glass, porcelain or stoneware receptacles within a protective plywood drum;

(7) 6PD2 for glass, porcelain, or stoneware receptacles within a protective wickerwork hamper;

(8) 6PG1 for glass, porcelain or stoneware receptacles within a protective fiber drum;

(9) 6PG2 for glass, porcelain, or stoneware receptacles within a protective fiberboard box;

(10) 6PH1 for glass, porcelain or stoneware receptacles within a protective expanded plastic packaging; and

(11) 6PH2 for glass, porcelain, or stoneware receptacles within a protective solid plastic packaging.

(b) Construction requirements for composite packagings with inner receptacles of glass, porcelain, or stoneware are as follows:

(1) Inner receptacles must conform to the following requirements:

(i) Receptacles must be of suitable form (cylindrical or pear-shaped), be made of good quality materials free from any defect that could impair their strength, and be firmly secured in the outer packaging.

(ii) Any part of a closure likely to come into contact with the contents of

the receptacle must be resistant to those contents. Closures must be fitted so as to be leakproof and secured to prevent any loosening during transportation. Vented closures must conform to § 173.24(f) of this subchapter.

(2) Protective packagings must conform to the following requirements:

(i) For receptacles with protective steel drum 6PA1, the drum must comply with § 178.504(b) of this subpart. However, the removable lid required for this type of packaging may be in the form of a cap.

(ii) For receptacles with protective packaging of steel crate or steel box 6PA2, the protective packaging must conform to the following:

(A) Section 178.512(b) of this subpart.

(B) In the case of cylindrical receptacles, the protective packaging must, when upright, rise above the receptacle and its closure; and

(C) If the protective crate surrounds a pear-shaped receptacle and is of matching shape, the protective packaging must be fitted with a protective cover (cap).

(iii) For receptacles with protective aluminum drum 6PB1, the requirements of § 178.505(b) of this subpart apply to the protective packaging.

(iv) For receptacles with protective aluminum box or crate 6PB2, the requirements of § 178.512(b) of this subpart apply to the protective packaging.

(v) For receptacles with protective wooden box 6PC, the requirements of § 178.513(b) of this subpart apply to the protective packaging.

(vi) For receptacles with protective plywood drum 6PD1, the requirements of § 178.507(b) of this subpart apply to the protective packaging.

(vii) For receptacles with protective wickerwork hamper 6PD2, the wickerwork hamper must be properly made with material of good quality. The hamper must be fitted with a protective cover (cap) so as to prevent damage to the receptacle.

(viii) For receptacles with protective fiber drum 6PG1, the drum must conform to the requirements of § 178.509(b) of this subpart.

(ix) For receptacles with protective fiberboard box 6PG2, the requirements of § 178.516(b) of this subpart apply to the protective packaging.

(x) For receptacles with protective solid plastic or expanded plastic packaging 6PH1 or 6PH2, the requirements of § 178.517(b) of this subpart apply to the protective packaging. Solid protective plastic packaging must be manufactured from high-density polyethylene from some other comparable plastic material. The removable lid required for this type of packaging may be a cap.

(3) Quantity limitations are as follows:

(i) Maximum net capacity for packaging for liquids: 60 L (16 gallons).

(ii) Maximum net mass for packagings for solids: 75 kg (165 pounds).

Subpart M—Testing of Non-bulk Packagings and Packages

§ 178.600 Purpose and scope.

This subpart prescribes certain testing requirements for performance-oriented packagings identified in subpart L of this part

§ 178.601 General requirements

(a) *General.* The test procedures prescribed in this subpart are intended to ensure that packages containing hazardous materials can withstand normal conditions of transportation and are considered minimum requirements. Each packaging must be manufactured and assembled so as to be capable of successfully passing the prescribed tests and of conforming to the requirements of § 173.24 of this subchapter at all times while in transportation.

(b) *Responsibility.* It is the responsibility of the packaging manufacturer and the person who offers a hazardous material for transportation, to the extent that assembly functions including final closure are performed by the latter, to assure that each package is capable of passing the prescribed tests.

(c) *Definitions.* For the purpose of this subpart:

(1) *Design qualification testing* is the performance of the drop, leakproofness, hydrostatic pressure, stacking, and cooperage tests, as applicable, prescribed in § § 178.603, 178.604, 178.605, 178.606, or § 178.607, respectively, for each new or different packaging, at the start of production of that packaging.

(2) *Periodic retesting* is the performance of the drop, leakproofness, hydrostatic pressure, and stacking tests, as applicable, prescribed in § § 178.603, 178.604, 178.605, or § 178.606, respectively, at the frequency specified in § 178.601(e) of this subpart.

(3) *Production testing* is the performance of the leakproofness test prescribed in § 178.604 of this subpart on each single or composite packaging intended to contain a liquid.

(4) *A different packaging* is one that differs (i.e. is not identical) from a previously produced packaging in structural design, size, material of construction, wall thickness or manner of construction but does not include:

(i) A packaging which differs only in surface treatment;

(ii) A combination packaging which differs only in that the outer packaging has been successfully tested with different inner packagings. A variety of such inner packagings may be assembled in this outer packaging without further testing;

(iii) A plastic packaging which differs only with regard to additives which conform to § 178.509(b)(3) or § 178.517(b)(4) or (5) of this part; or,

(iv) A combination packaging with inner packagings conforming to the provisions of paragraph (g) of this section.

(d) *Design qualification testing.* The packaging manufacturer shall achieve successful test results for the design qualification testing at the start of production of each new or different packaging.

(e) *Periodic retesting.* The packaging manufacturer shall achieve successful test results for the periodic retesting at intervals established by the manufacturer of sufficient frequency to ensure that each packaging produced by the manufacturer is capable of passing the design qualification tests. For single or composite packagings, the periodic retests must be conducted at least once every 12 months. For combination packagings, the periodic retests must be conducted at least once every 24 months.

(f) *Test samples.* The manufacturer shall conduct the design qualification and periodic tests prescribed in this subpart using random samples of packagings, in the numbers specified in the appropriate test section. In addition, the leakproofness test, when required, shall be performed on each packaging produced by the manufacturer, and each packaging prior to reuse under § 173.28 of this subchapter, by the reconditioner.

(g) *Selective testing.* The selective testing of packagings that differ only in minor respects from a tested type is permitted as described in this section.

(1) *Selective testing of combination packagings. Variation 1.* Variations are permitted in inner packagings of a tested combination package, without further testing of the package, provided an equivalent level of performance is maintained, as follows:

(i) Inner packagings of equivalent or smaller size may be used provided—

(A) The inner packagings are of similar design to the tested inner packagings (i.e. shape—round, rectangular, etc.);

(B) The material of construction of the inner packagings (glass, plastic, metal, etc.) offers resistance to impact and stacking forces equal to or greater than

that of the originally tested inner packaging:

(C) The inner packagings have the same or smaller openings and the closure is of similar design (e.g., screw cap, friction lid, etc.);

(D) Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings;

(E) Inner packagings are oriented within the outer packaging in the same manner as in the tested package; and,

(F) The gross mass of the package does not exceed that originally tested.

(ii) A lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in paragraph (g)(1)(i) of this section, may be used provided sufficient cushioning is added to fill void space(s) and to prevent significant movement of the inner packagings.

(2) *Selective testing of combination packagings. Variation 2.* Inner packagings of any type, for solids or liquids, may be assembled and transported without testing in an outer packaging under the following conditions:

(i) The outer packaging must have been successfully tested in accordance with § 178.603 of this subpart, with fragile (e.g., glass) inner packagings at the Packing Group I drop height;

(ii) The total combined gross mass of inner packagings may not exceed one-half the gross mass of inner packagings used for the drop test;

(iii) The thickness of cushioning material between inner packagings and between inner packagings and the outside of the packaging may not be reduced below the corresponding thickness in the originally tested packaging; and when a single inner packaging was used in the original test, the thickness of cushioning between inner packagings may not be less than the thickness of cushioning between the outside of the packaging and the inner packaging in the original test. When either fewer or smaller inner packagings are used (as compared to the inner packagings used in the drop test), sufficient additional cushioning material must be used to take up void spaces.

(iv) The outer packaging must have successfully passed the stacking test set forth in § 178.606 of this subpart when empty, i.e., without either inner packagings or cushioning materials. The total mass of identical packages must be based on the combined mass of inner packagings used for the drop test;

(v) Inner packagings containing liquids must be completely surrounded with a sufficient quantity of absorbent material to absorb the entire liquid contents of the inner packagings;

(vi) When the outer packaging is intended to contain inner packagings for liquids and is not leakproof, or is intended to contain inner packagings for solids and is not sift-proof, a means of containing any liquid or solid contents in the event of leakage must be provided in the form of a leakproof liner, plastic bag, or other equally efficient means of containment;

(vii) For air transport, packagings must comply with § 178.605 of this subpart; and

(viii) Packagings must be marked in accordance with § 178.503 of this part as having been tested to Packing Group I performance for combination packagings. The marked maximum gross mass may not exceed one half the gross mass used for the drop test with inner packagings. In addition, the marking required by § 178.503 of this part must include the letters "SP."

(3) *Approval of selective testing.* In addition to the provisions of § 178.601 (g)(1) and (g)(2) of this subpart, the Associate Administrator for Hazardous Materials Safety may approve the selective testing of packagings that differ only in minor respects from a tested type.

(h) *Approval of equivalent packagings.* A packaging having specifications different from those in §§ 178.505–178.523 of this part, or which is tested using methods other than those specified in subpart M of this part, may be used if approved by the Associate Administrator for Hazardous Materials Safety. Such packagings must be shown to be equally effective, and testing methods used must be equivalent.

(i) *Proof of compliance.* Notwithstanding the periodic retest intervals specified in paragraph (e) of this section, the Associate Administrator for Hazardous Materials Safety may at any time require demonstration of compliance by a manufacturer, through testing in accordance with this subpart, that packagings meet the requirements of this subpart. As required by the Associate Administrator for Hazardous Materials Safety, the manufacturer shall either—

(1) Conduct performance tests, or have tests conducted by an independent testing facility, in accordance with this subpart; or

(2) Supply packagings, in quantities sufficient to conduct tests in accordance with this subpart, to the Associate Administrator for Hazardous Materials Safety or a designated representative of the Associate Administrator.

(j) *Coatings.* If an inner treatment or coating of a packaging is required for safety reasons, the manufacturer shall design the packaging so that the treatment or coating retains its protective properties even after withstanding the tests prescribed by this subpart.

(k) *Record retention.* The manufacturer shall—

(1) Keep records of design qualification tests, including specific types, dates, locations, packaging specifications, test specifics (drop heights, hydrostatic pressures, etc.), results, and test operators' names or name of person responsible for testing, for each packaging, at each location where that packaging is manufactured and at each location where design qualification tests are conducted, as long as the packaging is produced and for at least two years thereafter.

(2) Keep records of periodic retests, including specific types, dates, locations, packaging specifications, test specifics (drop heights, hydrostatic pressures, etc.), results, and test operators' names or name of person responsible for testing, at each location where that packaging is manufactured and at each location where periodic tests are conducted, until such tests are successfully performed again and for at least two years from the date of each test; and

(3) Make all records of design qualification tests and periodic retests available for inspection by a representative of the Department upon request.

§ 178.602 Preparation of packagings and packages for testing.

(a) Tests must be carried out on packagings and packages as prepared for transportation, including inner packagings in the case of combination packagings.

(b) For the drop and stacking test, inner and single-unit receptacles must be filled to not less than 95 percent of their capacity in the case of solids and not less than 98 percent in the case of liquids. The material to be transported in the packagings may be replaced by a non-hazardous material, except for chemical compatibility testing or where this would invalidate the results of the tests.

(c) If the material to be transported is replaced for test purposes by a non-hazardous material, the material used must be of the same or higher specific gravity as the material to be carried, and its other physical properties (grain, size, viscosity) which might influence the results of the required tests must

correspond as closely as possible to those of the hazardous material to be transported. Water may also be used for the liquid drop test under the conditions specified in § 178.603(d)(2) of this subpart. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected.

(d) Paper or fiberboard packagings must be conditioned for at least 24 hours immediately prior to testing in an atmosphere maintained—

(1) At 50 percent ±2 percent relative humidity, and at a temperature of 23 °C±2 °C (73 °F±4 °F); or

(2) At 65 percent ±2 percent relative humidity, and at a temperature of 20 °C±2 °C (68 °F±4 °F), or 27 °C±2 °C (81 °F±4 °F); or

(3) For testing at periodic intervals only (i.e., other than initial design qualification testing), at ambient conditions.

(e) Each packaging must be closed in preparation for testing in the same manner as if prepared for actual shipment. All closures must be installed using proper techniques and torques.

(f) Bung-type barrels made of natural wood must be left filled with water for at least 24 hours before the tests.

§ 178.603 Drop test.

(a) The number of drops required and the packages' orientation are as follows:

Packaging	No. of tests	Drop orientation of samples
Steel drums, Aluminum drums, Metal drums (other than steel or aluminum), Steel Jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and Jerricans, Composite packagings which are in the shape of a drum.	Six—(three for each drop)	First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on a circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.
Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are in the shape of a box.	Five—(one for each drop)	First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample).
Bags—single-ply with a side seam	Three—(three drops per bag)	First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).
Bags—single-ply without a side seam, or multi-ply.	Three—(three drops per bag)	First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples).

(b) *Exceptions.* For testing of single or composite packagings constructed of stainless steel, nickel, or monel at periodic intervals only (i.e., other than design qualification testing), the drop test may be conducted with two samples, one sample each for the two drop orientations. These samples may have been previously used for the hydrostatic pressure or stacking test.

(c) *Special preparation of test samples for the drop test.* Testing of plastic drums, Jerricans, and boxes, composite packagings with inner plastic receptacles, and of combination packagings with inner plastic receptacles, other than expanded plastic boxes and bags, must be carried out when the temperature of the test sample and its contents has been reduced to −18° °C (0 °F) or lower. Test liquids shall be kept in the liquid state, if necessary, by the addition of anti-freeze.

(d) *Target.* The target must be a rigid, non-resilient, flat and horizontal surface.

(e) *Drop height.* Drop heights, measured as the vertical distance from the target to the lowest point on the package, must be determined as follows:

(1) For solids and liquids, if the test is performed with the solid or liquid to be transported or with a non-hazardous material having essentially the same physical characteristic, the drop height must be determined according to packing group, as follows:

(i) Packing Group I: 1.8 m (5.9 feet).

(ii) Packing Group II: 1.2 m (3.9 feet).

(iii) Packing Group III: 0.8 m (3 feet).

(2) For liquids, if the test is performed with water—

(i) Where the materials to be carried have a specific gravity not exceeding 1.2, drop height must be determined according to packing group, as follows:

(A) Packing Group I: 1.8 m (5.9 feet).

(B) Packing Group II: 1.2 m (3.9 feet).

(C) Packing Group III: 0.8 m (3 feet).

(ii) Where the materials to be transported have a specific gravity exceeding 1.2, the drop height must be calculated on the basis of the specific gravity (SG) of the material to be carried, rounded up to the first decimal, as follows:

(A) Packing Group I: SG X 1.5 m (4.9 feet).

(B) Packing Group II: SG X 1.0 m (3 feet).

(C) Packing Group III: SG X 0.67 m (2.2 feet).

(f) *Criteria for passing the test.* A package is considered to successfully pass the drop tests if for each sample tested—

(1) For receptacles containing liquid, each receptacle does not leak when equilibrium has been reached between the internal and external pressures;

(2) For removable head drums for solids, the entire contents are retained by an inner packaging (e.g., a plastic bag) even if the closure on the top head of the drum is no longer sift-proof;

(3) For a bag, neither the outermost ply nor an outer packaging exhibits any damage likely to adversely affect safety during transport;

(4) For a composite or combination packaging, there is no damage to the outer packaging likely to adversely affect safety during transport, and there is no leakage of the filling substance from the inner packaging;

(5) For a drum, jerrican or bag, any discharge from a closure is slight and ceases immediately after impact with no further leakage; and

(6) For packagings for explosives, no rupture of the packaging occurs.

§ 178.604 Leakproofness test.

(a) *General.* The leakproofness test must be performed with compressed air or other suitable gases on all packagings intended to contain liquids, except that:

(1) The inner receptacle of a composite packaging may be tested without the outer packaging provided the test results are not affected; and

(2) This test is not required for inner packagings of combination packagings.

(b) *Number of packagings to be tested—*

(1) *Production testing.* All packagings subject to the provisions of this section must be tested and must pass the leakproofness test:

(i) Before they are first used in transportation; and

(ii) Prior to reuse, when authorized for reuse by § 173.28 of this subchapter.

(2) *Design qualification and periodic testing.* Three samples of each different packaging must be tested and must pass the leakproofness test.

(c) *Special preparation*—(1) For design qualification and periodic testing, packagings must be tested with closures in place. For production testing, packagings need not have their closures in place.

(2) For testing with closures in place, vented closures must either be replaced by similar non-vented closures or the vent must be sealed.

(d) *Test method.* The packaging must be restrained under water while an internal air pressure is applied; the method of restraint must not affect the results of the test. The test must be conducted for a period of time sufficient to pressurize the interior of the packaging to the specified air pressure and to determine if there is leakage of air from the packaging. Other methods, at least equally effective, may be used in accordance with Appendix B of this Part, or if approved by the Associate Administrator for Hazardous Materials Safety.

(e) *Pressure applied.* An internal air pressure (gauge) must be applied to the packaging as indicated for the following packing groups:

(1) Packing Group I: Not less than 30 kPa (4 psi).

(2) Packing Group II: Not less than 20 kPa (3 psi).

(3) Packing Group III: Not less than 20 kPa (3 psi).

(f) *Criteria for passing the test.* A packaging passes the test if there is no leakage of air from the packaging.

§ 178.605 Hydrostatic pressure test.

(a) *Packagings to be tested.* The hydrostatic pressure test must be performed on samples of all metal, plastic, and composite packagings intended to contain liquids. This test is not required for inner packagings of combination packagings. For internal pressure requirements for inner packagings of combination packagings intended for transportation by aircraft, see § 173.27(c) of this subchapter.

(b) *Number of test samples.* Three test samples are required for each different packaging. For packagings constructed of stainless steel, monel, or nickel, only one sample is required for periodic retesting of packagings.

(c) *Special preparation of receptacles for testings.* Vented closures must either be replaced by similar non-vented closures or the vent must be sealed.

(d) *Test method and pressure to be applied.* Metal packagings and composite packagings other than plastic (e.g., glass, porcelain or stoneware), including their closures, must be subjected to the test pressure for 5 minutes. Plastic packagings and composite packagings (plastic material), including their closures, must be subjected to the test pressure for 30 minutes. This pressure is the one to be marked as required in § 178.503(a) (5) of this part. The receptacles must be supported in a manner that does not invalidate the test. The test pressure must be applied continuously and evenly, and it must be kept constant throughout the test period. The hydraulic pressure (gauge) applied, taken at the top of the receptacle, and determined by any one of the following methods must be:

(1) Not less than the total gauge pressure measured in the packaging (i.e., the vapor pressure of the filling material and the partial pressure of the air or other inert gas minus 100 kPa (15 psi) at 55 °C (131 °F) and multiplied by a safety factor of 1.5. This total gauge pressure must be determined on the basis of a maximum degree of filling in accordance with § 173.24a(b)(3) of this subchapter and a filling temperature of 15 °C (59 °F);

(2) Not less than 1.75 times the vapor pressure at 50 °C (122 °F) of the material to be transported minus 100 kPa (15 psi) but with a minimum test pressure of 100 kPa (15 psi); or

(3) Not less than 1.5 times the vapor pressure at 55 °C (131 °F) of the material to be transported minus 100 kPa (15 psi), but with a minimum test pressure of 100 kPa (15 psi).

Packagings intended to contain hazardous materials of Packing Group I must be tested to a minimum test pressure of 250 kPa (36 psi).

(e) *Criteria for passing the test.* A package passes the hydrostatic test if, for each test sample, there is no leakage of liquid from the package.

§ 178.606 Stacking test.

(a) *General.* All packages other than bags must be subjected to a stacking test.

(b) *Number of test samples.* Three test samples are required for each different packaging. For periodic retesting of packagings constructed of stainless steel, monel, or nickel, only one test sample is required.

(c) *Test method*—(1) *Design qualification testing.* The test sample must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport. The minimum height of the stack, including the test sample, must be 3.0 m (10 feet). The duration of the test must be 24 hours, except that plastic drums, jerricans, and composite packaging 6HH, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 °C (104 °F). Alternative test methods which yield equivalent results may be used if approved by the Associate Administrator for Hazardous Materials Safety.

(2) *Periodic retesting.* The test sample must be tested in accordance with:

(i) Section 178.606(c)(1) of this subpart; or

(ii) The packaging may be tested using a dynamic compression testing machine. The test must be conducted at room temperature on an empty, unsealed drum. The test sample must be centered on the bottom platen of the testing machine. The top platen must be lowered until it comes in contact with the test sample. Compression must be applied end to end. The speed of the compression tester must be one-half inch plus or minus one-fourth inch per minute. An initial preload of 50 pounds must be applied to ensure a definite contact between the test sample and the platens. The distance between the platens at this time must be recorded as zero deformation. The force A to then be applied must be calculated using the formula:

$$A = (n-1)\{w + (s \times v \times 8.3)\} \times 1.5$$

Where:

A = applied load in pounds.

n = minimum number of containers that, when stacked, reach a height of 3 m.

s = specific gravity of lading.

w = maximum weight of one empty container in pounds.

v = actual capacity of container (rated capacity + outage) in gallons.

And:

8.3 corresponds to the weight in pounds of 1.0 gallon of water.

1.5 is a compensation factor that converts the static load of the stacking test into a load suitable for dynamic compression testing.

(d) *Criteria for passing the test.* No test sample may leak. In composite packagings or combination packagings, there must be no leakage of the filling substance from the inner receptacle, or inner packaging. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength or cause instability in stacks of packages. Stacking stability is considered sufficient when, after the stacking test, and, in the case of plastic packagings after cooling to ambient temperature, two packagings of the

same type filled with water placed on each test sample maintain their positions for one hour. For the dynamic compression test, a container passes the test if, after application of the required load, there is no buckling of the sidewalls sufficient to cause damage to its expected contents; in no case may the maximum deflection exceed one inch.

§ 178.607 Cooperage test for bung-type wooden barrels.

(a) *Number of samples.* One barrel is required for each different packaging.

(b) *Method of testing.* Remove all hoops above the bilge of an empty barrel at least two days old.

(c) *Criteria for passing the test.* A packaging passes the cooperage test only if the diameter of the cross-section of the upper part of the barrel does not increase by more than 10 percent.

§ 178.608 Vibration standard.

(a) Each packaging must be capable of withstanding, without rupture or leakage, the vibration test procedure outlined in this section.

(b) Test method. (1) Three sample packagings, selected at random, must be filled and closed as for shipment.

(2) The three samples must be placed on a vibrating platform that has a vertical double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate.

(3) The test must be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material of approximately 1.6 mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

(4) Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage.

(5) Other methods, at least equally effective, may be used; if approved by the Associate Administrator for Hazardous Materials Safety.

(c) *Criteria for passing the test.* A packaging passes the vibration test if there is no rupture or leakage from any of the packages.

§ 178.609 Test requirements for packagings for infectious substances (etiologic agents).

(a) Samples of each packaging must be prepared for testing as described in paragraph (b) of this section and then subjected to the tests in paragraphs (d) through (i) of this section.

(b) Samples of each packaging must be prepared as for transport except that a liquid or solid infectious substance should be replaced by water or, where conditioning at −18 °C (0 °F) is specified, by water/antifreeze. Each primary receptacle must be filled to 98 percent capacity. Packagings for live animals should be tested with the live animal being replaced by an appropriate dummy of similar mass.

(c) Packagings prepared as for transport must be subjected to the tests in Table I of this paragraph, which, for test purposes, categorizes packagings according to their material characteristics. For outer packagings, the headings in Table I relate to fiberboard or similar materials whose performance may be rapidly affected by moisture; plastics, other than expanded plastics or film, which may embrittle at low temperature; and other materials such as metal whose performance is not significantly affected by moisture or temperature. Inner packagings may be of plastics, other than expanded plastics or film. Where a primary receptacle and a secondary packaging of an inner packaging are made of different materials, the material of the primary receptacle determines the appropriate test.

TABLE 1.—TESTS REQUIRED

Material of					Tests required				
Outer packaging			Inner packaging		Refer to para. (d)				Refer to para. (h)
Fiberboard	Plastics	Other	Plastics	Other	(d)	(e)	(f)	(g)	
X			X			X	X	When dry ice is used	X
X				X		X			X
	X		X				X		X
	X			X			X		X
		X	X				X		X
		X		X	X				X

(d) Samples must be subjected to free-fall drops onto a rigid, nonresilient, flat, horizontal surface from a height of 9 m (30 feet).

The drops must be performed as follows:

(1) Where the samples are in the shape of a box, five must be dropped in sequence:

(i) Flat on the bottom;

(ii) Flat on the top;

(iii) Flat on the long side;

(iv) Flat on the short side; and

(v) On a corner.

(2) Where the samples are in the shape of a drum, three must be dropped in sequence:

(i) Diagonally on the top chime, with the center of gravity directly above the point of impact;

(ii) Diagonally on the base chime; and

(iii) Flat on the side.

(3) While the sample should be released in the required orientation, it is accepted that for aerodynamic reasons the impact may not take place in that orientation.

(4) Following the appropriate drop sequence, there must be no leakage from the primary receptacle(s) which should remain protected by absorbent material in the secondary packaging.

(e) The sample must be fully immersed in water for a period of at least 5 minutes and then allowed to drain for not more than 30 minutes at 23 °C (73 °F) and 50 ± 2 percent relative humidity. It should then be subjected to the test described in paragraph (d) of this section.

(f) The sample must be conditioned in an atmosphere of −18 °C (0 °F) or less for a period of at least 24 hours and within 15 minutes of removal from that atmosphere be subjected to the test described in paragraph (d) of this section. Where the sample contains dry ice, the conditioning period may be reduced to 4 hours.

(g) Where packaging is intended to contain dry ice, a test additional to that

specified in paragraph (d) or (e) or (f) of this section must be carried out. One sample must be stored so that all the dry ice dissipates and then be subjected to the test described in paragraph (d) of this section.

(h) Packagings with a gross mass of 7 kg (15 pounds) or less should be subjected to the tests described in paragraph (h)(1) of this section and packagings with a gross mass exceeding 7 kg (15 pounds) to the tests in paragraph (h)(2) of this section.

(1) Samples must be placed on a level hard surface. A cylindrical steel rod with a mass of at least 7 kg (15 pounds), a diameter not exceeding 38 mm (1.5 inches) and the impact end edges a radius not exceeding 6 mm (0.2 inches), must be dropped in a vertical free fall from a height of 1 m (3 feet), measured from the impact end of the impact surface of the sample. One sample must be placed on its base. A second sample must be placed in an orientation perpendicular to that used for the first. In each instance the steel rod must be aimed to impact the primary receptacle. Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).

(2) Samples must be dropped on to the end of a cylindrical steel rod. The rod must be set vertically in a level hard surface. It must have a diameter of 38 mm (1.5 inches) and the edges of the upper end a radius not exceeding 6 mm (0.2 inches). The rod must protrude from the surface a distance at least equal to that between the primary receptacle(s) and the outer surface of the outer packaging with a minimum of 200 mm (7.9 inches). One sample must be dropped in a vertical free fall from a height of 1 m (3 feet), measured from the top of the steel rod. A second sample must be dropped from the same height in an orientation perpendicular to that used for the first. In each instance the packaging should be so orientated that the steel rod must be aimed to impact the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable, provided that there is not leakage from the primary receptacle(s).

Appendix A to Part 178—Specifications for Steel

321a. The title of appendix A of part 178 is revised to read as set forth above.

321b. Appendix B to part 178 is added to read as follows:

Appendix B to Part 178—Alternative Leakproofness Test Methods

In addition to the method prescribed in § 178.604 of this subchapter, the following leakproofness test methods are authorized for other than the original design qualification tests:

(1) *Helium test.* The packaging must be filled with at least 1 L inert helium gas, air tight closed, and placed in a testing chamber. The testing chamber must be evacuated down to a pressure of 0 kPa which equals an over-pressure inside the drum of 100 kPa. The air in the testing chamber must be analyzed for traces of helium gas by means of a mass spectrograph. The test must be conducted for a period of time sufficient to evacuate the chamber and to determine if there is leakage into or out of the packaging, but not less than 30 seconds. If helium gas is detected, the leaking packaging must be automatically separated from non-leaking drums and the leaking area determined according to the method prescribed in § 178.604(d) of this subchapter. A packaging passes the test if there is no leakage of helium from the packaging during 30 seconds of testing.

(2) *Pressure differential test.* The packaging shall be restrained while either pressure or a vacuum is applied internally. The packaging must be pressurized to the pressure required by § 178.604(e) of this subchapter for the appropriate packing group. The method of restraint must not affect the results of the test. The test must be conducted for a period of time sufficient to appropriately pressurize or evacuate the interior of the packaging and to determine if there is leakage into or out of the packaging. A packaging passes the pressure differential test if its measured internal pressure does not change during 30 seconds of testing.

(3) *Solution over seams.* The packaging must be restrained while an internal air pressure is applied; the method of restraint may not affect the results of the test. The exterior surface of all seams and welds must be coated with a solution of soap suds or a water and oil mixture. The test must be conducted for a period of time sufficient to pressurize the interior of the packaging to the specified air pressure and to determine if there is leakage of air from the packaging. A packaging passes the test if there is no leakage of air from the packaging.

PART 179—SPECIFICATIONS FOR TANK CARS

322. The authority citation for part 179 continues to read as follows:

Authority: 49 U.S.C. App. 1803, 1804, 1805, 1806, 1808; 49 CFR part 1, unless otherwise noted.

§ 179.101–1 [Amended]

323. In § 179.101–1, the Table of individual specification requirements is amended as follows:

a. The column for DOT Specification 112A400F is removed.

b. The "Insulation" requirement entry for 112A200W, 112A340W, 112A400W, 112A500W, 114A340W, and 114A400W is changed from "[4] None" to "[4, 13] Optional".

c. Footnote 4 is revised to read: "[4] For tank car tanks that are not equipped with insulation per § 179.100–4 of this subchapter, at least the upper two-thirds of the exterior of the tank manway nozzle and all appurtenances in contact with this area of the tank shall have a finish coat of white paint; except that tanks used for hydrogen fluoride may have a dark colored band not exceeding 4 m (14 feet) wide around the center of the tank in the top platform and fitting area. Tank car tanks that are equipped with insulation per § 179.100–4 of this subchapter may be stenciled "EQUIPPED WITH INSULATION PER 49 CFR 179.100–4".

d. The DOT specification entry "112A400W [12]" is revised to read "112A400W [11 12]".

324. In §§ 179.102 through 179.102–17 and § 179.102–20, the following changes are made:

a. Sections 179.102–3, 179.102–5, 179.102–6, 179.102–7, 179.102–8, 179.102–9, 179.102–10, 179.102–11, 179.102–12, 179.102–13, 179.102–14, 179.102–15, 179.102–16 and 179.102–20 are removed.

b. In § 179.102–1, paragraphs (a)(2) through (a)(6) are removed and reserved.

c. In § 179.102–2, paragraph (a)(1) is removed, paragraphs (a) (2) and (3) are removed and reserved, and paragraph (a)(4) is redesignated as new paragraph (a)(1).

d. In § 179.102–4, paragraphs (a) and (l) are removed and reserved.

e. In § 179.102–17, in paragraph (a), "DOT–105A600W" is changed to "DOT–105J600W" and paragraph (m) is removed.

325. The title of § 179.105 is revised to read as follows:

§ 179.105 Special requirements for Specification 105S, 105J, 111J, 112S, 112J, 112T, 114S, 114J and 114T tank cars.

326. Section 179.105–1 is revised to read as follows:

§ 179.105–1 General.

(a) In addition to the requirements of this section, each Specification 105S, 105J, 111J, 111J, 112S, 112J, 112T, 114S, 114J and 114T tank car must meet the applicable requirements of §§ 179.100, 179.101, 179.103, and 179.104.

(b) Notwithstanding the provisions of §§ 179.3, 179.4 and 179.6, AAR approval is not required for changes in, or additions to, tank cars necessary to comply with this section.

(c) Each Specification 105S, 105J, 111J, 112S, 112J, 112T, 114S, 114J, and 114T tank car must be equipped with a tank head puncture resistance system that meets the requirements of § 179.105–5.

(d) Each Specification 105J, 111J, 112J, 112T, 114J, and 114T tank car shall be equipped with:

(1) A thermal protection system that meets the requirements of § 179.105–4; and

(2) A safety valve that meets the requirements of § 179.105–7.

§ 179.105–2 [Removed and Reserved]

§ 179.105–3 [Removed and Reserved]

327. Sections 179.105–2 and 179.105–3 are removed and reserved.

§ 179.105–4 [Amended]

328. In paragraph (a) introductory text of § 179.105–4, the phrase "Each specification 112T, 112J, 114T, and 114J tank car" is changed to read "Each Specification 105J, 111J, 112J, 112T, 114J, and 114T tank car".

329. In paragraph (a) of § 179.105–7, the phrase "each 112 and 114 tank car" is changed to read "each Specification 105J, 111J, 112J, 112T, 114J, and 114T tank car" and paragraph (c) is revised to read as follows:

179.105–7 Safety relief valves.

* * * * *

(c) Notwithstanding the provisions of § 179.100–15, § 179.200–18 or paragraph (a) of this section, the relieving or discharge capacity of the safety relief valve on a tank car tank used to transport a Division 2.3 (poisonous gas) material may be calculated in accordance with the formula prescribed in section A8.01 of appendix A of the AAR Specifications for Tank Cars applicable to compressed gases in insulated tanks if—

(1) The tank is equipped with a thermal protection system in accordance with § 179.105–4;

(2) In all of three consecutive simulation pool fire tests required by paragraph (d) of § 179.105–4, none of the thermocouples on the uninsulated side of the steel plate indicates a plate temperature in excess of 288 °C (550 °F); and

(3) For tanks used for ethylene oxide, the valve capacity is at least 1100 scfm (31.1 cubic meters per minute) at 586 kPa (85 psig).

* * * * *

330. In § 179.105–8, paragraphs (d) and (e) are added to read as follows:

§ 179.105–8 Stenciling.

* * * *

(d) Each Specification 105 tank car that is equipped as prescribed in § 179.105–1(c) shall be stenciled with the letter "S" substituted for the letter "A" in the specification marking.

(e) Each Specification 105 tank car that is equipped as prescribed in § 179.105–1(d) must be stenciled with the letter "J" substituted for the letter "A" in the specification marking.

§§ 179.106 through 179.106–4 [Removed and Reserved]

331. Sections 179.106 through 179.106–4 are removed and reserved.

332. In § 179.200–18, paragraphs (b)(1) and (b)(4) are revised to read as follows:

§ 179.200–18 Safety relief devices.

* * * * *

(b) *Safety vents*—(1) When permitted in § 179.201–1, a safety vent, having an inside diameter of at least 44 mm (1.7 inches) and an approved design to prevent interchange with other fixtures may be installed in place of a safety relief valve on tank car tanks or compartments.

* * * * *

(4) All tanks equipped with safety vents shall be stenciled "Not for Flammable or Poisonous Liquids".

* * * * *

§ 179.201–1 [Amended]

333. Section 179.201–1 is amended by removing all references in the table in paragraph (a) to §§ 179.202–2, 179.202–3, 179.202–4, 179.202–5, 179.202–6, 179.202–7, 179.202–8, 179.202–9, 179.202–10, 179.202–11, 179.202–12, 179.202–13, 179.202–14, 179.202–15, 179.202–16, 179.202–17, 179.202–18, 179.202–19, 179.202–20, 179.202–21, and 179.202–22.

§§ 179.202 through 179.202–22 [Removed and Reserved]

334. Sections 179.202 through 179.202–22 are removed and reserved.

§ 179.203–1 [Amended]

335. In § 179.203–1, paragraphs (c) and (d) are removed and paragraph (e) is redesignated as paragraph (c).

§ 179.203–2 [Amended]

336. In § 179.203–2, paragraph (a)(1) is removed and paragraphs (a)(2) through (a)(4) are redesignated as paragraphs (a)(1) through (a)(3).

§ 179.302 [Removed and Reserved]

337. Section 179.302 is removed and reserved.

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Administrator, Research and Special Programs Administration.

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