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Intermodal Portable Tanks

DEPARTMENT OF TRANSPORTATION**Research and Special Programs Administration**

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

[Docket No. HM-167; Amdt. Nos. 107-8, 171-60, 172-65, 173-144, 174-40, 176-13, 177-53, 178-65]

Intermodal Portable Tanks

AGENCY: Materials Transportation Bureau (MTB), Research and Special Programs Administration, DOT.

ACTION: Final rule.

SUMMARY: This final rule amends the Hazardous Materials Regulations to authorize the use of two new packaging specifications for intermodal portable tanks. These new portable tank specifications are designated Specification IM 101 and IM 102.

Included in the final rule are requirements governing the maintenance and usage of such tanks and the procedures whereby the Associate Director for Hazardous Materials Regulation, MTB, may designate agencies to approve DOT Specification IM 101 and IM 102 portable tanks. This rule also indicates those hazardous materials that are authorized for transportation in Specification IM 101 and IM 102 portable tanks and sets out certain safety requirements. Certain other special provisions necessary to ensure safe transportation of authorized hazardous materials in intermodal portable tanks are contained in the IM Tank Table which is published separately. (See "ADDRESS.")

These regulatory actions will facilitate the international transport of hazardous materials by implementing standards that, while not identical, are compatible with recognized worldwide standards for portable tank design and construction developed by the intergovernmental Maritime Consultative Organization (IMCO) and the United Nations (UN) Committee of Experts on the Transport of Dangerous Goods. Also, this rule will eliminate a substantial number of DOT exemptions for these types of tanks and thereby reduce administrative burdens associated with filing and processing exemption requests.

EFFECTIVE DATE: This amendment is effective May 1, 1981.

ADDRESS: Copies of the IM Tank Table and any subsequent amendments are available from the Associate Director for Hazardous Materials Regulation through the Dockets Branch (DCA-22), Research and Special Programs

Administration, Department of Transportation, Washington, D.C. 20590. The Dockets Branch is located in Room 8426 of the Nassif Building, 400 Seventh Street, SW., Washington, D.C. 20590.

FOR FURTHER INFORMATION CONTACT: Richard C. Barlow (202-755-4906) or Hattie M. Mitchell (202-426-2075), Office of Hazardous Materials Regulation, Materials Transportation Bureau, Department of Transportation, 400 Seventh Street, SW., Washington, D.C. 20590. Office hours are 8:00 a.m. to 4:30 p.m. Eastern Time, Monday through Friday.

SUPPLEMENTARY INFORMATION: On December 11, 1978, the MTB published a notice of proposed rulemaking (NPRM) under Docket HM-167, Notice No. 78-12 (43 FR 58050) which proposed to authorize the use of two new packaging specifications for portable tanks. Specifications for these proposed intermodal (IM) portable tanks were based primarily on international standards. Interested persons were invited to participate in the rulemaking process, and all comments received were given full consideration by the MTB.

The majority of the commenters were in agreement with the MTB that the requirements to be adopted under HM-167 should be compatible with standards in the "Recommendations on Multimodal Tank Transport" adopted by the UN Committee of Experts, and standards specified in the IMCO Code.

Based on these comments and the desire of the MTB to harmonize HM-167 with international standards, the IM portable tank specifications are designated as IM 101 and IM 102 (instead of the proposed IM 100 and IM 101) to correspond with the similarly designed and constructed IMCO Type 1 and IMCO Type 2 portable tanks. In addition, measurements in the final rule are specified in metric and nonmetric units to eliminate possible discrepancies in conversions.

A major effort has been made to harmonize this rule with the UN Recommendations by use of an IM Tank Table patterned after the lists of dangerous goods permitted for transport in portable tanks which appear in the IMCO and UN recommendations. Prior to use of an IM tank for transportation of a hazardous material, the person offering the material must determine from the Table if the tank is authorized for the material and, if so, what special requirements apply. Some of the requirements are maximum allowable working pressure, pressure relief device configuration, and bottom outlet configuration for various materials

authorized for transportation in an IM portable tank.

The Impact of Rulemaking on Existing Exemptions

It is the MTB's intention that, to the maximum extent possible, existing intermodal portable tanks authorized for use under an outstanding exemption be covered under this rule thereby eliminating the need for the exemption. The MTB has decided, however, that in order to be allowed to be re-marked as a specification IM portable tank, an existing intermodal tank must, as a minimum, conform to the basic provisions of this rule.

Accordingly, each owner or manufacturer of an intermodal portable tank which is in service under a DOT exemption or was constructed under a DOT exemption on or before May 1, 1981, should examine the tank and the tank drawings to determine if the tank meets the requirements of an IM 101 or IM 102 specification portable tank. In order to be marked and used as an IM 101 or IM 102 tank, the tank must be modified, re-rated and re-marked as specified by § 173.32a(d) herein according to the proper specification by May 1, 1983. The following tanks may be re-marked as a DOT specification tank:

1. A tank in full compliance with an IM 101 or IM 102 specification.
2. A tank that is modified and brought into full compliance with an IM 101 or IM 102 specification. (These modifications may include but are not limited to, the resetting, replacement, or the addition of pressure relief devices).
3. A tank which, while otherwise in conformance with an IM 101 or IM 102 specification, has its pressure relief device sited on the top of the tank within 12 degrees of the top longitudinal centerline, provided the inlet of each pressure relief device is in the vapor space of the tank.
4. A tank constructed of austenitic stainless steels which, while otherwise in conformance with the IM 102 specification (e.g. § 178.270-5), has an absolute minimum equivalent head and shell thickness of not less than 3.0 mm (0.118 inches).
5. A tank with an outside diameter greater than 1.8 m (5.9 feet) constructed of other than the reference mild steel which, while otherwise in conformance with the IM 101 specification, has a minimum shell thickness not less than the value derived from the formula in § 178.270-5(c) based on a required thickness of the reference steel equal to 6 mm (0.236 inches).

The requirement for location of pressure relief devices along the top longitudinal centerline is to preclude

discharges of liquid lading to an extent considered practical. This requirement will increase the level of safety at no additional cost for newly constructed portable tanks. The MTB has sought, in relaxing the location requirement for pressure relief devices on existing portable tanks, to reduce required modifications while maintaining safety.

For the minimum wall thickness, the UN/IMCO standards specify nonequivalent metric and nonmetric values of 3.00 mm/0.125 inches for IMCO Type 2 portable tanks and 6.00 mm/0.250 inches for IMCO Type 1 portable tanks. In the final rule, for new construction, the MTB has equated the more conservative nonmetric value to its equivalent metric value (i.e., 3.18 mm/0.125 inches and 6.35 mm/0.250 inches). For existing tanks, however, the MTB has determined that a tank under exemption built to the UN/IMCO metric standards provides adequate safety, and absent other areas of nonconformance, tanks meeting these standards may be re-marked as DOT specification tanks.

The owner of a portable tank under exemption which is remarked as an IM 101 or IM 102 portable tank is required to forward to the Associate Director for HMR and to retain at his principal place of business a written report containing the following information:

1. A statement certifying that each tank or series of identical tanks manufactured to a single design is in compliance, except as authorized herein, with the applicable IM 101 or IM 102 specification (§§ 178.270, 178.271, 178.272).
2. The identification of the person certifying the portable tank.
3. The applicable DOT exemption number and the serial number of each tank covered by the report.
4. A summary of the modifications made to the tank to bring it into conformance with the IM 101 or 102 specifications including authorized deviations.

Hazardous materials offered for transportation in tanks which are remarked as specification tanks, are subject to the authorizations, conditions and limitations of this final rule without regard to previous authorizations, conditions and limitations under an exemption.

After September 1, 1981, any exemption affecting a portable tank of a type covered by this final rule will not be renewed upon its expiration unless the owner or manufacturer of the tank has submitted information to the Associate Director for Hazardous Materials Regulation stating a valid reason why the tank cannot be brought into compliance with the requirements of this amendment.

A representative listing of exemptions affected by this rule is as follows:

IM Portable Tank Exemptions

3108	8556	7257	7610
4007	8564	7270	7620
5834	8569	7442	7626
5908	8757	7463	7633
5954	8793	7493	7665
5912	8858	7503	7671
5972	8864	7518	7685
6128	7005	7520	7701
6253	7010	7578	7714
6398	7014	7584	7720
8500	7088	7596	7738
7752	7808	8057	8243
7758	7825	8109	8245
7772	7831	8110	8251
7793	7838	8159	8274
7795	7867	8183	8275
7818	8000	8171	8293
7820	8002	8182	8284
7830	8005	8203	8298
7848	8012	8217	8323
7850	8015	8222	8325
7882	8021	8226	8348
7893	8046	8227	8374
7898	8047	8234	8375
7897	8056	8240	8417
7901	8252	8259	8370
8372			

AAR's Comments on the Design, Test, and Usage of IM Portable Tanks for Rail Service

The Association of American Railroads (AAR) made numerous comments and recommendations with respect to the design and construction of IM portable tanks as authorized for rail transport. Because these comments relate only to rail transportation they are discussed collectively rather than in the review by sections.

AAR suggested that "AAR.600 Specifications For Acceptability of Tank Containers in COFC Service" (AAR.600) be used as a guideline for IM portable tanks in rail service. AAR pointed out that HM-167 should recognize, as does AAR.600, both the rigors of normal transportation and the extra measures of performance necessary in accident situations. The MTB and the Federal Railroad Administration (FRA), which assisted MTB in the preparation of this rule, agree with the AAR's concept of considering both normal and accident environments in setting the minimum design requirements for packagings, and these unique and severe aspects were fully considered in this rulemaking.

Minimum Design Pressure

AAR contended that the railroad industry would not accept tanks with a design pressure of less than 35 psig. This would, in effect, prohibit all IM 102 and a large number of IM 101 portable tanks from rail service. The MTB believes AAR's comment results from a misunderstanding of the permitted usage of IM 101 and IM 102 portable tanks. Unlike many DOT specification packagings which are authorized for an entire generic group of hazardous materials such as flammable liquids, IM portable tanks are authorized only for particular materials or for a limited generic group of materials according to design pressure and other characteristics of the tank. For example, an IM 102 portable tank with a design pressure of 15 psig when used for

flammable liquids would be limited to flammable liquids, having no other hazards, with a vapor pressure below 9.2 psia at 149°F., and a flash point at 32°F. or above. Thus, a tank with a relatively low working pressure is authorized only for hazardous materials of relatively low hazard for which the tank provides an adequate level of safety. In addition, in most cases, the design of specification IM 101 and IM 102 portable tanks is controlled by the minimum thickness requirement as discussed below. Therefore, the MTB does not agree with the AAR recommendation that the working pressure of tanks authorized for rail transport must be 35 psig or higher.

Minimum Tank Wall Thickness. The AAR recommended that the minimum tank wall thickness acceptance criteria adopted in the final rule be equivalent to the thickness of plates criteria specified in AAR.600. AAR.600 requires for all tank sizes used to transport a hazardous material, regardless of the hazard severity of that material, a tank wall thickness of:

- (1) $\frac{3}{8}$ inch (0.375 inches, 9.5 mm) carbon steel; or,
- (2) 8 MSG (0.1644 inches, 4.2 mm) austenitic stainless steel.

The AAR supported these wall thickness requirements by stating "Tanks in hazardous materials service via rail must have added integrity to withstand possible accidents and the $\frac{3}{8}$ " mild carbon steel thickness of AAR.600 is a calculated equivalent, taking necessary safety factors into account. The selection of 8 gauge for a minimum stainless wall is based on a comparison of the puncture data of carbon steel and stainless steel." The AAR comments did not specifically address the various minimum tank wall thickness requirements proposed in the NPRM.

In the final rule, based on consideration of the size of the tank, the tank material and the hazard properties of the material being shipped, the MTB has adopted the following minimum tank wall thickness requirements:

- For large diameter (greater than 5.9 feet) IM 101 portable tanks fabricated of austenitic stainless steel, the minimum wall thickness required is approximately 0.188 inches (depending on the properties of the material of construction) and therefore is greater than the 0.164 inches recommended by the AAR. These IM 101 portable tanks are similar in design to the majority of the IMCO type 1 portable tanks.

- For large diameter IM 101 tanks fabricated of mild steel, the minimum wall thickness required is 0.250 inches. This value for mild steel is related to the

minimum wall thickness required for austenitic stainless steel by the equation in new § 178.270-5(c) which was adopted from the UN Recommendations, such that the puncture resistances for these materials are equivalent. Thus, for mild steels, the MTB believes the 0.250 inches minimum thickness requirement, even though less than the 0.375 inches recommended by the AAR, is comparable to the thickness for austenitic stainless steels supported by the AAR.

- For small diameter (5.9 feet or less) IM 101 portable tanks and for IM 102 (IMCO type 2) portable tanks, the MTB has adopted in this rule minimum tank thickness requirements that are consistent with the UN recommendations and the IMCO Code. These thickness requirements are in accord with other regulations calling for packaging integrity proportional to both the severity of hazard and the quantity of the material being transported in a packaging. As discussed earlier with respect to the minimum design pressure requirements, IM 102 tanks are limited to the carriage of hazardous materials of relatively low hazard.

The MTB does not believe that the AAR has sufficiently supported its view concerning an inadequacy in the minimum wall thickness requirements proposed in the NPRM and has not adopted the AAR's recommended minimum thickness requirements.

Dynamic Shock Loading

The AAR recommended that the tank and frame design loads for IM portable tanks authorized for rail be 2 "g" vertical combined with 3.5 "g" longitudinal and 1.5 "g" lateral for consistency with the loads encountered in rail transportation. The MTB agrees that the severity of longitudinal shock loading in the rail mode—which can exceed 3.5 "g" during switching operations and certain over the road operations such as start, stop, slack run-out and slack run-in—must be considered in order to provide an adequate level of safety through the entire life of an IM portable tank. However, the MTB and the FRA believe that the most efficient method of dealing with this shock load environment with respect to the total multi-modal transportation system is not through increased structural requirements on the specification IM 101 and IM 102 portable tanks which would result in increased unit cost, tare weight, and less efficient transportation of hazardous materials. Rather, the MTB and the FRA believe IM 101 and IM 102 portable tanks, when shipped by rail, should be shipped under conditions approved by the Associate

Administrator for Safety, FRA, including a requirement that rail cars have end-of-car cushioning or its equivalent. Such cushioning reduces over-the-road shock to below 2 "g" longitudinal and substantially reduces coupling shocks. The requirement for FRA approval of IM portable tanks has been added in § 174.63. In addition, a requirement that IM portable tanks not be coupled with excessive force has been added in § 174.84 to reduce high longitudinal shocks.

Safety Vents

The AAR pointed out that the current regulations do not authorize the use of safety vents (frangible discs) for flammable liquids shipped by tank car. The MTB agrees that such a requirement is valid for all bulk shipments of flammable liquids via rail and, accordingly, has added such a requirement for IM portable tanks in § 173.32c.

Also, in consideration of the fact that the AAR prohibits tank cars from having gravity actuated vacuum vents, the MTB has added a requirement that any vents or valves on a portable tank must be designed to provide total containment of the hazardous material in an overturn accident situation.

Portable Tanks in TOFC Service

The AAR expressed the view that the TOFC shipment of IM portable tanks is unsafe for two reasons. First, the AAR believes that there is an increased risk associated with TOFC securement, i.e., the securement of the portable tank to the motor vehicle chassis and the securement of the motor vehicle chassis to the flatcar. Second, the AAR believes that " * * * the combined center of gravity for the flatcar, chassis, and container is approximately 139" and this grossly exceeds the 98" maximum center of gravity for freight cars allowed by paragraph 2.1.3, AAR Specification M-1002."

Even though the AAR did not submit any data, calculations, or test results to support its position, the MTB feels that there may be some merit in the AAR's views. In order to obtain sufficient data to evaluate TOFC service, all sections of this rule pertaining to TOFC service have been removed and will become a part of a new rulemaking action (HM-177) entitled "Transportation of Hazardous Materials in TOFC Service". The MTB has scheduled a public hearing for February 25, 1981, at which time it will receive data, calculations and test results pertaining to the transportation of hazardous materials in TOFC service. MTB is particularly interested in receiving data, calculations, and test

results showing the effectiveness of TOFC securement and the safety effect of a high center of gravity on TOFC service. The notice of the public hearing appears elsewhere in this issue of the Federal Register.

Review By Sections

The following is an analysis and explanation by section of differences between this final rule and the NPRM. Persons interested in significant features of this rule that were not changed from the NPRM are referred to the discussion in the NPRM. Additionally, this review contains a discussion of substantive comments received in response to the NPRM.

Section 107.3. The definition of "approval agency" has been clarified and a definition of "competent authority" has been added.

Sections 107.401-107.405. These sections have been completely revised. Under Part 107, Subpart E, approval agencies will be designated as such by the MTB rather than subjected to an approval process as proposed in the NPRM. It is MTB's desire that IM portable tanks approved by an approval agency designated by MTB be acceptable to other governments in the implementation of their requirements, including international standards. Agencies will be designated by the MTB if they meet the requirements and conditions specified by § 107.402.

Approval agencies may be commercial enterprises or agencies of other governments. One commenter stated " * * * on the subject of Approval Agency * * * rather than leave open to any number of acceptable approving agencies, I feel consideration should be given to another approach. I suggest that those agencies previously qualified, assuming they would still qualify, be designated as 'Approval Agencies'. On those others who apply and are qualified I believe it would be advantageous to limit the number to those who can in combination serve the need of the field but not saturate with its attendant possible problems." The MTB believes any person meeting the required qualifications should be designated as an approval agency. No effort will be taken to restrict the number of qualified applicants seeking designation as approval agencies or to impede competition in the field.

Another commenter objected to excluding IM tank manufacturers and owners from eligibility as approval agencies. The commenter contended that self-certification would not compromise safety nor jeopardize compliance. The commenter further argued that DOT presently allows

manufacturer certification of certain other packagings. The MTB believes IM portable tanks should be certified by an independent inspection agency because IM portable tanks will be authorized for a broad range of hazardous materials and will be exposed to significantly different modal environments. An additional reason for the designated approval agency process is to establish a basis for their acceptability to other national governments. It is anticipated that domestic and foreign approval agencies recognized by foreign governments will apply for designation as approval agencies under this final rule. Therefore, the number of agencies necessary to approve a tank used in international transport will be minimized in that one approval agency may be able to issue approvals acceptable to many national administrations and for various modes of transport thereby reducing the burdens encountered by IM tank manufacturers.

One other commenter questioned whether in proposed § 107.404(a)(5) (which is § 107.405(b) in this final rule), it was the MTB's intent to require notification every time an inspector is hired or fired by the competent authority and all changes in managerial structure, geographic area of service, clients, etc. The commenter contended that the requirement should be revised to require notification to the Associate Director, Office of Hazardous Materials Regulation (OHMR) of only substantive changes in the information submitted in the application for designation as an approval agency. The MTB agrees with the commenter and an applicant is required by the final rule to submit considerably less information in an application than was proposed in the Notice. The MTB believes all required information is essential and is needed to evaluate an agency's continued qualifications to perform the applicable packaging approval function.

The procedures proposed in § 107.406 whereby the Associate Director for HMR may suspend to terminate a designation granted under this subchapter are adopted with a number of modifications in § 107.405 of this rule. It should be noted that § 107.405(a)(3) specifies that failure of a competent authority to recognize qualified designated approval agencies domiciled in the United States may be the basis for suspension or termination of a designation made by the Associate Director for HMR of a foreign approval agency. MTB believes this provision is necessary to assure that IM tank manufacturers will not be unnecessarily

burdened with required use of different inspection agencies serving the same purpose. Obviously, if the United States recognizes the approval agency designated by another government, equal treatment should be expected of that government relative to designated approval agencies domiciled in the United States.

Section 171.7. Paragraphs (c) and (d) of this section have been amended to reflect a reference appearing in § 178.270-3 to the "ISO 82-1974(e) Steel-Tensile Testing."

Section 171.8. Definitions are added for "IM Tank Table" "intermodal portable tank" or "IM portable tank", "outage" or "ullage" and "p.s.i." or "psi."

Section 172.203. A new paragraph (1) has been added to require that any material described on shipping papers by an n.o.s. entry in § 172.101 or § 172.102 and offered for transportation in an IM portable tank have the technical name, component, chemical element or group contributing to the hazard or hazards of the material shown in parentheses.

Section 173.32a. Based on the comments the MTB received on this section several changes were made.

A commenter indicated that it appears that if an approved agency supervises the manufacture of portable tanks, it cannot remain an independent party. MTB agrees and the duties of an approval agency have been revised to reflect that these duties include functions such as review of tank designs and the witnessing of all required tests but do not extend to actually supervising the manufacture of the tanks.

This same commenter suggested that, in paragraph (a), provision to be made to permit an owner or a manufacturer to submit test data on tank designs to reduce the need for certain calculations and to provide consistency with § 178.270-2(c). Another commenter recommended that three sets of all engineering data, rather than two sets, be submitted to an approval agency (as required by § 107.404(b)) in order that the third set could be retained by a field inspector who may even be located in a different geographical location than the main office of the agency. The MTB agrees with both commenters and has made the recommended changes.

Paragraph (d) has been revised, as discussed under the section titled "Impact of This Rulemaking on Existing Exemptions", to permit re-marking of certain portable tanks covered by a DOT exemption.

The MTB has revised proposed paragraph (e) (paragraph (f) herein) in

agreement with a commenter who pointed out that only modifications affecting conformance with § 178.270, that is, the structural integrity of the tank, its support structure or its ability to retain lading, should require prior approval by an approval agency and not minor cosmetic modifications. Also, as suggested by a commenter, an owner or a manufacturer desiring modification of a tank may use another approval agency if the initial approval agency is no longer operating or is not available.

A new paragraph (g) has been added to contain procedures whereby the Associate Director for HMR may terminate an approval certificate if:

1. Information upon which the approval was based is fraudulent or substantially erroneous; or
2. Termination of the approval is necessary to adequately protect against risk to life and property.

However, except in emergency situations, before the Associate Director for HMR may terminate an approval certificate, the owner or manufacturer and the approval agency must be informed of the reasons for the termination and be provided with an opportunity to comment or to achieve compliance.

Section 173.32b. A commenter objected to use of the term "hydrostatic" and suggested that it be replaced with the word "pressure." The commenter contended that hydrostatic applies to the use of water only. While historically the term may have applied in practice to the use of water, most technical references apply the term to any liquids. Therefore, the MTB has not changed its use of the term and any suitable liquid may be used. However, requirements on hydrostatic testing in paragraph (a)(1) have been revised based on a comment that inspection of a tank for corrosion and dents while it is under pressure may not be safe. In addition, requirements in paragraph (a)(2) have been revised to require that spring loaded pressure relief valves must be removed from a tank and tested at least every two and one-half years.

Also, based on objections from several commenters of the cost and inconvenience of using an approval agency to perform the visual inspection, the MTB is permitting the 2½ year interval visual inspection to be satisfied by an owner or his agent or, as proposed in the NPRM, by an approval agency. The MTB has revised these requirements to require that a visual inspection be performed at the time a hydrostatic test is due.

A new paragraph (c) has been added to inform owners of portable tanks meeting the definition of a container (49

CFR 450.3(3)) that these tanks must be offered for international transportation in accordance with the applicable requirements of Parts 450 through 453 of this title. The applicable provisions of these parts are primarily limited to the container frame and attachments for portable tanks.

Based on several comments, in paragraph (d), an alternate location has been provided for test markings. The markings for the hydrostatic test and the visual inspection test required by this section may be marked on the side of a tank near the identification plate, or may be stamped on the identification plate.

The MTB also agrees with a commenter that relief devices in deteriorated or damaged portable tanks that are being repaired or retested, need not be retested unless there is reason to believe that the relief devices are damaged or deteriorated. However, in either case, the valves must be removed from the tank and visually inspected for damage or deterioration. The provisions on damage or deteriorated portable tanks (proposed paragraphs (c) and (d)) have been consolidated in paragraph (e).

The recordkeeping requirements for this section are contained in a new paragraph (f).

Section 173.32c. The MTB has made several modifications to the basic requirements governing the use of specification IM 101 and IM 102 portable tanks proposed in this section.

A new requirement has been added in paragraph (c) of this section to prohibit the filling of an IM portable tank for which the prescribed periodic test and inspection under § 173.32b has become due. The MTB believes this requirement is justified in order to ensure proper maintenance of tanks. The requirement does not apply to any tank filled prior to the test due date.

Two commenters objected to the 55,000 pound gross weight limitation for IM portable tanks in the proposal as being too restrictive when compared to the ISO limit of 67,000 pounds for a 40 foot van. The MTB agrees with the commenters and has deleted the restriction. However, the MTB has added a requirement in paragraph (i) of the rule to specify that in no case may an IM portable tank be loaded to a weight that exceeds the maximum gross weight specified on the tank identification plate. The 55,000 pound gross weight restrictions also has been removed from § 173.32(a)(2).

In paragraph (j), the MTB has specified for IM portable tanks a minimum filling density of 80% by volume to limit dynamic instability that would result from lesser filling densities.

Also, a new paragraph (k) has been added to clarify that there may not be any leakage of material through a frangible disc or tell-tale device. For additional discussion, see the section review of § 178.270-11.

A large number of commenters, responding to the proposal for rear-end protection, expressed their views that the bumper requirements specified in 49 CFR 178.340-8 are not necessary for portable tanks and would place a severe economic burden on shippers. The commenters expressed the view that (1) the bumper requirements in § 178.340-8 are intended to protect the piping under cargo tanks in rear under-ride accidents, (2) that this is not a danger with portable tanks which are carried on trailers and have no exposed piping which could be damaged in under-ride accidents, and (3) the ISO frame and the head thicknesses used in IM portable tanks would provide greater inherent impact resistance when compared to cargo tanks. The MTB agrees with the commenters and has deleted the proposed bumper requirements. However, the MTB has added a requirement in paragraph (1) to preclude overhang or projection of any part of an IM portable tank when loaded on a highway or rail transport vehicle, to assure the protection provided by vehicle itself.

The procedures proposed in paragraph (d) authorizing the Associate Director for HMR to approve, under certain conditions, hazardous materials for transportation in IM portable tanks have been deleted and placed, with modifications, in new § 173.32d.

Section 173.32d. This section contains requirements whereby a person may request the Associate Director for HMR for approval to add a material to the IM Tank Table or to delete an entry from the Table. The procedures for filing an application and the required information to be included in the application are contained in the preface to the IM Tank Table. Note that paragraph (d) specifies that additions to the Table have interim status until opportunity is provided for public comment on each addition.

Section 173.116. Several commenters contended that the proposal relative to outage in paragraph (i) does not relate to UN, IMCO, or DOT cargo tank requirements and, therefore, should not be adopted. The MTB agrees with the commenters and has deleted the proposed outage requirement. See § 173.32c for requirements on filling density.

Section 173.118a. Except for an editorial change, this section was adopted as proposed in the notice.

Section 173.119 through

173.630. These sections contain various amendments to authorize carriage of hazardous materials in specification IM 101 and IM 102 portable tanks. The MTB received many comments requesting authorization to ship various hazardous materials not proposed in the notice in IM 101 and IM 102 specification portable tanks. Many of these comments dealt with specifying tank constructional features necessary to safely ship various hazardous materials. The MTB has adopted the use of the IM Tank Table to provide a clearer and more concise format for the large number of hazardous material involved and to provide harmony with international standards. The MTB carefully reviewed all the comments on hazardous materials, the UN Recommendations and IMCO Code, and the existing regulations in setting the standards in the IM Tank Table. Some materials discussed in various comments are still under review and may be added to the IM Tank Table at a later date.

Sections 174.63 and 174.84. The MTB has revised the heading to § 174.63 to include IM portable tanks and has added a new paragraph (d) to provide for COFC service under conditions approved by the Associate Administrator for Safety, FRA. Section 174.84 has been revised to provide that flat cars carrying IM portable tanks may not be coupled with excessive force. Also, see discussion of AAR's comments above.

Section 178.340. This section is adopted as proposed in the notice.

Section 177.834. This section is revised to provide that IM portable tanks may not be stacked on each other or placed under other freight during transportation by motor vehicle.

Section 178.270-1. The MTB agrees with the commenters on the proposal to this section that a vapor pressure of 43 psia at a temperature of 122°F. instead of 150°F. should be used in order to provide agreement with the criteria used for the IMCO Type 1 and Type 2 portable tank, and accordingly has revised paragraph (a). In addition, the MTB notes that this criteria prohibits the shipment of several flammable liquids (ethylene oxide, etc.), which are considered as a gas in most international regulations, in specification IM 101 tanks. This presents no conflict with DOT regulations, however, since DOT requires the shipment of these materials in high pressure tanks.

Section 178.270-2. The MTB disagrees with the commenter who stated that other acceptable experimental methods for stress analysis of a tank should be

permitted to be approved by an approval agency, instead of the Associate Director for HMR, to expedite handling of such approvals. Section UG-101 of the ASME Code, which is the basis for the approval, is adaptable and should be used. Any other experimental methods need to be approved by the MTB to centralize data on such methods and to minimize duplicative review efforts.

Section 178.270-3. Sections 178.270-3 and 178.270-4 are interrelated and as a result of the incorporation of comments received, the MTB has revised both sections. Several commentors expressed confusion with respect to the materials authorized in proposed § 178.270-3 for the construction of IM 101 and IM 102 intermodal portable tanks and objected to the restriction that only ASME Code specified materials would be authorized. It is the intent of the MTB to limit the materials of construction to steel. The MTB has replaced the word "steel" with the words "carbon and alloy steels" to clarify that all types of steel manufactured to a recognized national code and meeting the specified criteria are authorized for the construction of IM 101 and IM 102 portable tanks. Materials other than steel, such as aluminum, nickel, and monel, are not authorized.

The MTB has also, in § 178.270-3, expanded the authorization for steels and the criteria for the determination of the maximum allowable stress value to permit the use of non-ASME materials by using ASME criteria for the determination of the maximum allowable stress value for the actual steel used. Two methods of deriving the maximum allowable stress values are offered. The first method allows the maximum allowable stress value to be based on the actual measured yield and tensile strengths of the group of plates used to fabricate the tank shell. The yield and tensile strength value is limited to not greater than 120 percent of the minimum values at 93°C. (200°F.) specified in the national standard used to manufacture the steel. This limiting value was chosen because yield and tensile strengths may vary in a plate. The MTB feels that 120 percent is the maximum safe variation from the guaranteed minimum national standard value. The second method allows the maximum allowable stress value to be based on the specified minimum yield and tensile strengths at 93°C. (200°F.) specified by the national standard used to manufacture the material.

Several commenters stated that the evaluation of the maximum allowable stress value at 300°F. is excessive and is not specified in either the UN

Recommendations or IMCO Code. Upon review the MTB agrees that 300°F. is excessive. However, good design practice, the UN Recommendations and the IMCO Code state that in choosing a material and in determining the wall thickness for a tank, the maximum and minimum filling or working temperatures should be taken into account. Therefore, since the working pressure is based on a product vapor pressure at 149°F. for all IM 101 and IM 102 portable tanks and tank shell temperatures over the ullage volume have been measured to be in the range of 200°F., the MTB believes it is reasonable to require the stress evaluation temperature to be at least 200°F. and has amended § 178.270-3 accordingly.

A commenter stated that a gauge length of $L/D=4$ for the tensile test specimen should replace the $L/D=5$ in § 178.270-3. The MTB disagrees. A gauge length of five is used to provide harmony with the UN Recommendations for multimodal tank transport. In addition, the relationship $[L_0 = 5.85 (S_u)^{1/2}]$ between specimen gauge length and cross-sectional area has been added to clarify that both bar and strip specimens are authorized. Also, the MTB has specified usage of the procedures in ISO 82-1974(e) Steels-Tensile Testing. These requirements should cause no undue burden on the domestic IM portable tank industry.

Section 178.270-4. In the NPRM the MTB discussed the inconsistency between the UN/IMCO standards and the ASME requirements regarding maximum allowable stress levels for a tank. The MTB requested comments on the relative merits of both systems and also requested specific comment on the following three issues:

- (a) The potential that safety would be compromised if a 3:1 factor of safety was to be applied in certain cases;
- (b) Any potentially significant barriers to trade that could result from the use of the stress level limitations proposed in the NPRM that are inconsistent with those in the international standards; and,
- (c) The extent to which tanks constructed to a 3:1 factor of safety are actually in use throughout the world and reports of relevant transportation experience concerning such tanks.

The MTB received 11 comments on the maximum allowable stress value. The commenters included foreign tank manufacturers, domestic and foreign shippers and carriers, and an approval agency. The opinions expressed by the commenters fell into three groups: those supporting a 3:1 factor of safety; a 4:1 factor of safety; and a 3:1 factor of

safety provided adequate safety is demonstrated.

One of the six commentors who supported the 3:1 factor of safety proposed other control measures which would in effect result in a tank with a factor of safety greater than 4:1. Cost was the principal reason for support of the 3:1 factor of safety. Other reasons cited were the adequacy of the 3:1 factor of safety and the adverse affect of inconsistent stress levels on the free movement of the tanks in international trade.

Unfortunately, the MTB did not receive any analysis or data to support either the 4:1 or 3:1 factor of safety. Thus, the MTB evaluated the two systems based on available data and the physical requirements of the two systems to define the safety and economic effects of the inconsistencies between the two systems.

For austenitic stainless steel, the ASME Code limits the maximum allowable stress at test pressure to the lower of 93.75 percent of the specified minimum yield strength determined at the 0.2 percent offset. Similarly, international standards limit stress at the test pressure to the lower of 75 percent of the specified minimum yield strength at the 1.0 percent offset. When the maximum allowable stresses for these two systems are compared for specific materials, the stress is found to be essentially equal and controlled by the 75 percent of the yield strength for the UN/IMCO. In effect, the result of using either system will be a tank having approximately the same shell thickness. The MTB believes that it is advantageous to be in harmony with UN Recommendations and the IMCO Code when possible. Therefore, for austenitic stainless steels, the MTB is adopting the UN/IMCO method as well as the ASME method for specifying the maximum allowable stress levels.

For carbon and low alloy steels, the ASME Code limits the maximum allowable stress at test pressure to the lower of 93.75 percent of the specified minimum yield strength or 37.5 percent of the specified minimum tensile strength. This method utilizes a 0.2 percent offset. The ASME Code stress levels insure at all times a minimum factor of safety of 4:1 against ultimate strength (at the maximum allowable working pressure): whereas, the UN/IMCO stress levels would permit a range in the factor of safety from approximately 4:1 to approximately 3:1 against the ultimate strength at that pressure.

In the UN Recommendations and the IMCO Code, and as the MTB proposed in the NPRM, the determination of the

tank wall thickness is a function of minimum wall thickness requirements as well as the maximum allowable stress requirements. In evaluating the respective influence of each of these parameters on the side walls of a tank, the MTB found that in almost all cases the minimum wall thickness requirements exceed the thickness required by hoop stress. In most of the applications for exemption received by the MTB for IM portable tanks, the "fixed minimum" wall thickness of the cylindrical shell portion as established by the IMCO Code regulations and the UN Recommendations exceed the thicknesses required by ASME. Thus, in the side walls of the tanks, the minimum thickness requirement controls the required wall thickness and the 4:1 vs 3:1 factor of safety has little effect on the tank design.

The MTB believes that IM portable tanks must be capable of resisting the bending, torsion and shear stresses created by the cyclic application of loadings. To adequately resist such forces, careful consideration must be given to the structural reinforcements in those vital areas where the mechanically induced stresses, in addition to pressure induced stresses, are significant factors. Most tank failures result from fracture starting at a flaw, crack, or stress concentration. The more common locations of stress concentrations are at openings and attachments, and it is in such areas that it is particularly important to maintain the margin of strength and safety—through added reinforcement—provided by the ASME Code. In addition, the IM portable tank specifications and the corresponding international standard do not prescribe heat treatment or radiographic examination of welds which are important requirements in tank designs having a factor of safety below 4:1. Considering all factors in the design of the IM 101 and IM 102 portable tanks, a tank designed with a 3:1 factor of safety offers no significant economic advantage in cost over a tank designed with a 4:1 factor of safety. For these reasons the MTB has adopted the maximum allowable stress values for carbon and low alloy steel as proposed.

Section 178.270-5. A new paragraph (d) in § 178.270-5 has been added to provide greater compatibility with the UN Recommendations and to provide a better definition of the minimum wall thickness requirements for portable tanks used to transport certain hazardous materials for which the IM Tank Table requires greater thickness than the standards values specified in § 178.270-5(b). In this case, the specified

minimum shell and head thickness is based on the steel defined in paragraph § 178.270-5(a) and on a tank diameter of 1.8m (5.9 feet). For other materials of construction and for different diameters, the required wall thickness varies as defined by the formula (that is, thinner wall thicknesses for stronger materials of construction, thicker walls for larger diameter tanks).

The metric and nonmetric equivalencies specified for tank shell thickness in the UN Recommendations and IMCO Code are not equivalent, but are based on the closest standard plate thickness. In the final rule, minimum shell thicknesses are specified for the reference mild steel. These thicknesses must also be used as the basis for the calculation of the equivalent minimum shell thickness for other steels. The MTB has based the minimum allowed shell thickness on the larger of the standard plate thicknesses specified in the UN Recommendations and the IMCO Code.

Section 178.270-6. A new paragraph (b) has been added to require that IM portable tanks designed for international transportation must be in accordance with 49 CFR Parts 450 through 453.

Section 178.270-7. The MTB has revised § 178.270-7 to clarify the requirements for welded joints in the tank shells. The ASME Code has been referenced for weld procedures and welder performance. Additionally, the MTB agrees with several commentors that the requirement for all longitudinal welds to be in the upper half of the tank shell is too restrictive and is not practical for low pressure tanks constructed of stainless steel, which is the predominant material used for IM portable tanks. Therefore, the MTB has deleted proposed paragraph 178.270-7(b).

Section 178.270-8. Except for an editorial change, this section is adopted as proposed in the notice.

Section 178.270-9. The MTB, in agreement with a commenter, has reduced the minimum size requirements for inspection openings. In addition, for clarity, the MTB has added the requirement that each inspection opening must be located above the liquid level in any tank. This requirement is implied by both the UN Recommendation and the IMCO Code.

Section 178.270-10. A commenter recommended that the phrase "and in any case at least three pounds per square inch" be added at the end of § 178.270-10(b) to provide protection from tank collapse due to vacuum and to provide better compatibility with the UN Recommendations. The MTB agrees and has added the phrase "and in any case

at least 0.21 bar (3 p.s.i.)" to the end of paragraph 178.270-10(b).

Section 178.270-11. This section had been completely revised. To provide closer harmony with the UN Recommendation and the IMCO Code in proposed paragraph 178.270-11(a)(1) (paragraph (a)(1) herein), the cut-off point for when a portable tank must be equipped with a spring-loaded pressure relief device has been changed from a capacity of "500 gallons or more" to "more than 500 gallons." Thus, a 500-gallon tank is excluded from the requirement for a spring-loaded pressure relief device.

Two commenters argued that a certain amount of flexibility should be provided in the siting of the pressure relief devices specified in proposed paragraph (b)(2) (paragraph (b)(1) in this rule). The MTB agrees with the necessity for flexibility in the siting location but believes it is necessary to place a boundary on the allowable siting locations. A requirement for the siting pressure relief valve inlets, in the top center of the tank has been added with a specified limitation.

Two commenters pointed out that the proposed requirement in paragraph (b)(4) that the valve disc in a spring-loaded pressure relief device must be free to turn on its seats has practical drawbacks, particularly when flame-traps and anti-ice devices are installed. The MTB agrees that these drawbacks would offset any intended safety benefits and has deleted the requirement. Proper functioning of the valves is better assured by periodic valve inspection and retesting.

Two other commenters pointed out that the use of a frangible disc on the inlet side of a spring-loaded pressure relief valve for the transportation of highly corrosive materials was not addressed in the NPRM. The added requirements in paragraph (a)(3), recommended by one commenter, are based on the UN Recommendations and the IMCO Code. If a frangible disc is inserted in series with a pressure relief valve, the space between the disc and the valve must be provided with a suitable tell-tale indicator, pressure gage, needle valve, try cock, etc. to permit detection of frangible disc leakage as a result of pinholing or disc rupture. A frangible disc will not burst at the intended internal tank pressure should pressure build up in the space between the disc and the pressure relief valve. In an extreme case in which the tank is subject to a very rapid pressure rise as for example in the case of a fire, the disc may not rupture below the tank test pressure. Any possibility of pressure build up in the region between the disc

and the safety relief valve would be eliminated if an open vent is used. However, such a vent would result in the release of hazardous vapors in the event of a premature failure of a frangible disc. Therefore, any tell-tale indicator for the space between the frangible disc and the safety relief valve must be designed to preclude loss of any hazardous material during transportation. After filling and prior to transportation, the tell-tale indicator must be inspected to determine that the disc is vapor tight. Instructions for the use of the tell-tale indicator must be provided in the vicinity of the indicator at all times.

A commenter stated that in proposed paragraph 178.270-11(d) (paragraph (c) herein) the primary pressure relief device setting be related to the product (total containment pressure) and not the tank (maximum allowable working pressure—MAWP) in order to remove conflict with European land mode maximum allowable relief valve settings. The setting of primary relief valves on the basis of the maximum allowable working pressure is the method used in the UN Recommendations and the IMCO Code. This method uses total containment pressure as only one of the criteria used to authorize a hazardous material in a particular tank and allows great flexibility in the commodities authorized for shipment in a particular tank. In the case where the total containment pressure is substantially below the MAWP, a greater margin of product containment is provided. Thus, the MTB believes that a change to the proposal is not necessary.

A commenter argued that in proposed paragraph (d)(1) (also (d) herein) one standard cubic foot of air per minute per 30 square feet of exposed tank area was too small a value for a minimum relief valve capacity. The MTB agrees and has revised this paragraph to include: first, a minimum valve size and capacity for each spring-loaded relief device, and second, the minimum total relief valve capacity for each tank as specified in the MC 307 cargo tank specification. This criteria has been used in the evaluation of portable tank exemption applications for many years.

Proposed paragraph 178.270-11(d)(2) (paragraph (d)(2) herein) has been revised for clarity to provide that, regardless of the pressure relief device type and design, the pressure in a tank, even in a fire situation, may never exceed the test pressure of the tank. The minimum cross sectional area requirement for vacuum relief valves

was deleted from § 178.270-11(d)(1) and placed in § 178.270-11(d)(4).

Two commenters objected to usage of the tabular requirement in proposed paragraph (d)(3) for the minimum total emergency vent capacity as too restrictive and not in full harmony with the UN Recommendations and the IMCO Code. After review of these requirements, the MTB agrees with the commenters and has added as an alternative to the table, a formula based on the Compressed Gas Association's Pamphlet S-1.2 to allow the minimum emergency vent capacity to be sized for a specific hazardous material or group of materials intended for transportation in a particular IM portable tank. When this approach is used, the tank approval certificate must specify those hazardous materials that may be transported in the tank based on the reduced vent capacity.

One commenter questioned the justification for the greatly increased values in Table I, Minimum Emergency Vent Capacity, as compared with the values stated in current regulations for cargo tanks in § 178.342-5. The MTB has three reasons for using the values given in Table 1: (1) Table 1 is identical with the corresponding table given in both the UN Recommendations and in the IMCO Code; (2) the table is designed to provide a safe total venting capacity for all hazardous materials transported in IM 101 and IM 102 intermodal portable tanks; and, (3) because of the size and intermodal nature of IM 101 and IM 102 portable tanks, the probability of these tanks being in a total fire engulfment situation is higher than for a cargo tank. Therefore, the MTB has determined that the total vent capacities required in Table I are fully justified.

Several parties recommended that the MTB eliminate the high temperature insulation requirement and authorize the use of readily available insulating materials in proposed paragraph (d)(3) (paragraph (d)(5) herein). The 1200°F. requirement for the insulation and jacket materials is in full harmony with the corresponding UN Recommendations and IMCO Code. The MTB feels it is necessary to maintain this harmony for the IM 101 and IM 102 intermodal portable tanks. Also, since the total venting requirement for the tank is substantially reduced when the requirements of (f)(4) are met, it is appropriate that the thermal integrity requirements remain high. In addition, the MTB wishes to clarify that when the effects of insulation are not used to reduce the required total venting capacity, only the provisions of § 178.270-2(e) are applicable to the

insulation. The MTB has also redefined the coefficient "F" in proposed paragraph (d) (paragraph (d) in this rule) using the same relationship used by both the UN Recommendations and the IMCO Code.

Upon further consideration the MTB has revised proposed § 178.270-11(e)(2) (now paragraph (d)(6)) to authorize flow rating at 110% of the MAWP.

Section 178.270-12. Two commenters recommended that the location for internal discharge valves be expanded to include "within its companion flange." Also, they recommended the addition of a requirement for a shear section outboard of the internal discharge valve. The MTB feels the recommendations are valid and are in harmony with both DOT and international requirements and they have been adopted in paragraphs § 178.270-12 (d) and (e).

Section 178.270-13. The § 178.270-13(d) heading has been revised and the MTB has provided that a tank identical in design, except of a smaller size, to a previously tested and approved tank need not be prototype qualification tested.

Section 178.270-14. A requirement has been added in this section that the relief valve settings must be included on the identification plate of an IM portable tank to avoid confusion during inspection and testing. The provisions concerning the identification plate have been amended by the change of entries and the size of the lettering and by the addition of metric units to provide harmony with the UN Recommendation and the IMCO Code. The location for the marking of the date and identification of the witnessing or performing party for both the last visual inspection and the last hydrostatic test has been made optional to provide operational flexibility. The markings may be on the tank or on the metal identification plate in accordance with the provisions of § 173.32b(d).

Sections 178.271 and 178.272. The IM 101 and IM 102 portable tanks must be designed and constructed in accordance with the ASME Code, with the few exceptions noted in the specification. Inspection and supervision of testing, however, must be performed by an approval agency and not ASME. Therefore, the MTB has added the statement "ASME certification and stamp not required" to both § 178.271 and § 178.272 for clarity.

Also, concerning effective dates, the MTB must comply with the Federal Reports Act of 1942 and procedures administered thereunder by the Office of Management and Budget (OMB) relating to prior clearance of recordkeeping

requirements imposed by Federal regulatory action. Prior OMB clearance is required with respect to the provisions adopted herein which impose recordkeeping or report preparation requirements.

MTB will inform the public through notification in the Federal Register when OMB clearance of these requirements has been received. It is anticipated that this clearance process will be completed prior to the effective date prescribed herein.

In consideration of the foregoing, Parts 107, 171, 172, 173, 174, 176, 177, and 178 are amended as follows:

PART 107—HAZARDOUS MATERIALS PROGRAM PROCEDURES

1. In the table of sections for Part 107, a new Subpart E heading and entries are added to read as follows:

Subpart E—Designation of Approval Agencies

- 107.401 Purpose and scope.
- 107.402 Application for designation as an approval agency.
- 107.403 Designation of approval agencies.
- 107.404 Conditions of designation.
- 107.405 Termination of designation.

2. In § 107.3, new definitions for "approval agency" and "competent authority" are added in alphabetical sequence to read as follows:

§ 107.3 Definitions.

"Approval Agency" means an organization or a person designated by the MTB to certify packagings as having been designed, manufactured, tested, modified, marked or maintained in compliance with applicable DOT regulations.

"Competent Authority" means a national agency responsible under its national law for the control or regulation of the transportation of hazardous materials (dangerous goods). The MTB is the United States Competent Authority.

3. In Part 107, a new Subpart E is added to read as follows:

Subpart E—Designation of Approval Agencies

§ 107.401 Purpose and scope.

This subpart establishes procedures for the designation of approval agencies to issue approval certificates for packagings as having been designed, manufactured, tested, or maintained in compliance with the requirements of this subchapter and Subchapter C of this

chapter. This subpart does not apply unless made applicable by a rule in Subchapter C of this chapter.

§ 107.402 Application for designation as an approval agency.

(a) Any organization or person seeking designation as an approval agency shall apply in writing to the Associate Director for Hazardous Materials Regulation (DMT-20), Department of Transportation, 400 Seventh Street, S.W., Washington, D.C. 20590. Each application must be signed and certified to be correct by the applicant or, if the applicant is an organization, by an authorized officer or official representative of the organization. Any false statement or representation, or the knowing and willful concealment of a material fact, may subject the applicant to prosecution under the provisions of 18 U.S.C. 1001, result in the denial or termination of a designation.

(b) Each application for designation must be in English and include the following information:

(1) Name and address of the applicant, including place of incorporation if a corporation. In addition, if the applicant is not a resident of the United States, the name and address of a permanent resident of the United States designated in accordance with § 107.7 to serve as agent for service of process.

(2) If the applicant's principal place of business is in a country other than the United States, a copy of the designation from the Competent Authority of that country delegating to the applicant an approval authority for the type of packaging for which a DOT designation is sought, and a statement that the Competent Authority also delegates similar authority to U.S. Citizens or organizations having designations under this subpart from the MTB.

(3) A listing, by DOT specification (or exemption) number, of the types of packagings for which approval authority is sought.

(4) A personnel qualifications plan listing the qualification that the applicant will require of each person to be used in the performance of each packaging approval function. As a minimum, these qualifications must include—

(i) The ability to review and evaluate design drawings, design and stress calculations;

(ii) A knowledge of the applicable regulations of this subchapter;

(iii) The ability to conduct or monitor and evaluate test procedures and results; and

(iv) The ability to review and evaluate the qualification of materials and fabrication procedures.

(5) A statement that the applicant will perform its functions independent of the manufacturers and owners of the packagings concerned.

(6) A statement that the applicant will allow the Associate Director for HMR or his representative, to inspect its records and facilities in so far as they relate to the approval of specification packagings and shall cooperate in the conduct of such inspections.

(c) The applicant shall furnish any additional information relevant to the applicant's qualifications, if requested by the Associate Director for HMR.

§ 107.403 Designation of approval agencies.

(a) If the Associate Director for HMR determines that an application contains all the required information, the applicant is sent a letter of designation and assigned an identification code.

(b) If the Associate Director for HMR determines that an application does not contain all the required information, the application is denied and the applicant is sent a written notice containing all the reasons for the denial.

(c) Within 30 days of an initial denial of an application under paragraph (b) of this section, the applicant may file an amended application. If after considering the amended application, the Associate Director determines that it should be denied, he notifies the applicant, and the denial constitutes the final action of the Associate Director on the application. Within 60 days of receipt of the final denial the applicant may appeal the denial to the Director, MTB, setting forth in writing where the Associate Director erred in this determination.

§ 107.404 Conditions of designation.

(a) Each designation made under this subpart contains the following conditions:

(1) The designated approval agency may use only testing equipment that it has determined, through personal inspection, to be suitable for the purpose.

(2) Each approval certificate issued by the designated approval agency must contain the name and identification code of the approval agency.

(3) Each approval certificate must be in a format acceptable to the Associate Director for HMR.

(b) The designated approval agency shall notify the Associate Director for HMR within 20 days after the date there is any change in the information submitted under § 107.402.

(c) The designated approval agency shall comply with all of the terms and conditions stated in its letter of designation under this subpart.

(d) Nothing in this Part relieves a manufacturer or owner of a packaging of responsibility for compliance with any of the applicable requirements of this title.

§ 107.405 Termination of designation

(a) Any designation issued under § 107.403 of this subchapter may be suspended or terminated if the Associate Director for HMR determines that:

(1) The application for designation contained a misrepresentation, or the applicant willfully concealed a material fact.

(2) The approval agency failed to comply with a term or condition stated in the agency's letter of designation.

(3) The Competent Authority of an approval agency of a country outside the United States has failed to initiate, maintain or recognize a qualified U.S. approval agency.

(b) Before a designation is suspended or terminated, the Associate Director for HMR shall give to the approval agency:

(1) Written notice of the facts or conduct believed to warrant suspension or termination of the designation.

(2) Sixty days in which to show in writing why the designation should not be suspended or terminated.

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

4. In § 171.7, paragraphs (c)(29), (d)(23) and (f) are added to read as follows:

§ 171.7 Matter incorporated by reference.

(c) * * *
(29) ISO: International Organization for Standardization, Case Postale 56, CH-1211 Geneve 20, Switzerland. Also available from the American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.

(d) * * *
(23) "ISO 82-1974(e) Steel-Tensile Testing." First Edition 1974-08-01.

(f) The material listed in this section has been approved for incorporation by reference by the Director of the Federal Register. These materials are incorporated as they exist on the date of the approval and a notice of any change in these materials will be published in the Federal Register. The material incorporated by reference is available for inspection at the Office of the Federal Register Information Center,

Room 8301, 1100 L Street, NW,
Washington, D.C. 20406.

§ 171.8 [Amended]

5. In § 171.8 definitions for "IM Tank Table," "Intermodal portable tank or IM portable tank," "outage or ullage" and "p.s.i. or psi" are added in alphabetical sequence to read as follows:

"IM Tank Table" means the table (with preface) listing hazardous materials approved by the Associate Director of HMR for carriage in IM portable tanks under special conditions specified therein.

"Intermodal portable tank" or "IM portable tank" means a specific class of portable tanks designed primarily for international intermodal use.

"Outage" or "ullage" means the amount by which a packaging falls short of being liquid full, usually expressed in percent by volume.

"P.s.i." or "psi" means pounds per square inch.

PART 172—HAZARDOUS MATERIALS TABLE AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

6. § 172.203, paragraph (1) is added to read as follows:

§ 172.203 Additional description requirements.

(1) *IM portable tanks.* A hazardous material described by an "n.o.s" entry in § 172.101 or § 172.102 (when authorized) and offered for transportation in an IM portable tank must be described on shipping papers in accordance with the provisions of paragraph (i)(2) of this section.

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

7. The Table of Sections to Subpart B, Part 173, is amended by revising the entry for § 173.32 and adding new entries for §§ 173.32a, 173.32b, 173.32c and 173.32d to read as follows:

173.32 Qualification, maintenance and use of portable tanks other than Specification IM portable tanks.

173.32a Approval of Specification IM portable tanks.

173.32b Periodic testing and inspection of Specification IM portable tanks.

173.32c Use of Specification IM portable tanks.
 173.32d Additions, modifications and removals of entries in the IM Tank Table.
 * * * * *

§ 173.32 [Amended]

8. In § 173.32, paragraph (a)(2) is removed.

9. Sections 173.32a, 173.32b, 173.32c and 173.32d are added to read as follows:

§ 173.32a Approval of Specification IM portable tanks.

(a) Application for approval.

(1) An owner or manufacturer of an IM portable tank (§§ 178.270–178.272 of this subchapter) shall apply for approval to any approval agency designated to approve that tank in accordance with the procedures in Subpart E, Part 107 of this chapter.

(2) Each application for approval must contain the following information:

(i) Three complete copies of all engineering drawings, calculations, and test data necessary to insure that the design complies with the relevant specification.

(ii) The manufacturer's serial number that will be assigned to each portable tank.

(iii) A statement as to whether the design type has been examined by any approval agency previously and judged unacceptable. Affirmative statements must be documented with the name of the approving agency, reason for nonacceptance, and the nature of modifications made to the design type.

(b) *Action by approval agency.* The approval agency shall—

(1) Review the application for approval to determine whether it is complete and conforms with the requirements of paragraph (a) of this section. If an application is incomplete, it will be returned to the applicant and the applicant will be informed in what respects the application is incomplete.

(2) Review all drawings and calculations to ensure that the design is in compliance with all requirements of the relevant specification. If the application is approved, one set of the approved drawings, calculations, and test data shall be returned to the applicant. The second and third (inspector's copy) sets of approved drawings, calculations, and test data shall be retained by the approval agency.

(3) Witness all tests required in § 178.270–13 of this subchapter.

(4) Ensure, through appropriate inspection that each IM portable tank is fabricated in all respects in conformance with the approved

drawings, calculations, and test data; and

(5) Upon successful completion of all requirements of this subpart, the approval agency shall:

(i) Apply its name, identifying mark or identifying number, and the date upon which the approval was issued, to the metal identification plate required by § 178.270–14 of this subchapter.

(ii) Issue an approval certificate for each IM portable tank or, in the case of a series of identical tanks manufactured to a single design, for the series of IM portable tanks. The approval certificate must include all the information required to be displayed on the required metal identification plate.

(c) *Disposition of approval certificates.* A copy of each approval certificate shall be retained by the approval agency and by the owner of each IM portable tank, and a copy shall be forwarded by the approval agency to the Associate Director for HMR.

(d) *Denial of application for approval.* If an approval agency finds that an IM portable tank cannot be approved for any reason, it shall so notify the applicant in writing and shall provide the applicant with the reasons for which the approval is denied. An applicant aggrieved by a decision of an approval agency may appeal the decision in writing within 90 days of receipt to the Associate Director for HMR.

(e) *Approval of IM portable tank under DOT exemption.* The owner or manufacturer of an IM portable tank constructed on or before May 1, 1981, which is covered by the provisions of a DOT exemption, shall examine the tank and the tank designs to determine if it meets the requirements of an IM 101 or IM 102 specification portable tank.

(1) IM portable tanks in conformance with the following requirements, or any combination thereof, may be durably remarked (certified) as a DOT specification IM101E**** or IM102E**** as applicable (with the asterisks replaced by the DOT exemption number).

(i) Any IM portable tank in full conformance with an IM 101 or IM 102 specification;

(ii) Any IM portable tank which is modified or re-rated and brought into full conformance with an IM 101 or IM 102 specification;

(iii) Any IM portable tank having the safety relief device (including its inlet) sited along the top of the tank within 12 degrees from the top longitudinal centerline, if the inlet is situated in the vapor space of the tank and the tank is otherwise in conformance with the applicable IM 101 or IM 102 specification;

(iv) Any IM portable tank constructed of austenitic stainless steels having an absolute minimum equivalent head and shell thickness of 3.00 mm (0.118 inches) or greater and which is otherwise in conformance with the IM 102 specification.

(v) Any IM portable tank with an outside diameter greater than 1.8 m (5.9 feet) constructed of other than the reference mild steel which, while otherwise in conformance with the IM 101 specification, has a minimum shell thickness not less than the value derived from the formula in § 178.270–5(c) of this subchapter based on a required thickness of the reference steel of 6 mm (0.236 inches).

(2) The owner or manufacturer of a portable tank which is certified (re-marked) as meeting an IM 101 or IM 102 specification shall complete a written report. One copy of the report shall be forwarded to the Associate Director for HMR by the person making the certification within thirty days of the date of certification. A copy of the report shall be retained by the manufacturer (if he performs the certification) and the owner at his principal place of business during the period the portable tank is in his ownership and for at least one year thereafter. The report shall contain the following information:

(i) A statement certifying that each portable tank or a series of identical tanks manufactured to a single design is in compliance, except as provided by paragraph (e)(1) of this section, with the applicable IM 101 or IM 102 Specification (§§ 178.270, 178.271 and 178.272, of this subchapter).

(ii) The identification of the person certifying the portable tank and the date of the certification.

(iii) The applicable DOT exemption number and the serial number of each tank covered by the report.

(iv) A summary of any modifications made to the tank to bring it into conformance with the applicable IM 101 or IM 102 specification and the provisions of paragraph (e)(1) of this section when they apply.

(3) If an IM portable tank covered by an exemption cannot meet the appropriate requirements specified in paragraph (e)(1) of this section, the owner or manufacturer of the portable tank shall advise the Associate Director for HMR before September 1, 1981, giving the reasons why the necessary modification cannot be made.

(f) Approval of other existing IM portable tanks.

Portable tanks constructed on or before May 1, 1981, that have not operated under a DOT exemption must

be approved in accordance with the provisions of paragraph (b) of this section.

(g) *Modifications to approved portable tanks.*

(1) Prior to modification of any approved portable tank which may affect conformance to § 178.271 or § 178.272 of this subchapter, the owner or manufacturer desiring to make such modification shall inform the approval agency that issued the initial approval of the portable tank (or if unavailable another approval agency) of the nature of the modification and request approval of the modification. The owner or manufacturer shall supply the approval agency with three sets of all revised drawings, calculations, and test data relative to the intended modification.

(2) A statement as to whether the intended modification has been examined by any approval agency previously and judged unacceptable. An affirmative statement must be documented with the name of the approving agency, the reason for nonacceptance, and the nature of changes made to the modification since its original rejection.

(3) The approval agency shall review the request for modification, and if it is determined that the proposed modification is in full compliance with the relevant DOT specification the request shall be approved and the approval agency shall—

(i) Return one set of the approved revised drawings, calculations, and test data to the applicant. The second and third sets of the approved revised drawings, calculations, and test data shall be retained by the approval agency as required in § 107.404(a)(3) of this chapter.

(ii) Ensure through appropriate inspection, that all modifications conform to the revised drawings, calculations, and test data.

(iii) Determine the extent to which retesting of the modified tank is necessary based on the nature of the proposed modification, and ensure that all required retests are performed in accordance with § 178.270-13 of this subchapter.

(iv) If modification to an approved tank alters any information on the approval certificate, issue a new approval certificate for the modified tank and ensure that any necessary changes are made to the metal identification plate. A copy of each newly issued approval certificate shall be retained by the approval agency and by the owner of each portable tank.

(4) If it is determined that the proposed modification is not in compliance with the relevant DOT specification, the

request shall be denied. The procedures of paragraph (d) of this section apply to such denial.

(h) *Termination of Approval Certificate.*

(1) The Associate Director for HMR may terminate an approval issued under this section if he determines that—

(i) Information upon which the approval was based is fraudulent or substantially erroneous; or

(ii) Termination of the approval is necessary to adequately protect against risks to life and property.

(iii) The approval was not issued by the approval agency in good faith.

(2) Before an approval is withdrawn, the Associate Director for HMR gives the owner or manufacturer and the approval agency—

(i) Written notice of the facts or conduct believed to warrant the withdrawal;

(ii) Opportunity to submit oral and written evidence, and

(iii) Opportunity to demonstrate or achieve compliance with the application requirement.

(3) If the Associate Director for HMR determines that a certificate of approval must be withdrawn to preclude a significant and imminent adverse effect on public safety, he shall withdraw the certificate of approval issued by a designated approval agency. In such circumstances, the procedures of paragraphs (h)(2)(ii) and (iii) of this section need not be provided prior to withdrawal of the approval, but shall be provided as soon as practicable thereafter.

§ 173.32b Periodic testing and inspection of Specification IM portable tanks.

(a) *Periodic testing.*—(1) *Hydrostatic test.* Each Specification IM portable tank (§§ 178.270, 178.271 and 178.272 of this subchapter) and all piping, valves and accessories, except pressure-relief devices, shall be hydrostatically tested with water, or other liquid of similar density and viscosity, to a pressure not less than 150 percent of its maximum allowable working pressure. Testing shall be at intervals of not more than five years. While under pressure the tank shall be inspected, for leakage, distortion, or any other condition which might render the tank unsafe for service. The hydrostatic test shall be witnessed by an approval agency. Any damage or deficiency which might render the portable tank unsafe for service shall be repaired to the satisfaction of the witnessing approval agency and the tank hydrostatically retested. Upon successful completion of the hydrostatic test, the witnessing approval agency shall apply its name, identifying mark or

identifying number and the date of the test on the tank as described in paragraph (d) of this section.

(2) *Pressure relief valves.* Spring loaded pressure relief valves must be removed from the tank and tested at intervals of not more than two and one-half years.

(b) *Visual inspection.* Each portable tank and all piping, valves and accessories shall be visually inspected at intervals not exceeding two and one-half years. The inspection shall be conducted by an owner or his agent or by an approval agency, except that it must be conducted by an approval agency coincident with each hydrostatic test required by paragraph (a) of this section. In the case of insulated tanks, insulation need not be removed if, in the opinion of the person performing the visual inspection, external corrosion is likely to be negligible. If evidence of any unsafe condition is discovered, the portable tank may not be returned to service until such condition has been corrected to the satisfaction of the person performing the inspection. The inspection shall include the following:

(1) The tank shall be carefully inspected internally for corroded areas, dents, distortions, defects in welds, and other conditions that might render the tank unsafe for service;

(2) The piping, valves, and gaskets shall be carefully inspected for corroded areas, defects in welds, and other conditions, including leakage, that might render the tank unsafe for service;

(3) Devices for tightening manhole covers must be operative and there must be no leakage at manhole covers or gaskets.

(4) Missing or loose bolts or nuts on any flanged connection or blank flange must be replaced or tightened.

(5) All emergency devices and valves must be free from corrosion, distortion and any damage or defect that could prevent their normal operation.

(6) Required markings on the tank must be legible.

(7) Upon successful completion of the visual reinspection, the inspector shall mark the date of the visual reinspection on the tank as described in paragraph (d) of this section.

(c) *International shipments.* A portable tank that meets the definition of "container" in § 450.3(a)(3) of this title may not be offered for international transport unless the frame work, tank supports and lifting attachments fully comply with all applicable requirements of Parts 450-453 of this title.

(d) *Test date marking.* The month and year of the last hydrostatic test, the identification markings of the approval agency witnessing the test, and the date

of the last visual inspection must be durably and legibly marked on or near the metal identification plate in letters not less than 3 mm (0.118 inches) high when on the metal identification plate and 32 mm (1.25 inches) high when on the tank.

(e) *Damaged or deteriorated portable tanks.* Without regard to any other test requirement, any tank that shows evidence at any time of damaged or corroded areas, leakage, or other deterioration that indicates a weakness that could render the tank unsafe for service, must be inspected and tested in accordance with the requirements of paragraphs (a) and (b) of this section prior to reuse. Pressure relief devices need not be tested or replaced unless there is reason to believe the relief devices have been affected by the damage or deterioration.

(f) *Record retention.* The owner of each portable tank or his authorized agent shall retain a written record of the date and results of all required tests, (including visual inspections), and the name and address of the person performing the test, until the next retest has been satisfactorily completed and recorded.

§ 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 and under conditions approved by the Associate Director for HMR in the IM Tank Table.

(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 and the conditions and limitations specified in the IM Tank Table for the hazardous material.

(c) An IM portable tank for which the prescribed periodic retest or reinspection under § 173.32b of this subchapter has become due may not be filled and offered for shipment until the retest or reinspection has been successfully completed. This paragraph does not apply to any tank filled prior to the test due date.

(d) Prior to filling, each IM portable tank shall be given a complete external inspection. Any unsafe condition must be corrected prior to its use. The external inspection shall include:

(1) A visual inspection of—

(i) The shell, piping, valves and other appurtenances for corroded areas, dents, defects in welds and other defects such as missing, damaged, or leaking gaskets;

(ii) All flanged connections or blank flanges for missing or loose nuts and bolts;

(iii) All emergency devices for corrosion, distortion, or any damage or defect that could prevent their normal operation; and

(iv) All required markings on the tank for legibility.

(2) An inspection to determine that any device for tightening manhole covers is operative and adequate to prevent leakage at the manhole cover.

(e) A hazardous material may not be loaded in an IM portable tank if the part of the tank or any of its appurtenances having contact with the material during transportation would be subject to destructive attack by or a dangerous reaction with the material.

(f) A hazardous material may not be loaded in an IM portable tank unless it has pressure relief devices providing total relieving capacity meeting the requirements of § 178.270-II(d) of this subchapter.

(g) A hazardous material may not be loaded in an IM portable tank with filling or discharge connections located below the normal liquid level of the tank unless—

(1) Each filling or discharge connection located below the normal liquid level of the tank has at least two serially-mounted closures consisting of an internal discharge valve and a bolted blank flange or other suitable, liquid-tight closure on each filling or discharge connection; or

(2) When required for a hazardous material by the IM Tank Table, 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.

(h) Except during a hydrostatic test, an IM portable tank may not be subjected to a pressure greater than its maximum allowable working pressure.

(i) An IM portable tank may not be loaded to a gross weight greater than the maximum allowable gross weight specified on its identification plate.

(j) An IM portable tank or compartment thereof having a volume greater than 5,000 liters (1,900 gallons) may not be loaded to a filling density less than 80 percent by volume.

(k) The outage for an IM portable tank may not be less than 2 percent at a temperature of 122°F (50°C).

(l) Each tell-tale indicator for the space between a frangible disc and a

safety relief valve mounted in series must be checked after the tank is filled and prior to transportation to ensure that the frangible disc is leak free. Any leakage through the frangible disc must be corrected prior to offering the tank for transportation. The tell-tale device must be designed to prevent the loss of any hazardous material through the device itself while the tank is in transportation.

(m) An IM portable tank containing a hazardous material may not be loaded on a highway or rail transport vehicle unless loaded entirely within the horizontal outline thereof, without overhang or projection of any part of the tank assembly.

(n) Specification IM 101 and IM 102 portable tanks used for the transportation of flammable liquids via rail may not be fitted with nonreclosing pressure relief devices except in series with spring loaded pressure relief valves.

(o) An IM 101 tank may be used whenever an IM 102 tank is authorized provided it meets the requirements of columns (5), (6), (7) and (8) of the IM Tank Table for the material to be transported.

§ 173.32d Additions, modifications and removals of entries in the IM Tank Table.

The following requirements and conditions apply to listing of hazardous materials in the IM Tank Table (the Table):

(a) A hazardous material that is not listed or authorized in the Table may be added to the Table by the Associate Director for HMR.

(b) Any person may request the Associate Director for HMR to add a material to the Table, or to delete or modify an entry in the Table. A request should contain the information specified in the preface to the Table.

(c) The decision of the Associate Director for HMR to add a material to the Table, deny addition of a material to the Table, or to delete or modify an entry in the Table, will be based on a technical analysis of available data concerning the material and analogical comparison with existing entries in the Table.

(d) Each addition of a material to the Table by the Associate Director for HMR has interim status until completion of his review of comments following publication in the Federal Register of proposed permanent addition of the material to the Table. Following consideration of all comments in response to the publication, the Associate Director will add the material to the Table, or terminate its interim

status, based on the information received.

(e) If the Associate Director for HMR determines that it may be necessary to remove an authorization for a material from the Table, or to modify the conditions for transportation of a material in an IM portable tank, he shall take action after subjecting the issue to public comment by publication in the Federal Register unless he determines that public safety requires immediate action.

(f) If the Associate Director for HMR denies a request for addition of a material to the Table or terminates an addition of a material under paragraphs (c) and (d) of this section, an appeal of the denial or termination may be submitted to the Director, Materials Transportation Bureau, within 60 days of receipt of the denial or termination. The decision of the Director concerning the appeal is final.

10. In § 173.118a, paragraph (b)(4) is revised to read as follows:

§ 173.118a Exceptions for combustible liquids.

(b) * * *

(4) Carriage aboard aircraft and vessels (for packaging requirements for transport by vessel see § 176.340 of this subchapter); and,

11. In § 173.119, paragraphs (a)(30), (e)(5), (f)(7) and (m)(18) are added to read as follows:

§ 173.119 Flammable liquids not specifically provided for.

(a) * * *

(30) IM portable tanks, under conditions specified in the IM Tank Table.

(e) * * *

(5) IM portable tanks, under conditions specified in the IM Tank Table.

(f) * * *

(7) IM portable tanks, under conditions specified in the IM Tank Table.

(m) * * *

(18) IM portable tanks, under the conditions specified in the IM Tank Table. Not authorized for flammable liquids which are also organic peroxides or oxidizers.

12. In § 173.252, paragraph (a)(5) is added to read as follows:

§ 173.252 Bromine.

(a) * * *

(5) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. In addition, each tank must have a nickel cladding material on the inside surface comprising at least 20 percent of the total thickness or must be lined with lead at least 5.0 mm thick. The cladding material must conform to requirements of ASTM Specification B-162-69. The composite plate must conform to requirements of ASTM Specification A-265-69. The total quantity in one tank may not be less than 88 percent nor more than 92 percent of the quantity the tank is authorized to carry.

13. In § 173.262, paragraphs (a)(13) and (b)(5) are added to read as follows:

§ 173.262 Hydrobromic acid.

(a) * * *

(13) In IM portable tanks as prescribed in paragraph (b)(5) of this section.

(b) * * *

(5) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table.

14. In § 173.266, paragraphs (a)(3) and (b)(10) are added to read as follows:

§ 173.266 Hydrogen peroxide solution in water.

(a) * * *

(3) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter) under the conditions specified in the IM Tank Table are authorized for shipment of hydrogen peroxide solution in water containing 70 percent or less hydrogen peroxide by weight. Pressure relief devices shall be designed to prevent the entry of foreign matter, the leakage of liquid and the development of any dangerous excess pressure. In addition, the tank shall be designed so that internal surfaces may be effectively cleaned and passivated. The tank shall be clearly marked "FOR HYDROGEN PEROXIDE ONLY." Each tank must be equipped with pressure relief devices conforming to the requirements of the following table:

Concentration of hydrogen peroxide solution	Total venting capacity in standard cubic feet per hour (S.C.F.H.) per pound of hydrogen peroxide solution
52 percent or less.....	11
Over 52 percent but not greater than 60 percent.....	22
Over 60 percent but not greater than 70 percent.....	32

(b) * * *

(10) In IM portable tanks as prescribed in paragraph (a)(3) of this section.

15. In § 173.268, paragraph (k) is added to read as follows:

§ 173.268 Nitric acid.

(k) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Authorized for nitric acid of any concentration.

16. In § 173.269, paragraph (a)(7) is added to read as follows:

§ 173.269 Perchloric acid.

(a) * * *

(7) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Authorized only for perchloric acid not exceeding 50 percent by weight.

17. In § 173.272, paragraph (i)(29) is added to read as follows:

§ 173.272 Sulfuric acid.

(i) * * *

(29) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Sulfuric acid of concentrations greater than 62.5 percent is authorized provided the corrosive effect on steel is not greater than that of 65.25 percent sulfuric acid, measured at 100° F.

18. In § 173.275, paragraph (a)(6) is added to read as follows:

§ 173.275 Difluorophosphoric acid, anhydrous, monofluorophosphoric acid, anhydrous, hexafluorophosphoric acid, and mixtures thereof.

(a) * * *

(6) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Mixtures of these materials are not authorized in IM portable tanks.

19. In § 173.276, paragraph (a)(11) is added to read as follows:

§ 173.276 Anhydrous hydrazine and hydrazine solution.

(a) * * *

(11) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Authorized only for hydrazine solution containing not more than 64 percent hydrazine by weight.

20. In § 173.288, paragraph (g) is added to read as follows:

§ 173.288 Chloroformates.

(g) * * *

(g) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. Authorized only for allyl chloroformate and benzyl chloroformate.

21. In § 173.289, paragraph (a)(11) is added to read as follows:

§ 173.289 Formic acid and formic acid solutions.

(a) * * *

(11) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), under conditions specified in the IM Tank Table. The tank must be marked "FOR FORMIC ACID ONLY."

22. In § 173.346, paragraph (a)(28) is added to read as follows:

§ 173.346 Poison B liquids not specifically provided for.

(a) * * *

(28) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter), are authorized for transportation of poison B liquids, n.o.s., with no subsidiary hazard, under conditions specified in the IM Tank Table.

23. In § 173.358, paragraph (a)(16) is added to read as follows:

§ 173.358 Hexaethyl tetraphosphate, methyl parathion, organic phosphate compound, organic phosphorus compound, parathion, tetraethyl dithiopyrophosphate, and tetraethyl pyrophosphate, liquid.

(a) * * *

(16) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter). Authorized only for organic phosphate compound and organic phosphorus compound, liquid, depending on the toxicity of the material and for methyl parathion, under conditions specified in the IM Tank Table.

24. In § 173.359, paragraph (a)(19) is added to read as follows:

§ 173.359 Hexaethyl tetraphosphate mixtures; methyl parathion mixtures; organic phosphorus compound mixtures; organic phosphate compound mixtures; parathion mixtures; tetraethyl dithiopyrophosphate mixtures; and tetraethyl pyrophosphate mixtures; liquid (includes solutions, emulsions, or emulsifiable liquids).

(a) * * *

(19) Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter) are authorized for these materials when shipped under conditions specified for a poisonous liquid not listed by name in the IM Tank Table.

25. The following paragraphs are added in the various sections indicated below to read as follows:

Specification IM 101 portable tanks (§§ 178.270, 178.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.135(a)(11)	§ 173.274(a)(5)
§ 173.136(a)(10)	§ 173.278(a)(2)
§ 173.141(a)(11)	§ 173.279(a)(3)
§ 173.143(a)(3)	§ 173.280(a)(9)
§ 173.145(a)(8)	§ 173.281(a)(3)
§ 173.147(a)(2)	§ 173.283(b)(3)
§ 173.246(a)(3)	§ 173.290(a)(3)
§ 173.247(a)(20)	§ 173.292(a)(3)
§ 173.247a(a)(4)	§ 173.293(a)(2)
§ 173.249(a)(9)	§ 173.294(a)(12)
§ 173.249a(a)(14)	§ 173.296(a)(4)
§ 173.250a(a)(4)	§ 173.297(a)(6)
§ 173.253(a)(9)	§ 173.298(a)(5)
§ 173.254(a)(6)	§ 173.347(a)(9)
§ 173.255(a)(7)	§ 173.348(a)(5)
§ 173.283(a)(30)	§ 173.349(a)(4)
§ 173.284(a)(20)	§ 173.352(a)(6)
§ 173.285(a)(5)	§ 173.356(a)(3)
§ 173.287(a)(10)	§ 173.360(a)(6)
§ 173.270(a)(6)	§ 173.361(a)(4)
§ 173.271(a)(19)	§ 173.362(a)(5)
§ 173.362a(a)(3)	§ 173.630(b)(5)
§ 173.620(a)(7)	

26. The following paragraphs are added in the various sections indicated below to read as follows:

Specification IM 101 and IM 102 portable tanks (§§ 178.270, 178.271, 178.272 of this subchapter) are authorized under conditions specified in the IM Tank Table.

§ 173.125(a)(8)	§ 173.132(a)(4)
§ 173.128(a)(5)	§ 173.144(a)(4)
§ 173.129(a)(3)	§ 173.245(a)(35)
§ 173.131(a)(2)	

PART 174—CARRIAGE BY RAIL

27. In § 174.63 the heading is revised and paragraph (d) is added to read as follows:

§ 174.63 Freight containers, portable tanks and IM portable tanks.

(d) An IM 101 or IM 102 portable tank—

(1) May not be transported in container-on-flat car service (COFC) except under conditions approved by

the Associate Administrator for Safety, FRA; and,

(2) May not be transported in trailer-on-flat-car (TOFC) service.

* * *

28. Section 174.84 is revised to read as follows:

§ 174.84 Switching of flatcars carrying placarded trailers, freight containers, portable tanks or IM portable tanks.

(a) A placarded flatcar or a flatcar carrying a placarded trailer, freight container, portable tank or IM portable tank under this subchapter may not be cut off while in motion.

(b) No rail car moving under its own momentum may be permitted to strike any placarded flatcar or any flatcar carrying a placarded trailer, freight container, portable tank or IM portable tank.

(c) No placarded flatcar or any flatcar carrying a placarded trailer, freight container, portable tank or IM portable tank may be coupled into with more force than is necessary to complete the coupling.

PART 176—CARRIAGE BY VESSEL

29. In the Table of Sections for Part 176, a new entry for § 176.340 is added to read as follows:

176.340 Combustible liquids in portable tanks.

* * *

30. A new § 176.340 is added to read as follows:

§ 176.340 Combustible liquids in portable tanks.

(a) Combustible liquids may be transported by vessel in portable tanks only as specified below:

(1) Specification IM 101 and IM 102 portable tanks (§§ 178.270, 178.271, 178.272 of this subchapter).

(2) Marine Portable Tanks (MPT) approved and constructed in accordance with 46 CFR Part 64.

(3) Portable tanks approved and maintained in accordance with 46 CFR 98.35, constructed prior to October 1, 1974. Such tanks may continue in service only until October 1, 1984.

(4) Specification 51 portable tanks (§ 178.245 of this subchapter).

(5) Portable tanks approved by the Commandant of the Coast Guard (G-MHM).

PART 177—CARRIAGE BY PUBLIC HIGHWAY

31. In § 177.834 paragraph (n) is revised to read as follows:

§ 177.834 General requirements.

* * *

(n) Specification 56, 57, IM 101, and IM 102 portable tanks, when loaded, may not be stacked on each other nor placed under other freight during transportation by motor vehicle.

PART 178—SHIPPING CONTAINER SPECIFICATIONS

32. In the table of sections, entries for §§ 178.270, 178.271 and 178.272 are added to read as follows:

178.270 Specification IM 101 and IM 102 steel portable tanks; general design and construction requirements.

178.271 Specification IM 101 steel portable tanks.

178.272 Specification IM 102 steel portable tanks.

33. New §§ 178.270, 178.271 and 178.272 are added to read as follows:

§ 178.270 Specification IM 101 and IM 102 steel portable tanks; general design and construction requirements.

§ 178.270.1 Specification requirements for IM 101 and IM 102 steel portable tanks.

(a) Each IM portable tank must meet the requirements of this section in addition to the requirements of § 178.271 (IM 101) or § 178.272 (IM 102). These requirements apply to IM portable tanks of diameters no greater than 2438 mm (96 inches) that are designed to carry liquids having a vapor pressure of less than 2.97 bar-absolute (43 psia) at a temperature of 50°C. (122°F.).

§ 178.270-2 General.

(a) Each tank, including attachments and service and structural equipment, must be designed to withstand, without loss of contents, the maximum internal pressure that can be anticipated to result from the contents and the static and dynamic stresses incurred in normal handling and transportation.

(b) For the purpose of this subchapter and the IM tank table "maximum allowable working pressure" or MAWP is the maximum pressure that an IM portable tank may experience during any normal operation (including loading and unloading). The only exception to this limitation is hydrostatic testing.

(c) Each portable tank must have a cross-sectional design that is capable of being stress analyzed either mathematically or by the experimental method contained in UG-101 of the ASME Code, or other method acceptable to the Associate Director for HMR.

(d) Each portable tank must be designed so that the center of gravity of the filled tank is approximately centered within the points of attachment for lifting devices.

(e) Each portable tank that is insulated must have the insulation protected from the accumulation of moisture or foreign matter that would decrease its efficiency or corrode the tank. Required insulation must be jacketed or otherwise protected from mechanical damage and meet the provisions of § 178.270-11(d)(5).

(f) Tank lining must meet the following requirements:

(1) The material used to line the tank must be—

(i) Substantially immune to attack by the hazardous material transported;

(ii) Homogeneous;

(iii) Nonporous;

(iv) Imperforated when applied;

(v) At least as elastic as the material of the tank shell; and

(vi) Have thermal-expansion characteristics compatible with the tank shell.

(2) The lining of the tank, tank fitting and piping must be—

(i) Attached by bonding or other satisfactory means;

(ii) Continuous; and

(iii) Extended around the face of any flange.

(3) Joints and seams in the lining must be made by fusing the material together or by other equally effective means.

§ 178.270-3 Materials of construction.

(a) Each portable tank must be constructed of carbon or alloy steels. Materials included in Part UHT of the ASME Code or equivalent materials are not authorized. Any materials used in the tank shell must conform to a recognized national standard and must be suitable for the external environments in which the tank will be carried. The minimum elongation for any material must be 20 percent or greater.

(b) The maximum stress allowed for a material shall be determined using one of the following methods:

(1) 1.5 times the specified values for the material at 93° C (200° F.) in Section VIII, Division 1 of the ASME Code;

(2) Derived by test for the actual yield and tensile strengths at 93° C (200° F) for the actual group of plates used to fabricate the tank using the methods described in § 178.270-3(d); or

(3) Derived from the minimum yield and tensile strengths at 93° C (200° F) specified by the national standard to which the material is manufactured using the methods described in § 178.270-3(d).

(c) Maximum allowable stress values, derived for an actual group of plates, that are based on actual tensile and yield strengths of the material at 93° C. (200° F.) shall not be greater than 120 percent of the specified minimum yield

and tensile strength specified in the national standard to which the material is manufactured.

(d) The maximum allowable stress values must be derived from the following criteria:

(1) For austenitic steels;

(i) When the yield strength is determined using the 0.2 percent offset, 93.75 percent of the yield strength.

(ii) When the yield strength is determined using the 1.0 percent offset, 75 percent of the yield strength.

(2) For carbon and low alloy steels, the yield strength is determined using the 0.2 percent offset. The maximum allowable stress value is the lower of 93.75 percent of the yield strength or 37.5 percent of the tensile strength.

(e) For purposes of these specifications, tensile strength, yield strength and elongation must be determined using a specimen having a gauge length:

$$L_0 = 5.65(S_0)^{1/2}$$

where:

L_0 = the gauge length of the specimen— millimeters (inches); and

S_0 = the cross sectional area of the specimen—square millimeters (square inches).

Tensile tests and analysis of results must be in accordance with "ISO 82-1974(e) Steels-Tensile Testing." The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length, except that for high alloy austenitic steels the yield strength shall be the stress corresponding to a permanent strain of 0.2 or 1.0 percent of the gauge length as appropriate. The elongation must be at least 20 percent.

(f) If maximum allowable stress values or minimum tank wall thicknesses are based on the actual yield strength, the actual tensile strength, or the actual elongation for the material used to fabricate the tank, the test records or certification of test results by the material producer or tank manufacturer must be approved by the approval agency, retained by the tank manufacturer for a period not less than 15 years, and made available to any duly identified representative of the Department or the owner of the tank.

§ 178.270-4 Structural integrity.

(a) *Maximum stress values.* The maximum calculated stress value in a tank at the Test Pressure must be less than or equal to that specified for the material of construction at 93° C. (200° F.) in § 178.270-3 of this part.

(b) *Tank shell loadings.* Tank shells, heads, and their fastenings shall be designed to prevent stresses in excess of

two thirds those specified in § 178.270-3 of this part. The design calculations must include the forces imposed by each of the following loads:

(1) An internal pressure equal to the maximum allowable working pressure less 1 bar (14.5 psig) in combination with the simultaneously applied loadings of 3W vertically downward, 2W longitudinally, and 1W laterally acting through the center of the tank (W is the maximum permissible weight of the loaded tank and its attachments), and the requirements of paragraphs (b)(4), (5) and (6) of this section;

(2) An internal pressure equal to the maximum allowable working pressure less 1 bar (14.5 psig), in combination with the simultaneously applied loadings of 1W vertically upward, 2W longitudinally, and 1W laterally acting through the center of the tank (W is the maximum permissible weight of the loaded tank and its attachments), and the requirements of paragraphs (b)(4), (5) and (6) of this section;

(3) The load on the tank head resulting from an internal pressure equal to the maximum allowable working pressure, less 1 bar (14.5 psig), in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g", and the requirements of paragraphs (b)(4), (5) and (6) of this section;

(4) Loads resulting from any discontinuities between tank shell and heads;

(5) Superimposed loads such as operating equipment, insulation, linings and piping; and

(6) Reactions of supporting lugs and saddles or other supports.

(c) The shell thickness used in calculating the resulting stress levels in a tank shall be exclusive of any corrosion allowance.

§ 178.270-5 Minimum thickness of shells and heads.

(a) For the purposes of this section, mild steel is steel with a guaranteed minimum tensile strength of 37 deka-newtons per square millimeter (53,650 p.s.i.) and a guaranteed elongation of 27 percent or greater.

(b) Except as otherwise provided in this subchapter, the shell and heads of each portable tank constructed of reference mild steel—

(1) With a maximum cross-sectional dimension of 1.8 meters (5.9 feet) or less, shall be at least 5mm (0.197 inches) thick; or,

(2) With a maximum cross-sectional dimension exceeding 1.8 meters (5.9 feet), shall be at least 6.35mm (0.250 inches) thick.

(c) The minimum thickness of the shell and heads of each portable tank

constructed of a steel other than the reference mild steel, shall be obtained from the following formula:

Formula for metric units

$$e_1 = (10e_0) / (Rm_1 A_1)^{1/3}$$

Formula for nonmetric units

$$e_1 = (112.3e_0) / (Rm_1 A_1)^{1/3}$$

where:

e_0 = Required thickness of the reference steel from § 178.270-5(b)—millimeters (inches);

e_1 = Equivalent thickness of the steel used—millimeters (inches);

Rm_1 = Specified minimum tensile strength of the steel used—deka newtons per square millimeter (p.s.i.); and

A_1 = Specified minimum percentage elongation of the steel used—percent times 100 (i.e., if 20% use 20.0).

(d) When other than the standard minimum thickness for the reference mild steel is specified for a tank in the IM Tank Table, the specified minimum shell and head thickness must be at least equal to the larger of the thicknesses calculated from the formula given in § 178.270-5(c) and the following formula:

Formula for metric units

$$3_1 = (10e_0 d_1) / 1.8(Rm_1 A_1)^{1/3}$$

Formula for nonmetric units

$$e_1 = (112.3e_0 d_1) / 5.9(Rm_1 A_1)^{1/3}$$

where:

e_1 = Equivalent thickness of the steel used—millimeters (inches);

e_0 = The specified minimum shell and head thickness of the reference mild steel specified in the IM Tank Table—millimeters (inches);

d_1 = Actual outside diameter of the tank—meters (feet);

Rm_1 = Specified minimum tensile strength of the steel used—deka newtons per square millimeter (p.s.i.); and

A_1 = Specified minimum percentage elongation of the steel used—percent times 100 (i.e., if 20% use 20.0).

Note.—For paragraph (c) and (d) of this section the actual values for the tensile strength and percent elongation for the steel, as determined through tests on specimens from the group of plates to be used in the fabrication of the tank, may be substituted for the specified minimum values in the calculation prescribed in this paragraph (See § 178.270-3 of this part). Test records or certification of test results by the material producer or tank manufacturer must be retained by the tank manufacturer for a period not less than 15 years and must be made available to the Department or the owner of the tank.

§ 178.270-6 Tank supports, frameworks and lifting attachments.

(a) Each portable tank must be constructed with a permanent support structure that provides a secure base in transport. Skids, frameworks, cradles, or

similar devices are acceptable. The calculated stress in tank supports, frameworks, and lifting attachments must not exceed 80 percent of the specified minimum yield strength of the material of construction under the applicable loading conditions specified in § 178.270-4(b).

(b) An IM portable tank that meets the definition of "container" in § 450.3(a)(3) must meet the requirements of Parts 450 through 453 of this title, in addition to the requirements of this subchapter.

§ 178.270-7 Joints in tank shells.

Joints in tank shells must be made by fusion welding. Such joints and their efficiencies must be as required by the ASME Code. Weld procedures and welder performance must be ASME Code qualified or must be qualified by the approval agency in accordance with the procedures in the ASME Code, Section IX, Welding and Brazing Qualifications. A record of each qualification must be retained by the manufacturer for the period prescribed in ASME Code, Section VIII, Pressure Vessels, and must be made available to any duly identified representative of the Department or the owner of the tank.

§ 178.270-8 Protection of valves and accessories.

Each valve, fitting, accessory, safety device, gauging device, and other appurtenance shall be adequately protected against mechanical damage.

§ 178.270-9 Inspection openings.

Each portable tank must be fitted with a manhole or other inspection opening sited above the maximum liquid level to allow for complete internal inspection and adequate access for maintenance and repair of the interior. Each portable tank with a capacity of more than 1894 liters (500 gallons) must be fitted with an elliptical or obround manhole at least 279 × 381 millimeters (11 × 15 inches), or 254 × 405 millimeters (10 × 16 inches), or with a circular manhole at least 381 millimeters (15 inches) in diameter. Any inspection opening and closure must be designed and reinforced as required by the ASME Code.

§ 178.270-10 External design pressure.

(a) Each portable tank not fitted with vacuum relief devices must be designed to withstand a positive external pressure differential of at least 0.4 bar > (6 p.s.i.).

(b) Each portable tank fitted with vacuum relief devices must be designed to withstand a positive external pressure differential not less than the set pressure of the vacuum relief device and in any case at least 0.21 bar (3 p.s.i.).

§ 178.270-11 Pressure and vacuum relief devices.

(a) *Relief devices required.* Each portable tank, or each independent compartment of a portable tank, must be fitted with pressure relief devices in accordance with the following:

(1) Each portable tank, or each independent compartment of a portable tank, with a capacity of more than 1893 liters (500 gallons), must be provided with a primary pressure relief device consisting of a spring-loaded pressure relief valve and, in addition, may have one or more emergency pressure relief devices that may be a spring-loaded pressure relief valve, a frangible disc or fusible element in parallel with the primary pressure relief device.

(2) Each portable tank, or each independent compartment of a portable tank, with a capacity of 1893 liters (500 gallons) or less, must be fitted with a primary pressure relief device that may either be a frangible disc or a spring-loaded pressure relief valve.

(3) If a frangible disc is inserted in series with required pressure relief valve, the space between the frangible disc and the pressure relief valve must be provided with a suitable tell-tale indicator to permit detection, prior to and during shipment, of disc rupture, pinholing, or leakage which could cause a malfunction of the pressure relief system. The frangible disc must rupture at a tank pressure within the range specified in §178.270-11(c)(1).

(b) *Location and construction of relief devices.*

(1) Pressure relief devices must be spring-loaded valves, frangible discs, or fusible elements. Vacuum relief devices must be capable of reclosing in any attitude. Each pressure relief device inlet must be situated in the vapor space of the tank. The discharge from any device must be unrestricted and directed to prevent impingement upon the tank shell or structural framework. Protective devices which deflect the flow of vapor are permissible provided the required vent capacity is maintained. Pressure and vacuum relief devices including their inlets must be sited on the top of the tank in a position as near as possible to the longitudinal and transverse center of the tank within the following limitation:

(i) Longitudinally on the tank within 107 cm (3½ feet) or ½ the tank length, whichever is less, from the top center of the tank; and

(ii) Transversally within 12 degrees of the tank top.

(2) Except for a relief device installed in a piping system, each relief device must provide unrestricted venting under all conditions. Each pressure relief

system, including any piping, must provide a venting capacity at least equal to the venting capacity specified in § 178.270-11(d) for the tank on which the system is installed.

(3) Fusible elements, when installed, must not be protected from direct communication with external heat sources.

(4) Spring-loaded pressure relief valves must be constructed in a manner to prevent unauthorized adjustment of the relief setting.

(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 a range of no less than 100 percent and no greater than 125 percent of the maximum allowable working pressure (MAWP) for tanks having a MAWP below 44 psig. For tanks having a MAWP of 44 psig or greater, the primary pressure relief device must be set to function in a range of no less than 100 percent and no greater than 110 percent of the MAWP. Spring-loaded pressure relief valves must close after discharge at a pressure not less than 90 percent of the start-to-discharge pressure and remain closed at all lesser pressures.

(2) *Emergency pressure relief devices.* Each frangible disc, other than those 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 125 percent and less than or equal to 150 percent of the MAWP. Each spring loaded pressure relief valve used as an emergency pressure relief device must be set to operate at no less than 125 percent of the MAWP and be fully open at 150 percent of the MAWP.

(3) *Fusible elements.* Fusible elements must have a nominal yield temperature greater than the highest tank operating temperature and less than or equal to 121°C. (250°F.). The pressure developed in the tank at the fusible element yield temperature must be below the test pressure of the tank.

(4) *Vacuum relief devices.* Vacuum relief devices, when used, must be designed to provide total containment of product under normal and accident conditions and must be set to open at a nominal external overpressure of not less than 0.21 bar (3 pounds per square inch) but not greater than the external pressure for which the tank is designed. Each vacuum relief device must have a minimum cross sectional flow area of 2.84 cm² (0.44 square inches).

(d) *Venting capacity of pressure relief devices.*—(1) *Pressure relief valves (spring-loaded relief valves).* Each pressure relief valve must have a

minimum diameter of 31.75 mm (1.25 inches) and must have a vent capacity of at least 170 standard cubic meters per hour (SCMH) (6,000 standard cubic feet per hour (SCFH)). The minimum total pressure relief valve vent capacity for each tank shall be 340 SCMH (12,000 SCFH) per 32.5 m² (350 square feet) of exposed tank area, but in any case at least 340 SCMH (12,000 SCFH).

(2) *Total tank vent capacity.* The total vent capacity of all pressure relief devices installed on each portable tank must be sufficient with all devices operating to limit the pressure in the tank or less than or equal to the test pressure. Except as provided in paragraph (d)(3) or (d)(4) of this section, the total vent capacity must be at least equal to that shown in the following Table:

Table 1.—Minimum total vent capacity

(Metric units table in cubic meters of air per hour at atmospheric pressure and 15°C.)

Exposed area square meters	Cubic meters free air per hour	Exposed area square meters	Cubic meters free air per hour
2	841	37.5	9,306
3	1,172	40	9,810
4	1,485	42.5	10,308
5	1,783	45	10,806
6	2,069	47.5	11,392
7	2,348	50	11,778
8	2,621	52.5	12,258
9	2,821	55	12,732
10	3,146	57.5	13,206
12	3,655	60	13,674
14	4,146	62.5	14,142
16	4,625	65	14,604
18	5,092	67.5	15,066
20	5,556	70	15,516
22.5	6,120	75	16,422
25	6,672	80	17,316
27.5	7,212	85	18,198
30	7,746	90	19,074
32.5	8,268	95	19,938
35	8,790	100	20,790

(Nonmetric units in cubic feet of air per hour at atmospheric pressure and 59°F.)

Exposed area square feet	Cubic feet free air per hour	Exposed area square feet	Cubic feet free air per hour
20	27,600	275	237,000
30	38,500	300	256,000
40	48,600	350	289,500
50	58,600	400	322,100
60	67,700	450	355,900
70	77,000	500	391,000
80	85,500	550	417,500
90	94,800	600	450,000
100	104,000	650	479,000
120	121,000	700	512,000
140	136,200	750	540,000
160	152,100	800	569,000
180	168,200	850	597,000
200	184,000	900	621,000
225	199,000	950	656,000
250	219,500	1,000	686,000

Note.—Interpolate for intermediate sizes.

(3) Notwithstanding the minimum total vent capacity shown in Table I, of paragraph (d)(2), a tank in dedicated service may have a lesser total vent capacity provided the approval

certificate required by § 173.32a of this subchapter specifies the hazardous materials for which the tank is suitable. The lesser total vent capacity must be determined in accordance with the following formula:

Formula for metric units

$$Q = 5,660,000 A^{0.82} (ZT)^{0.5} / (LC)(M^{0.5})$$

Formula for nonmetric units

$$Q = 37,980,000 A^{0.82} (ZT)^{0.5} / (LC)(M^{0.5})$$

where:

Q = The total required venting capacity, in cubic meters of air per hour at standard conditions of 15.6°C. and 1 atm (cubic feet of air per hour at standard conditions of 60°F. and 14.7 psia);

T = The absolute temperature of the vapor at the venting conditions—degrees Kelvin (°C + 273) [degrees Rankine (°F + 460)];

A = The exposed surface area of tank shell—square meters (square feet);

L = The latent heat of vaporization of the lading—calories per gram (BTU/lb);

Z = The compressibility factor for the vapor (if this factor is unknown, let Z equal 1.0);

M = The molecular weight of vapor;

C = A constant derived from (K), the ratio of specific heats of the vapor. If (K) is unknown, let C = 315.

$$C = 520[K(2/(K+1))^{(K+1)/(K-1)}]^{1/2}$$

where:

$$K = C_p/C_v$$

C_p = The specific heat at constant pressure, in calories per gram degree centigrade (BTU/lb°F.); and

C_v = The specific heat at constant volume, in calories per gram degree centigrade (BTU/lb°F.).

(4) The required total venting capacity determined by using Table I or paragraph (d)(3) of this section may be reduced for insulated tanks to Q_i by the following formula:

$$Q_i = FQ$$

where:

Q_i = The total required venting capacity of the insulated tank;

Q = The total venting capacity required for an uninsulated tank according to Table I or paragraph (d)(3) of this section;

F = A coefficient with a value greater than or equal to 0.25 according to the following formula:

Formula for metric units

$$F = 8U(649-t)/93.5 \times 10^6$$

Formula for nonmetric units

$$F = 8U(1200-t)/34,500$$

where:

U = The thermal conductance of the insulation system taken at 39°C. (100°F.), in gram calories per hour sq. meter °C. (BTU per hour sq. feet °F.); and

t = The actual temperature of the substance at loading, in °C. (°F.).

(5) Insulation, used for the purpose of reducing the venting capacity, must be approved by the approval agency. In all

cases, insulation approved for this purpose must:

(i) Remain effective at all temperatures up to 649°C. (1200°F.); and

(ii) Be jacketed with a material having a melting point of 649°C. (1200°F.) or greater.

(6) The flow capacity rating of any pressure relief device must be certified by the manufacturer to be in accordance with the applicable provisions of the ASME Code with the following exceptions:

(i) The ASME Code stamp is not required; and

(ii) The flow capacity certification test for spring loaded pressure relief valves may be conducted at a pressure not to exceed 120% of the set pressure provided the stamped flow capacity rating is not greater than 83% of the average capacity of the valves tested.

(e) *Markings on pressure and vacuum relief devices.* The following information shall be plainly displayed on each pressure relief device:

(1) The pressure or, when appropriate, the temperature at which the device is set to function;

(2) Except for vacuum relief devices, the rated flow capacity of air discharged per minute at 15°C. (59°F.) and atmospheric pressure, at:

(i) The set pressure for frangible discs;

(ii) No greater than 20% above the start to discharge pressure for spring-loaded relief devices; or,

(iii) The fusing temperature for fusible elements.

(3) The manufacturer's name and catalog number; and

(4) The allowable tolerances at the start to discharge pressure and the allowable tolerances at the discharge temperature.

§ 178.270-12 Valves, nozzles, piping, and gauging devices.

(a) All tank nozzles, except for those provided for relief devices, thermometer wells, and inspection openings, must be fitted with manually operated stop valves located as near the shell as practicable either internal or external to the shell. A tank nozzle installed for a pressure relief device must not be provided with a stop valve that restricts the flow from the tank to the pressure relief device (see § 178.270-11(b)(2)). A tank nozzle installed in the vapor space to provide a filling or cleaning opening, which is closed by a blank flange or other suitable means, need not be provided with a manually operated stop valve. A tank nozzle installed for a thermometer well or inspection opening need not be provided with a manually operated stop valve.

(b) Each valve must be designed and constructed to a rated pressure not less than the maximum allowable working pressure to the tank. Each stop valve with a screwed spindle must be closed by a clockwise motion of the handwheel. All valves must be constructed to prevent unintentional opening.

(c) Each internal discharge valve shall be self-closing, located inside the tank, within the welded flange or within its companion flange.

(d) A shear section must be located outboard of each internal discharge valve seat and within 10.2 cm (4 inches) of the vessel. The shear section must break under strain without affecting the product retention capabilities of the tank and any attachments.

(e) All piping must be of suitable material. Welded joints must be used wherever practicable. The bursting strength of all piping and pipe fittings must be at least 4 times the maximum allowable working pressure of the tank. Piping must be supported in such a manner as to prevent damage due to thermal stresses, jarring or vibration.

(f) All nozzles and tank shell penetrations for nozzles shall be designed and constructed in accordance with the ASME Code.

(g) Glass liquid level gauges, or gauges of other easily destructible material, which are in direct communication with the contents of the tank are prohibited.

§ 178.270-13 Testing.

(a) *Hydrostatic test.* Each portable tank and all piping, valves, and other attachments which are subject to the pressure of the contents of the tank, except pressure relief devices, must be hydrostatically tested by completely filling the tank (including domes, if any) with water or other liquid having a similar density and viscosity and applying a pressure of at least 150 percent of the maximum allowable working pressure. The pressure shall be maintained for at least 10 minutes. While under pressure, the tank shall be inspected for leakage, undue distortion, or other conditions which indicate weakness or which might render the tank unsafe for transportation service. Failure to successfully meet the test criteria shall be deemed evidence of failure to meet the requirements of this specification. Tanks failing to pass the test shall be suitably repaired and must successfully pass the prescribed tests prior to use for transporting any hazardous material.

(b) *Testing of internal coils.* Internal coils, if installed, must be hydrostatically tested to an internal pressure of 13.8 bar (200 psig) or 150

percent of the rated pressure of the coils, whichever is greater.

(c) *Tank container qualification test.* For each tank design, a prototype tank, using a framework for containerized transport, must fulfill the requirements of Parts 450-453 of this title for compliance with the requirements of Annex II of the International Convention for Safe Containers. In addition, the following tests must be completed without leakage or deformation that would render the tank unsuitable for use:

(1) *Longitudinal restraint.* The tank loaded to twice its maximum gross weight must be positioned with its longitudinal axis vertical. It shall be held in this position for five minutes by support at the lower end of the base structure providing vertical and lateral restraint and by support at the upper end of the base structure providing lateral restraint only.

(2) *Lateral restraint.* The tank loaded to its maximum gross weight must be positioned for five minutes with its transverse axis vertical. It shall be held in this position for five minutes by support at the lower side of the base structure providing vertical and lateral restraint and by support at the upper side of the base structure providing lateral restraint only.

(d) *Approval of smaller tanks of the same design.* Design approval must include the prototype testing of at least one tank of each design and each size; however, a set of tests made on a tank of one size may serve for the approval of smaller tanks with equal or lesser diameter and length) made of the same material and thickness by the same fabrication technique and with identical supports and equivalent closures and other appurtenances.

(e) *Pressure and vacuum relief devices.* Each spring loaded relief device must be tested for the accuracy of the setting prior to installation on a tank and must be effectively sealed to maintain the required setting.

§ 178.270-14 Marking of tanks.

(a) *General.* Each tank must bear a corrosion resistant metal identification plate that is permanently attached to the portable tank and readily accessible for inspection. The information required in paragraph (b), and, when appropriate, paragraph (c) of this section must be stamped, embossed or otherwise marked by an equally durable method

on the plate in characters at least 3 mm (0.118 inches) high. The plate must not be painted.

(b) *Required information.* At least the following information must appear on the metal identification plate for each tank:

- (1) US DOT Specification number.
- (2) Country of manufacture.
- (3) Manufacturer's name.
- (4) Date of manufacture.
- (5) Manufacturer's serial number.
- (6) Identification of USA/DOT approval agency and approval number.
- (7) Maximum allowable working pressure, in bar or psig.
- (8) Test pressure, in bar or psig.
- (9) Total measured water capacity at 20°C (68°F.), in liters or gallons.
- (10) Maximum allowable gross weight, in kg or lbs.
- (11) Equivalent minimum shell thickness in mild steel, in mm or inches.
- (12) Tank material and specification number.
- (13) Metallurgical design temperature range, in °C. and °F.

(c) *Additional information.* The following additional information must appear on the metal identification plate when applicable:

- (1) Lining material.
- (2) Heating coil maximum allowable working pressure in bar and psig.
- (3) Corrosion allowance, in mm or in.
- (d) In addition to the markings required above, each tank used in international transport must have a Safety Approval Plate containing the information required in §§ 451.21 through 451.25 of this title.

(e) Nothing in this section shall be deemed to preclude the display of other pertinent information on the required metal identification plate.

§ 178.271 Specification IM 101 steel portable tanks.

§ 178.271-1 General requirements.

(a) Specification IM 101 portable tanks must comply with the general design and construction requirements in § 178.270 of this subpart in addition to the specific design requirements contained in this section.

(b) The maximum allowable working pressure of each tank shall be equal to or greater than 1.75 bar (25.4 psig) and less than 6.8 bar (100 psig).

(c) Each tank shall be designed and constructed in accordance with the requirements of Section VIII, Division 1, of the ASME Code except as limited or

modified in this section or in § 178.270 of this subpart. ASME certification or stamp is not required.

§ 178.272 Specification IM 102 steel portable tanks.

§ 178.272-1 General requirements.

(a) Specification IM 102 portable tanks must comply with the general design and construction requirements in § 178.270 of this subpart in addition to the specific design requirements contained in this section.

(b) The maximum allowable working pressure of each tank shall be less than 1.75 bar (25.4 psig) but at least 1.0 bar (14.5 psig).

(c) Each tank shall be designed and constructed in accordance with the requirements of Section VIII, Division 1, of the ASME Code except as limited or modified in this section or in § 178.270 of this subpart. ASME certification or stamp is not required.

§ 178.272-2 Minimum thickness of shells and heads.

(a) The approval agency may authorize a minimum thickness less than that required by § 178.270-5 of this subpart where additional protection against tank puncture provides equal integrity.

(b) The shell and head thickness of a tank must be at least:

(1) 3.18 mm (0.125 inches) for a tank with a maximum cross-sectional dimension of 1.8 meters (5.9 feet) or less; or

(2) 4 mm (0.157 inches) for a tank constructed of the reference mild steel having a maximum cross-sectional dimension exceeding 1.8 meters (5.9 feet). For tanks having a maximum cross-sectional dimension exceeding 1.8 meters (5.9 feet) constructed of other steels, an equivalent head and shell thickness calculated in accordance with § 178.270-5(c) of this subpart may be used, subject to an absolute minimum of 3.18 mm (0.125 inches).

(c) The following additional puncture protection systems are authorized:

(1) An overall external structural protection, such as a jacket, which is rigidly secured to the tank with a layer of cushioning material installed between the external structural protection and the tank; or

(2) A complete framework surrounding the tank including both longitudinal and transverse structural members.

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53 and App. A to Part 1)

Note.—The Materials Transportation Bureau has determined that this document will not result in a major economic impact under the terms of Executive Order 12221 and DOT implementing procedures (4411034), nor require an environmental impact statement under the National Environmental Policy Act (49 U.S.C. 4321 et seq.). A regulatory evaluation and environmental assessment are available for review in the docket.

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L. D. Santman,

Director, Materials Transportation Bureau.

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