OCT 25 1996

U.S. Department of Transportation
Research and Special Programs Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 9052
(SIXTEENTH REVISION)

EXPIRATION DATE: September 30, 1998

(FOR RENEWAL, SEE 49 CFR 107.105)

1. GRANTEE: Hoover Materials Handling Group, Inc.
Beatrice, Nebraska

2. PURPOSE AND LIMITATIONS: This exemption authorizes the manufacture, mark and sale, until September 30, 1996, of the non-DOT specification rotationally molded crosslinked or linear polyethylene portable tank enclosed within a protective steel cage or hardwood overpack for the transportation in commerce of certain Class 8 materials, Class 3 materials or a Division 5.1 material described in paragraph 6 below. This exemption provides no relief from any regulation other than as specifically stated.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Part 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR Part 173.242, 173.243 and Part 178, Subparts N and O, and part 180, Subpart D.

5. BASIS: This exemption is based on Hoover Materials Handling Group, Inc. application dated April 16, 1996, submitted in accordance with 49 CFR 107.105.

Expired — NO Renewal
Incorporated IN 49 CFR IBC
Subpart N - Section 178.700-710

6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous materials authorized	Hazard Class/ Division	Identi-fication Number	Packing Group
Class 8 liquids for which a DOT specification 34 reusable polyethylene drum is prescribed in 49 CFR Part 173, effective on September 30, 1991, and which have no secondary hazards and a pressure of no greater than 14.7 psia at 130°F.	8	as appli-cable	as appli-cable
Hydrogen peroxide solution in water containing 52% or less hydrogen peroxide by weight.	5.1	as appli-cable	as appli-cable
Ethyl and methyl alcohols and solutions thereof, class 3 materials compatible with polyethylene which have no secondary hazards and have flash points above 73°F; and other class 3 materials which are specifically identified to, and acknowledged in writing, by the Office of Hazardous Materials Exemptions and Approvals (OHMEA) prior to the first shipment. Class 3 materials having a flash point below 73 degrees F may not be transported by cargo vessel.	3	as appli-cable	as appli-cable

7. PACKAGING(S) and SAFETY CONTROL MEASURES:

a. Packagings prescribed are non-DOT specification rotationally-molded polyethylene portable tanks having a nominal capacity not to exceed 330 gallons as shown in Chemical Handling Equipment co. Inc., drawings M-1035, M-1041, or M-1042 on file with the OHMEA. These tanks may be enclosed as follows:

(1) A polyethylene portable tank, not to exceed 330 gallons capacity, in a wire frame or steel outer enclosure as shown on Bathey Manufacturing drawing no. 8094 or Chemical Handling Equipment Co., Inc. Drawing M-1036. As an alternative to the polyethylene portable tank described in paragraph 7.a. above, a rotationally-molded polyethylene portable tank as shown in Hoover Group, Inc., drawing 74000 dated June 15, 1992 may be used. Bottom outlets are authorized.

(2) A polyethylene portable tank not to exceed 225 gallons capacity, without bottom outlets, in a steel outer structure as described in the petitioner's request dated October 13, 1983.

(3) A polyethylene portable tank not to exceed 225 gallons capacity, without bottom outlets, in a wirebound hardwood overpack as shown on General Box Company drawing 6995 and described in petitioner's application dated March 30, 1984, and additional letter of May 31, 1984.

(4) A polyethylene portable tank not to exceed 225 gallons capacity in a wirebound hardwood overpack as shown on Chemical Handling Equipment Co., Inc. drawing S-330, dated August 29, 1986.

(5) A polyethylene portable tank not to exceed 275 gallons capacity, in a steel-reinforced high density polyethylene overpack, as shown on Chemical Handling Equipment Company, Inc.'s, Drawing M-1037, dated January 6, 1988. Bottom outlets are authorized. Polyethylene overpack must be made from high density linear polyethylene which has been specifically identified to and acknowledged by the OHMEA prior to first shipment.

b. Each portable tank must be made from high density or medium or low density linear polyethylene which has been specifically identified and is acceptable to OHMEA and be in compliance with the provisions of 49 CFR 178.19, except as follows:

(i) 178.19-3 -Does not apply.

(ii) 178.19-4 - Does not apply.

(iii) 178.19-6(a) - Does not apply. Instead, each portable tank must be permanently marked by embossment or with a metal certification plate permanently affixed to each portable tank. Where the tank is marked by embossment on the polyethylene unit, the Serial Number and Date of Manufacture may be etched or stamped into the polyethylene. Where etching or stamping is used, it may not reduce the marked area thickness below the minimum thickness prescribed herein. The markings must be in letters and numbers at least ¼-inch high located on the side of the portable tank. The markings shall be understood to certify that the portable tank complies with all requirements of this exemption and must contain at least the following information:

DOT-E 9052 portable tank
Tank manufacturer _____
Test pressure 15 psig.
Serial number _____
Date of manufacture (month and year) _____
Tare weight _____lbs.
Rated gross weight_____lbs.
Capacity _____U.S. gal.

(iv) 178.19-7(a)(3) - Changed to read: Each portable tank shall be tested by retaining for 5 minutes, hydrostatic pressure of at least 15 psig at equilibrium without leakage or pressure drop.

(v) 178.10-7(c)(2) - Does not apply.

c. Each tank must be fitted with a pressure relief device that will limit the pressure in the tanks to 15 psig and is in accordance with 49 CFR 178.253-4 except as follows:

(I) 178.253-4(a) - Frangible devices are not authorized on tanks shipped by cargo vessel.

(ii) 178.253-4(c)(1) - The pressure relief device must open not less than 10 psig and not over 15 psig. The minimum venting capacity for pressure activated vents must be 6,000 SCFH at not more than 15 pounds per square inch gauge.

(iii) 178.253-4(c)(3) - A fusible device that will function at a temperature no greater than 250°F may be used provided vapor pressure in the tank at 250 degrees F does not exceed 15 psig.

d. Portable tanks must be capable of satisfactorily withstanding the drop test and hydrostatic pressure test prescribed in 49 CFR 178.19-7(a)and the vibration test prescribed in 49 CFR 178.253-5(a)(1).

e. Except for portable tanks described in paragraph 7.a.(4) above, and for the alternative portable tank described in paragraph 7.a.(1) above, the minimum thickness of any polyethylene tank measured at any point on the container, is 0.185 inch, except that such a tank may have a total accumulated surface area of no more than 50 square inched having a minimum thickness of no less than 0.140 inches. For the alternative portable tanks described in paragraph 7.a.(1) above, the minimum polyethylene thickness of the portable tank measured at any point may be no less than 0.140 inches. For portable tanks described in paragraph 7.a.(4) above, the minimum thickness measured at any point on the container, is 0.150 inch. Other details of the shipping container must be as depicted on Chemical Handling Equipment Co., Inc., drawings M-1035, M-1036, M-1037, M-1041, M-1042 and S-330 and Bathey manufacturing drawing 8094, or Chemical Handling Equipment Co., Inc.'s, drawing entitled "Shop Print" dated May 1, 1989, included in petitioner's applications.

f. Additionally, each portable tank must possess the chemical and physical properties as reported to the OHMEA by the petitioner's letter dated May 10, 1983.

g. Any changes in design, resin, or process methods must be approved in writing by the OHMEA. Prototype test results for the tests required in paragraph 7.d. of this exemption must accompany any request for changes in design, resin, or process methods.

h. Reuse of any portable tank must be in accordance with the applicable requirements of 49 CFR 173.28 and 173.32(f) as modified herein. Each portable tank must be hydrostatically retested in accordance with 49 CFR 173.32(f) as applicable to DOT Specification 57 tanks, at test pressure of 15 psig for 5 minutes without a drop in pressure or leakage. Any tank that fails must be rejected and may not be used again for the transportation of hazardous materials. The date of the most recent periodic retest must be marked on the tank near the tank identification markings required in paragraph 7, a, iii. of this exemption. The owner of the tank or his authorized agent must retain a written record indicating the date and results of all required tests and the name and address of the tester, until the next retest has been satisfactorily completed and recorded.

i. Portable tanks with repaired bodies are not authorized.

j. Commodities must be compatible with the polyethylene (PE) portable tank, and may not permeate the PE to an extent that a hazardous condition could be caused during transportation and handling.

k. Portable tanks for hydrogen peroxide must have a vented closure to prevent accumulation of internal pressure.

l. Any fitting must be protected in accordance with 49 CFR 178.253-3.

m. The sides of each portable tank must be marked "KEEP THIS END UP" in two places, 180° apart, with an arrow pointing to the tank top.

n. Tanks must always be filled and shipped while enclosed in the steel cage, hardwood overpack or steel-reinforced polyethylene enclosure as shown in the petitioner's application.

8. SPECIAL PROVISIONS:

a. Offerors for transportation of the hazardous materials specified in this exemption may use the packaging described in this exemption for the transportation of such hazardous materials so long as no modifications or changes are made to the packages, all terms of this exemption are complied with, and a copy of the current exemption is maintained at each facility from which such offering occurs.

b. Each portable tank must be plainly marked on both sides near the middle, in letters at least two inches high on a contrasting background, "DOT-E 9052".

c. Shipments by rail must be in compliance with the requirements of 49 CFR 174.63(a) and (c).

d. A copy of this exemption, in its current status, must be maintained at each manufacturing facility at which this packaging is manufactured and must be made available to a DOT representative upon request.

e. Each packaging manufactured under the authority of this exemption must be either (1) marked with the name of the manufacturer and location (city and state) of the facility at which it is manufactured or (2) marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals Program for a specific manufacturing facility.

f. Shippers using the packaging covered by this exemption must comply with all provisions of this exemption, and all other applicable requirements contained in 49 CFR Parts 171-180.

g. Consistent with the regulations adopted under Docket HM-181E for intermediate bulk containers (IBCs), exemptions for IBCs of the type covered by those regulations will not allow new construction after September 30, 1996. Existing IBCs may be continued in service, provided renewal provisions under 107.105 are met, until September 30, 1998 under the conditions specified in the exemption that applies to their use. After September 30, 1998, each IBCs must conform to, and be certified as meeting, a UN IBC standard set forth in Subparts N and O of Part 178 of the Hazardous Materials Regulations (HMR; 49 CFR). A provision for approval of an equivalent IBC is specified in 49 CFR 178.801(I).

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, and cargo vessel.

10. MODAL REQUIREMENTS: A copy of this exemption must be carried aboard each cargo vessel, used to transport packages covered by this exemption.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. Section 5101 et seq:

    - All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
    - Registration required by 49 CFR 107.601 et seq., when applicable.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (49 CFR 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing, as soon as practicable of any incidents involving the package and shipments made under this exemption.

Issued at Washington, D.C.

J. Suzanne Hedgepeth

Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

OCT 25 1996
(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

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the upper end a radius not exceeding 6 mm (0.2 inches). The rod must protrude from the surface a distance at least equal to that between the primary receptacle(s) and the outer surface of the outer packaging with a minimum of 200 mm (7.9 inches). One sample must be dropped in a vertical free fall from a height of 1 m (3 feet), measured from the top of the steel rod. A second sample must be dropped from the same height in an orientation perpendicular to that used for the first. In each instance the packaging should be so orientated that the steel rod must be aimed to impact the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable, provided that there is not leakage from the primary receptacle(s).

(i) Packagings subject to this section are not subject to § 178.503 or any other requirements of this subpart, except § 178.608.

[Amdt. 178-97, 55 FR 52723, Dec. 21, 1990, as amended by Amdt. 178-111, 60 FR 48787, Sept. 20, 1995]

Subpart N—Intermediate Bulk Container Performance-Oriented Standards

SOURCE: Amdt. 178-103, 59 FR 38068, July 26, 1994, unless otherwise noted.

§ 178.700 Purpose, scope and definitions.

(a) This subpart prescribes requirements applying to intermediate bulk containers intended for the transportation of hazardous materials. Standards for these packagings are based on the UN Recommendations.

(b) Terms used in this subpart are defined in § 171.8 of this subchapter and in paragraph (c) of this section.

(c) The following definitions pertain to the intermediate bulk container standards in this subpart.

(1) *Body* means the receptacle proper (including openings and their closures, but not including service equipment), that has a volumetric capacity of not more than three cubic meters (3,000 liters, 793 gallons, or 106 cubic feet) and not less than 0.45 cubic meters (450 liters, 119 gallons, or 15.9 cubic feet) or a maximum net mass of not less than 400 kilograms (882) pounds.

(2) *Service equipment* means filling and discharge, pressure relief, safety, heating and heat-insulating devices and measuring instruments.

(3) *Structural equipment* means the reinforcing, fastening, handling, protective or stabilizing members of the body or stacking load bearing structural members (such as metal cages).

(4) *Maximum permissible gross mass* means the mass of the body, its service equipment, structural equipment and the maximum net mass (see § 171.8 of this subchapter).

[Amdt. 178-103, 59 FR 38068, July 26, 1994, as amended by Amdt. 178-108, 60 FR 40038, Aug. 4, 1995]

§ 178.702 Intermediate bulk container identification codes.

(a) Intermediate bulk container code designations consist of: two numerals specified in paragraph (a)(1) of this section; followed by the capital letter(s) specified in paragraph (a)(2) of this section; followed, when specified in an individual section, by a numeral indicating the category of intermediate bulk container.

(1) Intermediate bulk container code number designations are as follows:

Type	For solids, discharged		For liquids
	by gravity	Under pressure of more than 10 kPa (1.45 psi)	
Rigid	11	21	31
Flexible	13		

(2) Intermediate bulk container code letter designations are as follows:

"A" means steel (all types and surface treatments).
"B" means aluminum.
"C" means natural wood.
"D" means plywood.
"F" means reconstituted wood.
"G" means fiberboard.
"H" means plastic.
"L" means textile.
"M" means paper, multiwall.
"N" means metal (other than steel or aluminum).

(b) For composite intermediate bulk containers, two capital letters are used

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(1)

in sequence following the numeral indicating intermediate bulk container design type. The first letter indicates the material of the intermediate bulk container inner receptacle. The second letter indicates the material of the outer intermediate bulk container. For example, 31HA1 is a composite intermediate bulk container with a plastic inner receptacle and a steel outer packaging.

§178.703 Marking of intermediate bulk containers.

(a) The manufacturer shall:

(1) Mark every intermediate bulk container in a durable and clearly visible manner (applied in a single line or in multiple lines provided the correct sequence is followed) with the following information in the sequence presented:

(i) The United Nations symbol as illustrated in §178.503(d)(1). For metal intermediate bulk containers on which the marking is stamped or embossed, the capital letters 'UN' may be applied instead of the symbol.

(ii) The code number designating intermediate bulk container design type according to §178.702(a) (1) and (2).

(iii) A capital letter identifying the performance standard under which the design type has been successfully tested, as follows:

(A) X—for intermediate bulk containers meeting Packing Group I, II and III tests;

(B) Y—for intermediate bulk containers meeting Packing Group II and III tests; and

(C) Z—for intermediate bulk containers meeting only Packing Group III tests.

(iv) The month (designated numerically) and year (last two digits) of manufacture.

(v) The country authorizing the allocation of the mark. The letters 'USA' indicate that the intermediate bulk container is manufactured and marked in the United States in compliance with the provisions of this subchapter.

(vi) The name and address or symbol of the manufacturer or the approval agency certifying compliance with subparts N and O of this part. Symbols, if used, must be registered with the Associate Administrator for Hazardous Materials Safety.

(vii) The stacking test load in kilograms (kg). For intermediate bulk containers not designed for stacking, the figure "0" must be shown.

(viii) The maximum permissible gross mass or, for flexible intermediate bulk containers, the maximum net mass, in kg.

(2) The following are examples of symbols and required markings:

(i) For a metal intermediate bulk container containing solids discharged by gravity made from steel:

11A/Y/02 92/USA/ABC/5500/1500

(ii) For a flexible intermediate bulk container containing solids discharged by gravity and made from woven plastic with a liner:

13H3/Z/03 92/USA/ABC/0/1500

(iii) For a rigid plastic intermediate bulk container containing liquids, made from plastic with structural equipment withstanding the stack load and with a manufacturer's symbol in place of the manufacturer's name and address:

31H1/Y/04 93/USA/M9399/10800/1200

(iv) For a composite intermediate bulk container containing liquids, with a rigid plastic inner receptacle and an outer steel body and with the symbol of a DOT approved third-party test laboratory:

31HA1/Y/05 93/USA/+ZT1235/10800/1200

(b) *Additional marking.* In addition to markings required in paragraph (a) of this section, each intermediate bulk container must be marked as follows in a place near the markings required in paragraph (a) of this section that is readily accessible for inspection. Where units of measure are used, the metric unit indicated (e.g., 450 liters) must also appear.

(1) For each rigid plastic and composite intermediate bulk container, the following markings must be included:

(i) Rated capacity in liters of water at 20 °C (68 °F);

(ii) Tare mass in kilograms;

(iii) Gauge test pressure in kPa;

(iv) Date of last leakproofness test, if applicable (month and year); and

(v) Date of last inspection (month and year).

(2) For each metal intermediate bulk container, the following markings must be included on a metal corrosion-resistant plate:

(i) Rated capacity in liters of water at 20 °C (68 °F);

(ii) Tare mass in kilograms;

(iii) Date of last leakproofness test, if applicable (month and year);

(iv) Date of last inspection (month and year);

(v) Maximum loading/discharge pressure, in kPa, if applicable;

(vi) Body material and its minimum thickness in mm; and

(vii) Serial number assigned by the manufacturer.

(3) Markings required by paragraph (b)(1) or (b)(2) of this section may be preceded by the narrative description of the marking, e.g. "Tare Mass: * * *"

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where the "* * *" are replaced with the tare mass in kilograms of the intermediate bulk container.

(4) For each fiberboard and wooden intermediate bulk container, the tare mass in kg must be shown.

(5) Each flexible intermediate bulk container may be marked with a pictogram displaying recommended lifting methods.

(6) For each composite intermediate bulk container, the inner receptacle must be marked with at least the following information:

(i) The code number designating the intermediate bulk container design type, the name and address or symbol of the manufacturer, the date of manufacture and the country authorizing the allocation of the mark as specified in paragraph (a) of this section;

(ii) Where the outer casing of a composite intermediate bulk container can be dismantled, each of the detachable parts must be marked with the month and year of manufacture and the name or symbol of the manufacturer.

[Amdt. 178-103, 59 FR 38068, July 26, 1994, as amended by Amdt. 178-119, 62 FR 24743, May 6, 1997]

§ 178.704 General intermediate bulk container standards.

(a) Each intermediate bulk container must be resistant to, or protected from, deterioration due to exposure to the external environment. Intermediate bulk containers intended for solid hazardous materials must be sift-proof and water-resistant.

(b) All service equipment must be so positioned or protected as to minimize potential loss of contents resulting from damage during intermediate bulk container handling and transportation.

(c) Each intermediate bulk container, including attachments, and service and structural equipment, must be designed to withstand, without loss of hazardous materials, the internal pressure of the contents and the stresses of normal handling and transport. An intermediate bulk container intended for stacking must be designed for stacking. Any lifting or securing features of an intermediate bulk container must be of sufficient strength to withstand the normal conditions of handling and transportation without gross distortion or failure and must be positioned so as to cause no undue stress in any part of the intermediate bulk container.

(d) An intermediate bulk container consisting of a packaging within a framework must be so constructed that:

(1) The body is not damaged by the framework;

(2) The body is retained within the framework at all times; and

(3) The service and structural equipment are fixed in such a way that they cannot be damaged if the connections between body and frame allow relative expansion or movement.

(e) Bottom discharge valves must be secured in the closed position and the discharge system suitably protected from damage. Valves having lever closures must be secured against accidental opening. The open or closed position of each valve must be readily apparent. For each intermediate bulk container containing a liquid, a secondary means of sealing the discharge aperture must also be provided, e.g., by a blank flange or equivalent device.

(f) Intermediate bulk container design types must be constructed in such a way as to be bottom-lifted or top-lifted as specified in §§ 178.811 and 178.812.

§ 178.705 Standards for metal intermediate bulk containers.

(a) The provisions in this section apply to metal intermediate bulk containers intended to contain liquids and solids. Metal intermediate bulk container types are designated:

(1) 11A, 11B, 11N for solids that are loaded or discharged by gravity.

(2) 21A, 21B, 21N for solids that are loaded or discharged at a gauge pressure greater than 10 kPa (1.45 psig).

(3) 31A, 31B, 31N for liquids or solids.

(b) Definitions for metal intermediate bulk containers:

(1) *Metal intermediate bulk container* means an intermediate bulk container with a metal body, together with appropriate service and structural equipment.

(2) *Protected* means providing the intermediate bulk container body with additional external protection against impact and abrasion. For example, a multi-layer (sandwich) or double wall

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construction or a frame with a metal lattice-work casing.

(c) Construction requirements for metal intermediate bulk containers are as follows:

(1) *Body*. The body must be made of ductile metal materials. Welds must be made so as to maintain design type integrity of the receptacle under conditions normally incident to transportation.

(i) The use of dissimilar metals must not result in deterioration that could affect the integrity of the body.

(ii) Aluminum intermediate bulk containers intended to contain flammable liquids must have no movable parts, such as covers and closures, made of unprotected steel liable to rust, which might cause a dangerous reaction from friction or percussive contact with the aluminum.

(iii) Metals used in fabricating the body of a metal intermediate bulk container must meet the following requirements:

(A) For steel, the percentage elongation at fracture must not be less than 10,000/Rm with a minimum of 20 percent; where Rm = minimum tensile strength of the steel to be used, in N/mm^2; if U.S. Standard units of pounds per square inch are used for tensile strength then the ratio becomes 10,000 × (145/Rm).

(B) For aluminum, the percentage elongation at fracture must not be less than 10,000/(6Rm) with an absolute minimum of eight percent; if U.S. Standard units of pounds per square inch are used for tensile strength then the ratio becomes 10,000 × 145 / (6Rm).

(C) Specimens used to determine the elongation at fracture must be taken transversely to the direction of rolling and be so secured that:

$$Lo = 5d$$

or

$$Lo = 5.65\sqrt{A}$$

where:

Lo = gauge length of the specimen before the test
d = diameter
A = cross-sectional area of test specimen.

(iv) Minimum wall thickness:

(A) For a reference steel having a product of Rm × Ao = 10,000, where Ao = minimum elongation (as a percentage) of the reference steel to be used on fracture under tensile stress, (Rm × Ao = 10,000 × 145; if tensile strength is in U.S. Standard units of pounds per square inch) the wall thickness must not be less than:

Capacity in liters [1]	Wall thickness in mm (inches)			
	Types 11A, 11B, 11N		Types 21A, 21B, 21N, 31A, 31B, 31N	
	Unprotected	Protected	Unprotected	Protected
>450 and ≤1000	2.0 (0.079)	1.5 (0.059)	2.5 (0.098)	2.0 (0.079)
>1000 and ≤2000	2.5 (0.098)	2.0 (0.079)	3.0 (0.118)	2.5 (0.098)
>2000 and ≤3000	3.0 (0.118)	2.5 (0.098)	4.0 (0.157)	3.0 (0.118)

[1] Where: gallons = liters × 0.264.

(B) For metals other than the reference steel described in paragraph (c)(1)(iii)(A) of this section, the minimum wall thickness is the greater of 1.5 mm (0.059 inches) or as determined by use of the following equivalence formula:

Formula for Metric Units

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{Rm_1 \times A_1}}$$

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Formula for U.S. Standard Units

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{(Rm_1 \times A_1)/145}}$$

where:

e_1 = required equivalent wall thickness of the metal to be used (in mm or if e_o is in inches, use formula for U.S. Standard units).

e_o = required minimum wall thickness for the reference steel (in mm or if e_o is in inches, use formula for U.S. Standard units).

Rm_1 = guaranteed minimum tensile strength of the metal to be used (in N/mm² or for U.S. Standard units, use pounds per square inch).

A_1 = minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress (see paragraph (c)(1) of this section).

(2) *Pressure relief.* The following pressure relief requirements apply to intermediate bulk containers intended for liquids:

(i) Intermediate bulk containers must be capable of releasing a sufficient amount of vapor in the event of fire engulfment to ensure that no rupture of the body will occur due to pressure build-up. This can be achieved by spring-loaded or frangible pressure relief devices or by other means of construction.

(ii) The start-to-discharge pressure may not be higher than 65 kPa (9 psig) and no lower than the vapor pressure of the hazardous material plus the partial pressure of the air or other inert gases, measured in the intermediate bulk container at 55 °C (131 °F), determined on the basis of a maximum degree of filling as specified in §173.35(d) of this subchapter. This does not apply to fusible devices unless such devices are the only source of pressure relief for the IBC. Pressure relief devices must be fitted in the vapor space.

[Amdt. 178–103, 59 FR 38068, July 26, 1994, as amended by Amdt. 178–108, 60 FR 40038, Aug. 4, 1995; Amdt. 178–117, 61 FR 50629, Sept. 26, 1996]

§178.706 Standards for rigid plastic intermediate bulk containers.

(a) The provisions in this section apply to rigid plastic intermediate bulk containers intended to contain solids or liquids. Rigid plastic intermediate bulk container types are designated:

(1) 11H1 fitted with structural equipment designed to withstand the whole load when intermediate bulk containers are stacked, for solids which are loaded or discharged by gravity.

(2) 11H2 freestanding, for solids which are loaded or discharged by gravity.

(3) 21H1 fitted with structural equipment designed to withstand the whole load when intermediate bulk containers are stacked, for solids which are loaded or discharged under pressure.

(4) 21H2 freestanding, for solids which are loaded or discharged under pressure.

(5) 31H1 fitted with structural equipment designed to withstand the whole load when intermediate bulk containers are stacked, for liquids.

(6) 31H2 freestanding, for liquids.

(b) Rigid plastic intermediate bulk containers consist of a rigid plastic body, which may have structural equipment, together with appropriate service equipment.

(c) Rigid plastic intermediate bulk containers must be manufactured from plastic material of known specifications and be of a strength relative to its capacity and to the service it is required to perform. In addition to conformance to §173.24 of this subchapter, plastic materials must be resistant to aging and to degradation caused by ultraviolet radiation.

(1) If protection against ultraviolet radiation is necessary, it must be provided by the addition of a pigment or inhibiter such as carbon black. These additives must be compatible with the contents and remain effective throughout the life of the intermediate bulk container body. Where use is made of carbon black, pigments or inhibitors, other than those used in the manufacture of the tested design type, retesting may be omitted if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

(2) Additives may be included in the composition of the plastic material to improve the resistance to aging or to serve other purposes, provided they do not adversely affect the physical or

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chemical properties of the material of construction.

(3) No used material other than production residues or regrind from the same manufacturing process may be used in the manufacture of rigid plastic intermediate bulk containers.

(4) Rigid plastic intermediate bulk containers intended for the transportation of liquids must be capable of releasing a sufficient amount of vapor to prevent the body of the intermediate bulk container from rupturing if it is subjected to an internal pressure in excess of that for which it was hydraulically tested. This may be achieved by spring-loaded or frangible pressure relief devices or by other means of construction.

§ 178.707 Standards for composite intermediate bulk containers.

(a) The provisions in this section apply to:

(1) Composite intermediate bulk containers intended to contain solids and liquids. Composite intermediate bulk container types are designated:

(i) 11HZ1 Composite intermediate bulk containers with a rigid plastic inner receptacle for solids loaded or discharged by gravity.

(ii) 11HZ2 Composite intermediate bulk containers with a flexible plastic inner receptacle for solids loaded or discharged by gravity.

(iii) 21HZ1 Composite intermediate bulk containers with a rigid plastic inner receptacle for solids loaded or discharged under pressure.

(iv) 21HZ2 Composite intermediate bulk containers with a flexible plastic inner receptacle for solids loaded or discharged under pressure.

(v) 31HZ1 Composite intermediate bulk containers with a rigid plastic inner receptacle for liquids.

(vi) 31HZ2 Composite intermediate bulk containers with a flexible plastic inner receptacle for liquids.

(2) The marking code in paragraph (a)(1) of this section must be completed by replacing the letter Z by a capital letter in accordance with § 178.702(a)(2) to indicate the material used for the outer packaging.

(b) Definitions for composite intermediate bulk container types:

(1) A *composite intermediate bulk container* is an intermediate bulk container which consists of a rigid outer packaging enclosing a plastic inner receptacle together with any service or other structural equipment. The outer packaging of a composite intermediate bulk container is designed to bear the entire stacking load. The inner receptacle and outer packaging form an integral packaging and are filled, stored, transported, and emptied as a unit.

(2) The term plastic means polymeric materials (i.e., plastic or rubber).

(3) A "rigid" inner receptacle is an inner receptacle which retains its general shape when empty without closures in place and without benefit of the outer casing. Any inner receptacle that is not "rigid" is considered to be "flexible."

(c) Construction requirements for composite intermediate bulk containers with plastic inner receptacles are as follows:

(1) The outer packaging must consist of rigid material formed so as to protect the inner receptacle from physical damage during handling and transportation, but is not required to perform the secondary containment function. It includes the base pallet where appropriate. The inner receptacle is not intended to perform a containment function without the outer packaging.

(2) A composite intermediate bulk container with a fully enclosing outer packaging must be designed to permit assessment of the integrity of the inner container following the leakproofness and hydraulic tests. The outer packaging of 31HZ2 composite intermediate bulk containers must enclose the inner receptacles on all sides.

(3) The inner receptacle must be manufactured from plastic material of known specifications and be of a strength relative to its capacity and to the service it is required to perform. In addition to conformance with the requirements of § 173.24 of this subchapter, the material must be resistant to aging and to degradation caused by ultraviolet radiation. The inner receptacle of 31HZ2 composite intermediate bulk containers must consist of at least three plies of film.

(i) If necessary, protection against ultraviolet radiation must be provided

by the addition of pigments or inhibitors such as carbon black. These additives must be compatible with the contents and remain effective throughout the life of the inner receptacle. Where use is made of carbon black, pigments, or inhibitors, other than those used in the manufacture of the tested design type, retesting may be omitted if the carbon black content, the pigment content, or the inhibitor content do not adversely affect the physical properties of the material of construction.

(ii) Additives may be included in the composition of the plastic material of the inner receptacle to improve resistance to aging, provided they do not adversely affect the physical or chemical properties of the material.

(iii) No used material other than production residues or regrind from the same manufacturing process may be used in the manufacture of inner receptacles.

(iv) Composite intermediate bulk containers intended for the transportation of liquids must be capable of releasing a sufficient amount of vapor to prevent the body of the intermediate bulk container from rupturing if it is subjected to an internal pressure in excess of that for which it was hydraulically tested. This may be achieved by spring-loaded or frangible pressure relief devices or by other means of construction.

(4) The strength of the construction material comprising the outer packaging and the manner of construction must be appropriate to the capacity of the composite intermediate bulk container and its intended use. The outer packaging must be free of any projection that might damage the inner receptacle.

(i) Outer packagings of natural wood must be constructed of well seasoned wood that is commercially dry and free from defects that would materially lessen the strength of any part of the outer packaging. The tops and bottoms may be made of water-resistant reconstituted wood such as hardboard or particle board. Materials other than natural wood may be used for construction of structural equipment of the outer packaging.

(ii) Outer packagings of plywood must be made of well-seasoned, rotary cut, sliced, or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the casing. All adjacent plies must be glued with water-resistant adhesive. Materials other than plywood may be used for construction of structural equipment of the outer packaging. Outer packagings must be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

(iii) Outer packagings of reconstituted wood must be constructed of water-resistant reconstituted wood such as hardboard or particle board. Materials other than reconstituted wood may be used for the construction of structural equipment of reconstituted wood outer packaging.

(iv) Fiberboard outer packagings must be constructed of strong, solid, or double-faced corrugated fiberboard (single or multiwall).

(A) Water resistance of the outer surface must be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 grams per square meter (0.0316 pounds per square foot—see ISO International Standard 535–1976 (E)). Fiberboard must have proper bending qualities. Fiberboard must be cut, creased without cutting through any thickness of fiberboard, and slotted so as to permit assembly without cracking, surface breaks, or undue bending. The fluting of corrugated fiberboard must be firmly glued to the facings.

(B) The ends of fiberboard outer packagings may have a wooden frame or be constructed entirely of wood. Wooden battens may be used for reinforcements.

(C) Manufacturers' joints in the bodies of outer packagings must be taped, lapped and glued, or lapped and stitched with metal staples.

(D) Lapped joints must have an appropriate overlap.

(E) Where closing is effected by gluing or taping, a water-resistant adhesive must be used.

(F) All closures must be sift-proof.

(v) Outer packagings of plastic materials must be constructed in accordance with the relevant provisions of paragraph (c)(3) of this section.

(5) Any integral pallet base forming part of an intermediate bulk container, or any detachable pallet, must be suitable for the mechanical handling of an intermediate bulk container filled to its maximum permissible gross mass.

(i) The pallet or integral base must be designed to avoid protrusions that may cause damage to the intermediate bulk container in handling.

(ii) The outer packaging must be secured to any detachable pallet to ensure stability in handling and transportation. Where a detachable pallet is used, its top surface must be free from sharp protrusions that might damage the intermediate bulk container.

(iii) Strengthening devices, such as timber supports to increase stacking performance, may be used but must be external to the inner receptacle.

(iv) The load-bearing surfaces of intermediate bulk containers intended for stacking must be designed to distribute loads in a stable manner. An intermediate bulk container intended for stacking must be designed so that loads are not supported by the inner receptacle.

(6) Intermediate IBCs of type 31HZ2 must be limited to a capacity of not more than 1,250 liters.

[Amdt. 178–103, 59 FR 38068, July 26, 1994, as amended by Amdt. 178–119, 62 FR 24743, May 6, 1997]

§ 178.708 Standards for fiberboard intermediate bulk containers.

(a) The provisions of this section apply to fiberboard intermediate bulk containers intended to contain solids that are loaded or discharged by gravity. Fiberboard intermediate bulk containers are designated: 11G.

(b) Definitions for fiberboard intermediate bulk container types:

(1) *Fiberboard intermediate bulk containers* consist of a fiberboard body with or without separate top and bottom caps, appropriate service and structural equipment, and if necessary an inner liner (but no inner packaging).

(2) *Liner* means a separate tube or bag, including the closures of its openings, inserted in the body but not forming an integral part of it.

(c) Construction requirements for fiberboard intermediate bulk containers are as follows:

(1) Top lifting devices are prohibited in fiberboard intermediate bulk containers.

(2) Fiberboard intermediate bulk containers must be constructed of strong, solid or double-faced corrugated fiberboard (single or multiwall) that is appropriate to the capacity of the outer packaging and its intended use. Water resistance of the outer surface must be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 grams per square meter (0.0316 pounds per square foot see ISO 535–1976(E)). Fiberboard must have proper bending qualities. Fiberboard must be cut, creased without cutting through any thickness of fiberboard, and slotted so as to permit assembly without cracking, surface breaks, or undue bending. The fluting of corrugated fiberboard must be firmly glued to the facings.

(i) The walls, including top and bottom, must have a minimum puncture resistance of 15 Joules (11 foot-pounds of energy) measured according to ISO 3036, incorporated by reference in § 171.7 of this subchapter.

(ii) Manufacturers' joints in the bodies of intermediate bulk containers must be made with an appropriate overlap and be taped, glued, stitched with metal staples or fastened by other means at least equally effective. Where joints are made by gluing or taping, a water-resistant adhesive must be used. Metal staples must pass completely through all pieces to be fastened and be formed or protected so that any inner liner cannot be abraded or punctured by them.

(3) The strength of the material used and the construction of the liner must be appropriate to the capacity of the intermediate bulk container and the intended use. Joints and closures must be sift-proof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transport.

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(4) Any integral pallet base forming part of an intermediate bulk container, or any detachable pallet, must be suitable for the mechanical handling of an intermediate bulk container filled to its maximum permissible gross mass.

(i) The pallet or integral base must be designed to avoid protrusions that may cause damage to the intermediate bulk container in handling.

(ii) The outer packaging must be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface must be free from sharp protrusions that might damage the intermediate bulk container.

(iii) Strengthening devices, such as timber supports to increase stacking performance, may be used but must be external to the inner liner.

(iv) The load-bearing surfaces of intermediate bulk containers intended for stacking must be designed to distribute loads in a stable manner.

§ 178.709 Standards for wooden intermediate bulk containers.

(a) The provisions in this section apply to wooden intermediate bulk containers intended to contain solids that are loaded or discharged by gravity. Wooden intermediate bulk container types are designated:

(1) 11C Natural wood with inner liner.

(2) 11D Plywood with inner liner.

(3) 11F Reconstituted wood with inner liner.

(b) Definitions for wooden intermediate bulk containers:

(1) *Wooden intermediate bulk containers* consist of a rigid or collapsible wooden body together with an inner liner (but no inner packaging) and appropriate service and structural equipment.

(2) *Liner* means a separate tube or bag, including the closures of its openings, inserted in the body but not forming an integral part of it.

(c) Construction requirements for wooden intermediate bulk containers are as follows:

(1) Top lifting devices are prohibited in wooden intermediate bulk containers.

(2) The strength of the materials used and the method of construction must be appropriate to the capacity and intended use of the intermediate bulk container.

(i) Natural wood used in the construction of an intermediate bulk container must be well-seasoned, commercially dry, and free from defects that would materially lessen the strength of any part of the intermediate bulk container. Each intermediate bulk container part must consist of uncut wood or a piece equivalent in strength and integrity. Intermediate bulk container parts are equivalent to one piece when a suitable method of glued assembly is used (i.e., a Lindermann joint, tongue and groove joint, ship lap or rabbet joint, or butt joint with at least two corrugated metal fasteners at each joint, or when other methods at least equally effective are used). Materials other than natural wood may be used for the construction of structural equipment of the outer packaging.

(ii) Plywood used in construction of bodies must be at least 3-ply. Plywood must be made of well-seasoned, rotary-cut, sliced or sawn veneer, commercially dry, and free from defects that would materially lessen the strength of the body. All adjacent plies must be glued with water-resistant adhesive. Materials other than plywood may be used for the construction of structural equipment of the outer packaging.

(iii) Reconstituted wood used in construction of bodies must be water resistant reconstituted wood such as hardboard or particle board. Materials other than reconstituted wood may be used for the construction of structural equipment of the outer packaging.

(iv) Wooden intermediate bulk containers must be firmly nailed or secured to corner posts or ends or be assembled by similar devices.

(3) The strength of the material used and the construction of the liner must be appropriate to the capacity of the intermediate bulk container and its intended use. Joints and closures must be sift-proof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transportation.

(4) Any integral pallet base forming part of an intermediate bulk container, or any detachable pallet, must be suitable for the mechanical handling of an

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intermediate bulk container filled to its maximum permissible gross mass.

(i) The pallet or integral base must be designed to avoid protrusions that may cause damage to the intermediate bulk container in handling.

(ii) The outer packaging must be secured to any detachable pallet to ensure stability in handling and transportation. Where a detachable pallet is used, its top surface must be free from sharp protrusions that might damage the intermediate bulk container.

(iii) Strengthening devices, such as timber supports to increase stacking performance, may be used but must be external to the inner liner.

(iv) The load-bearing surfaces of intermediate bulk containers intended for stacking must be designed to distribute loads in a stable manner.

§ 178.710 Standards for flexible intermediate bulk containers.

(a) The provisions of this section apply to flexible intermediate bulk containers intended to contain solid hazardous materials. Flexible intermediate bulk container types are designated:

(1) 13H1 woven plastic without coating or liner.

(2) 13H2 woven plastic, coated.

(3) 13H3 woven plastic with liner.

(4) 13H4 woven plastic, coated and with liner.

(5) 13H5 plastic film.

(6) 13L1 textile without coating or liner.

(7) 13L2 textile, coated.

(8) 13L3 textile with liner.

(9) 13L4 textile, coated and with liner.

(10) 13M1 paper, multiwall.

(11) 13M2 paper, multiwall, water resistant.

(b) Definitions for flexible intermediate bulk containers:

(1) *Flexible intermediate bulk containers* consist of a body constructed of film, woven plastic, woven fabric, paper, or combination thereof, together with any appropriate service equipment and handling devices, and if necessary, an inner coating or liner.

(2) *Woven plastic* means a material made from stretched tapes or monofilaments.

(3) *Handling device* means any sling, loop, eye, or frame attached to the body of the intermediate bulk container or formed from a continuation of the intermediate bulk container body material.

(c) Construction requirements for flexible intermediate bulk containers are as follows:

(1) The strength of the material and the construction of the flexible intermediate bulk container must be appropriate to its capacity and its intended use.

(2) All materials used in the construction of flexible intermediate bulk containers of types 13M1 and 13M2 must, after complete immersion in water for not less than 24 hours, retain at least 85 percent of the tensile strength as measured originally on the material conditioned to equilibrium at 67 percent relative humidity or less.

(3) Seams must be stitched or formed by heat sealing, gluing or any equivalent method. All stitched seam-ends must be secured.

(4) In addition to conformance with the requirements of §173.24 of this subchapter, flexible intermediate bulk containers must be resistant to aging and degradation caused by ultraviolet radiation.

(5) For plastic flexible intermediate bulk containers, if necessary, protection against ultraviolet radiation must be provided by the addition of pigments or inhibitors such as carbon black. These additives must be compatible with the contents and remain effective throughout the life of the container. Where use is made of carbon black, pigments, or inhibitors, other than those used in the manufacture of the tested design type, retesting may be omitted if the carbon black content, the pigment content or the inhibitor content does not adversely affect the physical properties of the material of construction. Additives may be included in the composition of the plastic material to improve resistance to aging, provided they do not adversely affect the physical or chemical properties of the material.

(6) No used material other than production residues or regrind from the same manufacturing process may be used in the manufacture of plastic

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flexible intermediate bulk containers. This does not preclude the re-use of component parts such as fittings and pallet bases, provided such components have not in any way been damaged in previous use.

(7) When flexible intermediate bulk containers are filled, the ratio of height to width may not be more than 2:1.

[Amdt. 178-103, 59 FR 38068, July 26, 1994, as amended by Amdt. 178-108, 60 FR 40038, Aug. 4, 1995]

Subpart O—Testing of Intermediate Bulk Containers

SOURCE: Amdt. 178-103, 59 FR 38074, July 26, 1994, unless otherwise noted.

§ 178.800 Purpose and scope.

This subpart prescribes certain testing requirements for intermediate bulk containers identified in subpart N of this part.

§ 178.801 General requirements.

(a) *General.* The test procedures prescribed in this subpart are intended to ensure that intermediate bulk containers containing hazardous materials can withstand normal conditions of transportation and are considered minimum requirements. Each packaging must be manufactured and assembled so as to be capable of successfully passing the prescribed tests and of conforming to the requirements of § 173.24 of this subchapter at all times while in transportation.

(b) *Responsibility.* It is the responsibility of the intermediate bulk container manufacturer to assure that each intermediate bulk container is capable of passing the prescribed tests. To the extent that an intermediate bulk container assembly function, including final closure, is performed by the person who offers a hazardous material for transportation, that person is responsible for performing the function in accordance with §§ 173.22 and 178.2 of this subchapter.

(c) *Definitions.* For the purpose of this subpart:

(1) *Intermediate bulk container design type* refers to intermediate bulk container which does not differ in structural design, size, material of construction, wall thickness, manner of construction and representative service equipment.

(2) *Design qualification testing* is the performance of the drop, leakproofness, hydrostatic pressure, stacking, bottom-lift or top-lift, tear, topple, righting and vibration tests, as applicable, prescribed in this subpart, for each different intermediate bulk container design type, at the start of production of that packaging.

(3) *Periodic design requalification test* is the performance of the applicable tests specified in paragraph (c)(2) of this section on an intermediate bulk container design type, in order to requalify the design for continued production at the frequency specified in paragraph (e) of this section.

(4) *Production inspection* is the inspection that must initially be conducted on each newly manufactured intermediate bulk container.

(5) *Production testing* is the performance of the leakproofness test in accordance with paragraph (f) of this section on each intermediate bulk container intended to contain solids discharged by pressure or intended to contain liquids.

(6) *Periodic retest and inspection* is performance of the applicable test and inspections on each intermediate bulk container at the frequency specified in § 180.352 of this subchapter.

(7) *Different intermediate bulk container design type* is one that differs from a previously qualified intermediate bulk container design type in structural design, size, material of construction, wall thickness, or manner of construction, but does not include:

(i) A packaging which differs in surface treatment;

(ii) A rigid plastic intermediate bulk container or composite intermediate bulk container which differs with regard to additives used to comply with §§ 178.706(c), 178.707(c) or 178.710(c);

(iii) A packaging which differs only in its lesser external dimensions (i.e., height, width, length) provided materials of construction and material thicknesses or fabric weight remain the same;

(iv) A packaging which differs in service equipment.

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