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or metal inner packaging with a maximum capacity not exceeding 1.2 L. Sufficient outage must be provided such that the inner packaging will not become liquid full at 55 °C (130 °F). The net quantity (measured at 20 °C (68 °F)) of liquid in any inner packaging may not exceed 1 L. For transportation by aircraft, the net quantity in one package may not exceed the quantity specified in columns (9A) or (9B), as appropriate.

(ii) The inner packaging must be placed in a hermetically sealed barrier bag which is impervious to the lading, and then wrapped in a non-reactive absorbent material in sufficient quantity to completely absorb the contents of the inner packaging. Alternatively, the inner packaging may first be wrapped in a non-reactive absorbent material and then placed in the hermetically sealed barrier bag. The combination of inner packaging, absorbent material, and bag must be placed in a snugly fitting metal can.

(iii) The metal can must be securely closed. For liquids that are in Division 4.2 or 4.3, the metal can must be hermetically sealed. For Division 4.2 materials in Packing Group I, the metal can must be tested in accordance with part 178 of this subchapter at the Packing Group I performance level.

(iv) The metal can must be placed in a fiberboard box that is placed in a hermetically sealed barrier bag which is impervious to the lading.

(v) The intermediate packaging must be placed inside a securely closed, outer packaging conforming to §173.201.

(vi) Not more than four intermediate packagings are permitted in an outer packaging.

(2) For solids:

(i) The hazardous material must be placed in a tightly closed glass, plastic or metal inner packaging. The net quantity of material in any inner packaging may not exceed 2.85kg (6.25 pounds). For transportation by aircraft, the net quantity in one package may not exceed the quantity specified in columns (9A) or (9B), as appropriate.

(ii) The inner packaging must be placed in a hermetically sealed barrier bag which is impervious to the lading.

(iii) The barrier bag and its contents must be placed in a fiberboard box that is placed in a hermetically-sealed barrier bag which is impervious to the lading.

(iv) The intermediate packaging must be placed inside an outer packaging conforming to §173.211.

(v) Not more than four intermediate packagings are permitted in an outer packaging.

(d) The outside of the package must be marked, in association with the proper shipping name, with the statement: ''This package conforms to 49 CFR 173.13.''

[Amdt. 173–253, 61 FR 27173, May 30, 1996, as amended at 65 FR 50460, Aug. 18, 2000; 66 FR 45381, Aug. 28, 2001; 70 FR 3309, Jan. 24, 2005; 71 FR 54395, Sept. 14, 2006; 75 FR 27215, May 14, 2010]

Subpart B—Preparation of Hazardous Materials for Transportation

§173.21 Forbidden materials and packages.

Unless otherwise provided in this subchapter, the offering for transportation or transportation of the following is forbidden:

(a) Materials that are designated ''Forbidden'' in Column 3 of the §172.101 table.

(b) Forbidden explosives as defined in §173.54 of this part.

(c) Electrical devices, such as batteries and battery-powered devices, which are likely to create sparks or generate a dangerous evolution of heat, unless packaged in a manner which precludes such an occurrence.

(d) For carriage by aircraft, any package which has a magnetic field of more than 0.00525 gauss measured at 4.5 m (15 feet) from any surface of the package.

(e) A material in the same packaging, freight container, or overpack with another material, the mixing of which is likely to cause a dangerous evolution of heat, or flammable or poisonous gases or vapors, or to produce corrosive materials.

(f) A package containing a material which is likely to decompose with a self-accelerated decomposition temperature (SADT) of 50 °C (122 °F) or

less, or polymerize at a temperature of 54 °C (130 °F) or less with an evolution of a dangerous quantity of heat or gas when decomposing or polymerizing, unless the material is stabilized or inhibited in a manner to preclude such evolution. The SADT may be determined by any of the test methods described in Part II of the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter).

(1) A package meeting the criteria of paragraph (f) of this section may be required to be shipped under controlled temperature conditions. The control temperature and emergency temperature for a package shall be as specified in the table in this paragraph based upon the SADT of the material. The control temperature is the temperature above which a package of the material may not be offered for transportation or transported. The emergency temperature is the temperature at which, due to imminent danger, emergency measures must be initiated.

§ 173.21 TABLE: METHOD OF DETERMINING CONTROL AND EMERGENCY TEMPERATURE.

SADT [1]	Control temperatures	Emergency temperature
SADT ≤ 20 °C (68 °F).	20 °C (36 °F) below SADT.	10 °C (18 °F) below SADT.
20 °C (68 °F) < SADT ≤ 35 °C (95 °F).	15 °C (27 °F) below SADT.	10 °C (18 °F) below SADT.
35 °C (95 °F) < SADT ≤ 50 °C (122 °F).	10 °C (18 °F) below SADT.	5 °C (9 °F) below SADT.
50 °C (122 °F) < SADT.	[2]	[2]

[1] Self-accelerating decomposition temperature.
[2] Temperature control not required.

(2) For self-reactive materials listed in §173.224(b) table control and emergency temperatures, where required are shown in Columns 5 and 6, respectively. For organic peroxides listed in The Organic Peroxides Table in §173.225 control and emergency temperatures, where required, are shown in Columns 7a and 7b, respectively.

(3) Refrigeration may be used as a means of stabilization only when approved by the Associate Administrator. Approvals issued by the Bureau of Explosives are no longer valid (see §171.19 of this subchapter). Methods of stabilization approved by the Associate Administrator are as follows:

(i) For highway transportation:

(A) A material meeting the criteria of this paragraph (f) may be transported only in a transport vehicle, freight container, or motor vehicle equipped with a mechanical refrigeration unit, or loaded with a consumable refrigerant, capable of maintaining the inside temperature of the hazardous material at or below the control temperature required for the material during transportation.

(B) Each package containing a material meeting the criteria of this paragraph (f) must be loaded and maintained at or below the control temperature required for the material. The temperature of the material must be determined by appropriate means and entered on a written record at the time the packaging is loaded.

(C) The vehicle operator shall monitor the inside temperature of the transport vehicle, freight container, or motor vehicle and enter that temperature on a written record at the time the package is loaded and thereafter at intervals not exceeding two hours. Alternatively, a transport vehicle, freight container, or motor vehicle may be equipped with a visible or audible warning device that activates when the inside temperature of the transport vehicle, freight container, or motor vehicle exceeds the control temperature required for the material. The warning device must be readily visible or audible, as appropriate, from the vehicle operator's seat in the vehicle.

(D) The carrier shall advise the vehicle operator of the emergency temperature for the material, and provide the vehicle operator with written procedures that must be followed to assure maintenance of the control temperature inside the transport vehicle, freight container, or motor vehicle. The written procedures must include instructions for the vehicle operator on actions to take if the inside temperature exceeds the control temperature and approaches or reaches the emergency temperature for the material. In addition, the written temperature-control procedures must identify enroute

points where the consumable refrigerant may be procured, or where repairs to, or replacement of, the mechanical refrigeration unit may be accomplished.

(E) The vehicle operator shall maintain the written temperature-control procedures, and the written record of temperature measurements specified in paragraph (f)(3)(i)(C) of this section, if applicable, in the same manner as specified in §177.817 of this subchapter for shipping papers.

(F) If the control temperature is maintained by use of a consumable refrigerant (e.g., dry ice or liquid nitrogen), the quantity of consumable refrigerant must be sufficient to maintain the control temperature for twice the average transit time under normal conditions of transportation.

(G) A material that has a control temperature of 40 °C (104 °F) or higher may be transported by common carrier. A material that has a control temperature below 40 °C (104 °F) must be transported by a private or contract carrier.

(ii) For transportation by vessel, shipments are authorized in accordance with the control temperature requirements in Chapter 7.7 of the IMDG Code (IBR, see §171.7 of this subchapter).

(g) Packages which give off a flammable gas or vapor, released from a material not otherwise subject to this subchapter, likely to create a flammable mixture with air in a transport vehicle.

(h) Packages containing materials (other than those classed as explosive) which will detonate in a fire.

(1) For purposes of this paragraph, ''detonate'' means an explosion in which the shock wave travels through the material at a speed greater than the speed of sound.

(2) When tests are required to evaluate the performance of a package under the provisions of this paragraph, the testing must be done or approved by one of the agencies specified in §173.56.

(i) Except for a package containing a lighter design sample that meets the requirements of §173.308(b)(2), a package containing a lighter (see §171.8 of this subchapter) containing a Division 2.1 material, of a design that has not been examined and successfully tested by an authorized person under the criteria specified in §173.308(a)(4) or, a lighter design containing a Class 3 material, that has not been approved by the Associate Administrator.

(j) An organic peroxide of the ''ketone peroxide'' category which contains more than 9 percent available oxygen as calculated using the equation in §173.128(a)(4)(ii). The category, ketone peroxide, includes, but is not limited to:

Acetyl acetone peroxide
Cyclohexanone peroxide(s)
Diacetone alcohol peroxides
Methylcyclohexanone peroxide(s)
Methyl ethyl ketone peroxide(s)
Methyl isobutyl ketone peroxide(s)

(k) Notwithstanding any other provision of this subchapter, including subpart C of part 171 and 175.10(a)(2) of this subchapter, an oxygen generator (chemical) as cargo on a passenger-carrying aircraft. This prohibition does not apply to an oxygen generator for medical or personal use of a passenger that meets the requirements of §175.10(a)(7) of this subchapter.

[Amdt. 173–224, 55 FR 52609, Dec. 21, 1990]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §173.21, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§173.22 Shipper's responsibility.

(a) Except as otherwise provided in this part, a person may offer a hazardous material for transportation in a packaging or container required by this part only in accordance with the following:

(1) The person shall class and describe the hazardous material in accordance with parts 172 and 173 of this subchapter, and

(2) The person shall determine that the packaging or container is an authorized packaging, including part 173 requirements, and that it has been manufactured, assembled, and marked in accordance with:

(i) Section 173.7(a) and parts 173, 178, or 179 of this subchapter;

(ii) A specification of the Department in effect at the date of manufacture of the packaging or container;

(iii) National or international regulations based on the UN Recommendations (IBR, see §171.7 of this subchapter), as authorized in §173.24(d)(2);

(iv) An approval issued under this subchapter; or

(v) An exemption or special permit issued under subchapter A of this chapter.

(3) In making the determination under paragraph (a)(2) of this section, the person may accept:

(i) Except for the marking on the bottom of a metal or plastic drum with a capacity over 100 L which has been reconditioned, remanufactured or otherwise converted, the manufacturer's certification, specification, approval, or exemption or special permit marking (see §§178.2 and 179.1 of this subchapter); or

(ii) With respect to cargo tanks provided by a carrier, the manufacturer's identification plate or a written certification of specification or exemption or special permit provided by the carrier.

(4) For a DOT Specification or UN standard packaging subject to the requirements of part 178 of this subchapter, a person must perform all functions necessary to bring the package into compliance with parts 173 and 178 of this subchapter, as identified by the packaging manufacturer or subsequent distributor (for example, applying closures consistent with the manufacturer's closure instructions) in accordance with §178.2 of this subchapter. A person must maintain a copy of the manufacturer's notification, including closure instructions (*see* §178.2(c) of this subchapter) unless permanently embossed or printed on the packaging. When applicable, a person must maintain a copy of any supporting documentation for an equivalent level of performance under the selective testing variation in §178.601(g)(1) of this subchapter. A copy of the notification, unless permanently embossed or printed on the packaging, and supporting documentation, when applicable, must be made available for inspection by a representative of the Department upon request for the time period of the packaging's periodic retest date, *i.e.*, every 12 months for single or composite packagings and every 24 months for combination packagings.

(b) No person may offer a motor carrier any hazardous material specified in 49 CFR 385.403 unless that motor carrier holds a safety permit issued by the Federal Motor Carrier Safety Administration.

(c) Prior to each shipment of fissile radioactive materials, and Type B or highway route controlled quantity packages of radioactive materials (see §173.403), the shipper shall notify the consignee of the dates of shipment and expected arrival. The shipper shall also notify each consignee of any special loading/unloading instructions prior to his first shipment. For any shipment of irradiated reactor fuel, the shipper shall provide physical protection in compliance with a plan established under:

(1) Requirements prescribed by the U.S. Nuclear Regulatory Commission, or

(2) Equivalent requirements approved by the Associate Administrator.

[Amdt. 173–100, 42 FR 2689, Jan. 13, 1977]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §173.22, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§173.22a Use of packagings authorized under special permits.

(a) Except as provided in paragraph (b) of this section, no person may offer a hazardous material for transportation in a packaging the use of which is dependent upon an exemption or special permit issued under subpart B of part 107 of this title, unless that person is the holder of or a party to the exemption or special permit.

(b) If an exemption or special permit authorizes the use of a packaging for the transportation of a hazardous material by any person or class of persons other than or in addition to the holder of the exemption or special permit, that person or a member of that class of persons may use the packaging for the purposes authorized in the exemption or special permit subject to the terms specified therein. Copies of exemptions and special permits may be obtained by accessing the Hazardous Materials Safety Web site at *http://*

www.phmsa.dot.gov/hazmat/regs/sp-a'' or by writing to the Associate Administrator for Hazardous Materials Safety, U.S. Department of Transportation, East Building, 1200 New Jersey Avenue, SE., Washington, DC 20590–0001, Attention: Records Center.

(c) When an exemption or special permit issued to a person who offers a hazardous material contains requirements that apply to a carrier of the hazardous material, the offeror shall furnish a copy of the current exemption or special permit to the carrier before or at the time a shipment is tendered.

[70 FR 73165, Dec. 9, 2005, as amended at 72 FR 55692, Oct. 1, 2007; 76 FR 56315, Sept. 13, 2011]

§ 173.23 Previously authorized packaging.

(a) When the regulations specify a packaging with a specification marking prefix of ''DOT,'' a packaging marked prior to January 1, 1970, with the prefix of ''ICC'' may be used in its place if the packaging otherwise conforms to applicable specification requirements.

(b) [Reserved]

(c) After July 2, 1982, a seamless aluminum cylinder manufactured in conformance with and for use under DOT special permit (SP) or exemption (E) 6498, 7042, 8107, 8364 or 8422 may be continued in use if marked before or at the time of the next retest with either the specification identification ''3AL'' immediately above the special permit or exemption number, or the DOT mark (e.g., DOT 3AL 1800) in proximity to the special permit or exemption marking.

(d) Cylinders (spheres) manufactured and marked under DOT special permit (SP) or exemption (E) 6616 prior to January 1, 1983, may be continued in use if marked before or at the time of the next retest with the specification identification ''4BA'' near the special permit or exemption marking.

(e) After October 1, 1984, cylinders manufactured for use under special permit (SP) or exemption (E) 6668 or 8404 may be continued in use, and must be marked ''DOT-4LXXXYY'' (XXX to be replaced by the service pressure, YY to be replaced by the letters ''AL'', if applicable) in compliance with Specification 4L (§178.57 of this subchapter) on or before January 1, 1986. The ''DOT-4LXXXYY'' must appear in proximity to other required special permit or exemption markings.

(f) An MC 331 cargo tank motor vehicle must conform to structural integrity requirements in §178.337–3 or to corresponding requirements in effect at the time of manufacture.

(g) A non-bulk packaging manufactured, tested, marked, and certified on or before September 30, 1996, in accordance with the applicable provisions of subparts L and M of part 178 of this subchapter in effect on September 30, 1995, may be used as authorized by this subchapter if the packaging conforms to all requirements applicable at the time of manufacture. In addition, such a packaging may be reused as authorized by §173.28 without a nominal thickness marking, if it conforms to the minimum thickness criteria prescribed in §173.28(b)(4).

(h) A packaging that is permanently marked with a special permit number, ''DOT–SP'' or ''DOT–E,'' for which the provisions of the special permit have been incorporated into this subchapter may continue to be used for the life of the packaging without obliterating or otherwise removing the special permit number.

(i) An exemption packaging or shipping paper that is permanently marked ''DOT-E'' prior to October 1, 2007, may continue in use as long as the exemption or special permit remains valid, unless otherwise specified in the exemption or special permit.

[Amdt. 173–3, 33 FR 14921, Oct. 4, 1968]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §173.23, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§ 173.24 General requirements for packagings and packages.

(a) Applicability. Except as otherwise provided in this subchapter, the provisions of this section apply to—

(1) Bulk and non-bulk packagings;

(2) New packagings and packagings which are reused; and

(3) Specification and non-specification packagings.

(b) Each package used for the shipment of hazardous materials under this subchapter shall be designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation—

(1) Except as otherwise provided in this subchapter, there will be no identifiable (without the use of instruments) release of hazardous materials to the environment;

(2) The effectiveness of the package will not be substantially reduced; for example, impact resistance, strength, packaging compatibility, etc. must be maintained for the minimum and maximum temperatures, changes in humidity and pressure, and shocks, loadings and vibrations, normally encountered during transportation;

(3) There will be no mixture of gases or vapors in the package which could, through any credible spontaneous increase of heat or pressure, significantly reduce the effectiveness of the packaging;

(4) There will be no hazardous material residue adhering to the outside of the package during transport.

(c) Authorized packagings. A packaging is authorized for a hazardous material only if—

(1) The packaging is prescribed or permitted for the hazardous material in a packaging section specified for that material in Column 8 of the §172.101 table and conforms to applicable requirements in the special provisions of Column 7 of the §172.101 table and, for specification packagings (but not including UN standard packagings manufactured outside the United States), the specification requirements in parts 178 and 179 of this subchapter; or

(2) The packaging is permitted under, and conforms to, provisions contained in subparts B or C of part 171 of this subchapter or §§173.3, 173.4, 173.4a, 173.4b, 173.5, 173.5a, 173.6, 173.7, 173.8, 173.27, or §176.11 of this subchapter.

(d) *Specification packagings and UN standard packagings manufactured outside the U.S.*—(1) *Specification packagings.* A specification packaging, including a UN standard packaging manufactured in the United States, must conform in all details to the applicable specification or standard in part 178 or part 179 of this subchapter.

(2) UN standard packagings manufactured outside the United States. A UN standard packaging manufactured outside the United States, in accordance with national or international regulations based on the UN Recommendations (IBR, see §171.7 of this subchapter), may be imported and used and is considered to be an authorized packaging under the provisions of paragraph (c)(1) of this section, subject to the following conditions and limitations:

(i) The packaging fully conforms to applicable provisions in the UN Recommendations and the requirements of this subpart, including reuse provisions;

(ii) The packaging is capable of passing the prescribed tests in part 178 of this subchapter applicable to that standard; and

(iii) The competent authority of the country of manufacture provides reciprocal treatment for UN standard packagings manufactured in the U.S.

(e) Compatibility. (1) Even though certain packagings are specified in this part, it is, nevertheless, the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their lading. This particularly applies to corrosivity, permeability, softening, premature aging and embrittlement.

(2) Packaging materials and contents must be such that there will be no significant chemical or galvanic reaction between the materials and contents of the package.

(3) Plastic packagings and receptacles. (i) Plastic used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous condition is likely to occur during transportation, handling or refilling.

(ii) Each plastic packaging or receptacle which is used for liquid hazardous materials must be capable of withstanding without failure the procedure specified in appendix B of this part (''Procedure for Testing Chemical Compatibility and Rate of Permeation in Plastic Packagings and Receptacles'').

The procedure specified in appendix B of this part must be performed on each plastic packaging or receptacle used for Packing Group I materials. The maximum rate of permeation of hazardous lading through or into the plastic packaging or receptacles may not exceed 0.5 percent for materials meeting the definition of a Division 6.1 material according to §173.132 and 2.0 percent for other hazardous materials, when subjected to a temperature no lower than—

(A) 18 °C (64 °F) for 180 days in accordance with Test Method 1 in appendix B of this part;

(B) 50 °C (122 °F) for 28 days in accordance with Test Method 2 in appendix B of this part; or

(C) 60 °C (140 °F) for 14 days in accordance with Test Method 3 in appendix B of this part.

(iii) Alternative procedures or rates of permeation are permitted if they yield a level of safety equivalent to or greater than that provided by paragraph (e)(3)(ii) of this section and are specifically approved by the Associate Administrator.

(4) Mixed contents. Hazardous materials may not be packed or mixed together in the same outer packaging with other hazardous or nonhazardous materials if such materials are capable of reacting dangerously with each other and causing—

(i) Combustion or dangerous evolution of heat;

(ii) Evolution of flammable, poisonous, or asphyxiant gases; or

(iii) Formation of unstable or corrosive materials.

(5) Packagings used for solids, which may become liquid at temperatures likely to be encountered during transportation, must be capable of containing the hazardous material in the liquid state.

(f) Closures. (1) Closures on packagings shall be so designed and closed that under conditions (including the effects of temperature, pressure and vibration) normally incident to transportation—

(i) Except as provided in paragraph (g) of this section, there is no identifiable release of hazardous materials to the environment from the opening to which the closure is applied; and

(ii) The closure is leakproof and secured against loosening. For air transport, stoppers, corks or other such friction closures must be held in place by positive means.

(2) Except as otherwise provided in this subchapter, a closure (including gaskets or other closure components, if any) used on a specification packaging must conform to all applicable requirements of the specification and must be closed in accordance with information, as applicable, provided by the manufacturer's notification required by §178.2 of this subchapter.

(g) *Venting.* Venting of packagings, to reduce internal pressure which may develop by the evolution of gas from the contents, is permitted only when—

(1) Except for shipments of cryogenic liquids as specified in §173.320(c) and of carbon dioxide, solid (dry ice), transportation by aircraft is not involved;

(2) Except as otherwise provided in this subchapter, the evolved gases are not poisonous, likely to create a flammable mixture with air or be an asphyxiant under normal conditions of transportation;

(3) The packaging is designed so as to preclude an unintentional release of hazardous materials from the receptacle;

(4) For bulk packagings, other than IBCs, venting is authorized for the specific hazardous material by a special provision in the §172.101 table or by the applicable bulk packaging specification in part 178 of this subchapter; and

(5) Intermediate bulk packagings (IBCs) may be vented when required to reduce internal pressure that may develop by the evolution of gas subject to the requirements of paragraphs (g)(1) through (g)(3) of this section. The IBC must be of a type that has successfully passed (with the vent in place) the applicable design qualification tests with no release of hazardous material.

(h) Outage and filling limits—(1) *General.* When filling packagings and receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the packaging or receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to be encountered during transportation. Requirements for outage and filling

limits for non-bulk and bulk packagings are specified in §§ 173.24a(d) and 173.24b(a), respectively.

(2) *Compressed gases and cryogenic liquids.* Filling limits for compressed gases and cryogenic liquids are specified in §§ 173.301 through 173.306 for cylinders and §§ 173.314 through 173.319 for bulk packagings.

(i) *Air transportation.* Except as provided in subpart C of part 171 of this subchapter, packages offered or intended for transportation by aircraft must conform to the general requirements for transportation by aircraft in § 173.27.

[Amdt. 173–224, 55 FR 52610, Dec. 21, 1990, as amended by Amdt. 173–227, 56 FR 49989, Oct. 2, 1991; 56 FR 66265, Dec. 20, 1991; Amdt. 173–238, 59 FR 38064, July 26, 1994; Amdt. 173–241, 59 FR 67491, Dec. 29, 1994; Amdt. 173–242, 60 FR 26805, May 18, 1995; 66 FR 8647, Feb. 1, 2001; 66 FR 45379, 81, Aug. 28, 2001; 68 FR 45032, July 31, 2003; 68 FR 75742, Dec. 31, 2003; 69 FR 76154, Dec. 20, 2004; 72 FR 25176, May 3, 2007; 73 FR 4717, Jan. 28, 2008; 74 FR 2255, Jan. 14, 2009]

§ 173.24a Additional general requirements for non-bulk packagings and packages.

(a) *Packaging design.* Except as provided in § 172.312 of this subchapter:

(1) *Inner packaging closures.* A combination packaging containing liquid hazardous materials must be packed so that closures on inner packagings are upright.

(2) *Friction.* The nature and thickness of the outer packaging must be such that friction during transportation is not likely to generate an amount of heat sufficient to alter dangerously the chemical stability of the contents.

(3) *Securing and cushioning.* Inner packagings of combination packagings must be so packed, secured and cushioned to prevent their breakage or leakage and to control their shifting within the outer packaging under conditions normally incident to transportation. Cushioning material must not be capable of reacting dangerously with the contents of the inner packagings or having its protective properties significantly weakened in the event of leakage.

(4) *Metallic devices.* Nails, staples and other metallic devices shall not protrude into the interior of the outer packaging in such a manner as to be likely to damage inner packagings or receptacles.

(5) *Vibration.* Each non-bulk package must be capable of withstanding, without rupture or leakage, the vibration test procedure specified in § 178.608 of this subchapter.

(b) *Non-bulk packaging filling limits.* (1) A single or composite non-bulk packaging may be filled with a liquid hazardous material only when the specific gravity of the material does not exceed that marked on the packaging, or a specific gravity of 1.2 if not marked, except as follows:

(i) A Packing Group I packaging may be used for a Packing Group II material with a specific gravity not exceeding the greater of 1.8, or 1.5 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material;

(ii) A Packing Group I packaging may be used for a Packing Group III material with a specific gravity not exceeding the greater of 2.7, or 2.25 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material; and

(iii) A Packing Group II packaging may be used for a Packing Group III material with a specific gravity not exceeding the greater of 1.8, or 1.5 times the specific gravity marked on the packaging, provided all the performance criteria can still be met with the higher specific gravity material.

(2) Except as otherwise provided in this section, a non-bulk packaging may not be filled with a hazardous material to a gross mass greater than the maximum gross mass marked on the packaging.

(3) A single or composite non-bulk packaging which is tested and marked for liquid hazardous materials may be filled with a solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked. In addition:

(i) A single or composite non-bulk packaging which is tested and marked for Packing Group I liquid hazardous materials may be filled with a solid

Packing Group II hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 1.5, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.

(ii) A single or composite non-bulk packaging which is tested and marked for Packing Group I liquid hazardous materials may be filled with a solid Packing Group III hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 2.25, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.

(iii) A single or composite non-bulk packaging which is tested and marked for Packing Group II liquid hazardous materials may be filled with a solid Packing Group III hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 1.5, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.

(4) Packagings tested as prescribed in §178.605 of this subchapter and marked with the hydrostatic test pressure as prescribed in §178.503(a)(5) of this subchapter may be used for liquids only when the vapor pressure of the liquid conforms to one of the following:

(i) The vapor pressure must be such that the total pressure in the packaging (i.e., the vapor pressure of the liquid plus the partial pressure of air or other inert gases, less 100 kPa (15 psia)) at 55 °C (131 °F), determined on the basis of a maximum degree of filling in accordance with paragraph (d) of this section and a filling temperature of 15 °C (59 °F)), will not exceed two-thirds of the marked test pressure;

(ii) The vapor pressure at 50 °C (122 °F) must be less than four-sevenths of the sum of the marked test pressure plus 100 kPa (15 psia); or

(iii) The vapor pressure at 55 °C (131 °F) must be less than two-thirds of the sum of the marked test pressure plus 100 kPa (15 psia).

(5) No hazardous material may remain on the outside of a package after filling.

(c) *Mixed contents.* (1) An outer non-bulk packaging may contain more than one hazardous material only when—

(i) The inner and outer packagings used for each hazardous material conform to the relevant packaging sections of this part applicable to that hazardous material;

(ii) The package as prepared for shipment meets the performance tests prescribed in part 178 of this subchapter for the packing group indicating the highest order of hazard for the hazardous materials contained in the package;

(iii) Corrosive materials (except ORM-D) in bottles are further packed in securely closed inner receptacles before packing in outer packagings; and

(iv) For transportation by aircraft, the total net quantity does not exceed the lowest permitted maximum net quantity per package as shown in Column 9a or 9b, as appropriate, of the §172.101 table. The permitted maximum net quantity must be calculated in kilograms if a package contains both a liquid and a solid.

(2) A packaging containing inner packagings of Division 6.2 materials may not contain other hazardous materials except—

(i) Refrigerants, such as dry ice or liquid nitrogen, as authorized under the HMR;

(ii) Anticoagulants used to stabilize blood or plasma; or

(iii) Small quantities of Class 3, Class 8, Class 9, or other materials in Packing Groups II or III used to stabilize or prevent degradation of the sample, provided the quantity of such materials does not exceed 30 mL (1 ounce) or 30 g (1 ounce) in each inner packaging. The maximum quantity in an outer package, including a hazardous material used to preserve or stabilize a sample, may not exceed 4 L (1 gallon) or 4 kg (8.8 pounds). Such preservatives are not subject to the requirements of this subchapter.

(d) Liquids must not completely fill a receptacle at a temperature of 55 °C (131 °F) or less.

[Amdt. 173–224, 55 FR 52611, Dec. 21, 1990, as amended at 56 FR 66265, Dec. 20, 1991; 57 FR 45460, Oct. 1, 1992; 58 FR 51532, Oct. 1, 1993; Amdt. 173–255, 61 FR 50624, Sept. 26, 1996; 66 FR 45380, Aug. 28, 2001; 68 FR 61941, Oct. 30, 2003; 71 FR 32258, June 2, 2006]

§ 173.24b Additional general requirements for bulk packagings.

(a) *Outage and filling limits.* (1) Except as otherwise provided in this subchapter, liquids and liquefied gases must be so loaded that the outage is at least five percent for materials poisonous by inhalation, or at least one percent for all other materials, of the total capacity of a cargo tank, portable tank, tank car (including dome capacity), multi-unit tank car tank, or any compartment thereof, at the following reference temperatures—

(i) 46 °C (115 °F) for a noninsulated tank;

(ii) 43 °C (110 °F) for a tank car having a thermal protection system, incorporating a metal jacket that provides an overall thermal conductance at 15.5 °C (60 °F) of no more than 10.22 kilojoules per hour per square meter per degree Celsius (0.5 Btu per hour/per square foot/ per degree F) temperature differential; or

(iii) 41 °C (105 °F) for an insulated tank.

(2) Hazardous materials may not be loaded into the dome of a tank car. If the dome of the tank car does not provide sufficient outage, vacant space must be left in the shell to provide the required outage.

(b) *Equivalent steel.* For the purposes of this section, the reference stainless steel is stainless steel with a guaranteed minimum tensile strength of 51.7 deka newtons per square millimeter (75,000 psi) and a guaranteed elongation of 40 percent or greater. Where the regulations permit steel other than stainless steel to be used in place of a specified stainless steel (for example, as in § 172.102 of this subchapter, special provision B30), the minimum thickness for the steel must be obtained from one of the following formulas, as appropriate:

Formula for metric units

$$e_1 = (12.74e_0) / (Rm_1\ A_1)^{1/3}$$

Formula for non-metric units

$$e_1 = (144.2e_0) / (Rm_1\ A_1)^{1/3}$$

where:

e_0 = Required thickness of the reference stainless steel in mm or inches respectively;

e_1 = Equivalent thickness of the steel used in mm or inches respectively;

Rm_1 = Specified minimum tensile strength of the steel used in deka-newtons per square millimeter or pounds per square inch respectively; and

A_1 = Specified minimum percentage elongation of the steel used multiplied by 100 (for example, 20 percent times 100 equals 20). Elongation values used must be determined from a 50 mm or 2 inch test specimen.

(c) Air pressure in excess of ambient atmospheric pressure may not be used to load or unload any lading which may create an air-enriched mixture within the flammability range of the lading in the vapor space of the tank.

(d) A bulk packaging may not be loaded with a hazardous material that:

(1) Is at a temperature outside of the packaging's design temperature range; or

(2) Except as otherwise provided in this subchapter, exceeds the maximum weight of lading marked on the specification plate.

(e) *Stacking of IBCs and Large Packagings.* (1) IBCs and Large Packagings not designed and tested to be stacked. No packages or freight (hazardous or otherwise) may be stacked upon an IBC or a Large Packaging that was not designed and tested to be stacked upon.

(2) IBCs and Large Packagings designed and tested to be stacked. The superimposed weight placed upon an IBC or a Large Packaging designed to be stacked may not exceed the maximum permissible stacking test mass marked on the packaging.

(f) *UN portable tanks.* (1) A UN portable tank manufactured in the United States must conform in all details to the applicable requirements in parts 172, 173, 178 and 180 of this subchapter.

(2) *UN portable tanks manufactured outside the United States.* A UN portable tank manufactured outside the United States, in accordance with national or international regulations based on the UN Recommendations (IBR, see § 171.7 of this subchapter), which is an authorized packaging under § 173.24 of this subchapter, may be filled, offered and transported in the United States, if the § 172.101 Table of this subchapter authorizes the hazardous material for transportation in the UN portable tank and it conforms to the applicable T

codes, and tank provision codes, or other special provisions assigned to the hazardous material in Column (7) of the Table. In addition, the portable tank must—

(i) Conform to applicable provisions in the UN Recommendations (IBR, see §171.7 of this subchapter) and the requirements of this subpart;

(ii) Be capable of passing the prescribed tests and inspections in part 180 of this subchapter applicable to the UN portable tank specification;

(iii) Be designed and manufactured according to the ASME Code (IBR, see §171.7 of this subchapter) or a pressure vessel design code approved by the Associate Administrator;

(iv) Be approved by the Associate Administrator when the portable tank is designed and constructed under the provisions of an alternative arrangement (see §178.274(a)(2) of this subchapter); and

(v) The competent authority of the country of manufacture must provide reciprocal treatment for UN portable tanks manufactured in the United States.

[Amdt. 173–224, 55 FR 52612, Dec. 21, 1990, as amended at 56 FR 66266, Dec. 20, 1991; Amdt. 173–234, 58 FR 51532, Oct. 1, 1993; Amdt. 173–243, 60 FR 40038, Aug. 4, 1995; Amdt. 173–252, 61 FR 28676, June 5, 1996; Amdt. 173–255, 61 FR 50624, Sept. 26, 1996; 66 FR 33426, June 21, 2001; 67 15743, Apr. 3, 2002; 68 FR 75742, Dec. 31, 2003; 74 FR 2255, Jan. 14, 2009; 76 FR 56315, Sept. 13, 2011]

§173.25 Authorized packagings and overpacks.

(a) Authorized packages containing hazardous materials may be offered for transportation in an overpack as defined in §171.8 of this subchapter, if all of the following conditions are met:

(1) The package meets the requirements of §§173.21 and 173.24 of this subchapter.

(2) The overpack is marked with the proper shipping name and identification number, when applicable, and is labeled as required by this subchapter for each hazardous material contained therein, unless marking and labels representative of each hazardous material in the overpack are visible.

(3) Each package subject to the orientation marking requirements of §172.312 of this subchapter is packed in the overpack with its filling holes up and the overpack is marked with package orientation marking arrows on two opposite vertical sides of the overpack with the arrows pointing in the correct direction of orientation.

(4) The overpack is marked with the word ''OVERPACK'' when specification packagings are required, unless specification markings on the inside packages are visible.

(5) Packages containing Class 8 (corrosive) materials in Packing Group I or Division 5.1 (oxidizing) materials in Packing Group I may not be overpacked with any other materials.

(6) Where packages of limited quantity materials are overpacked and, until December 31, 2012 or December 31, 2013, packages bearing the ORM–D AIR or ORM–D marking, respectively, must be marked ''OVERPACK'' unless all marking required by this section are visible. Where packages of excepted quantities (*see* §173.4a of this part) are overpacked and all required markings are not visible through the overpack, they must be repeated on the overpack. An overpack containing packages of excepted quantities is not required to be marked ''OVERPACK.''

(b) Shrink-wrapped or stretch-wrapped trays may be used as outer packagings for inner packagings prepared in accordance with the limited quantity provisions or consumer commodity provisions of this subchapter, provided that—

(1) Inner packagings are not fragile, liable to break or be easily punctured, such as those made of glass, porcelain, stoneware or certain plastics; and

(2) Each complete package does not exceed 20 kg (44 lbs) gross weight.

(c) Hazardous materials which are required to be labeled POISON may be transported in the same motor vehicle with material that is marked or known to be foodstuffs, feed or any edible material intended for consumption by humans or animals provided the hazardous material is marked, labeled, and packaged in accordance with this subchapter, conforms to the requirements of paragraph (a) of this section and is overpacked as specified in §177.841(e) of this subchapter or in an overpack which is a UN 1A2, 1B2, or 1N2

drum tested and marked for a Packing Group II or higher performance level.

[Amdt. 173–165, 48 FR 28099, June 20, 1983, as amended by Amdt. 173–224, 55 FR 52612 Dec. 21, 1990; 56 FR 66266, Dec. 20, 1991; Amdt. 173–234, 58 FR 51532, Oct. 1, 1993; Amdt. 173–214, 59 FR 67491, Dec. 29, 1994; 64 FR 10776, Mar. 5, 1999; 68 FR 45032, July 31, 2003; 69 FR 76155, Dec. 20, 2004; 70 FR 34397, June 14, 2005; 73 FR 57005, Oct. 1, 2008; 76 FR 3368, Jan. 19, 2011]

§ 173.26 Quantity limitations.

When quantity limitations do not appear in the packaging requirements of this subchapter, the permitted gross weight or capacity authorized for a packaging is as shown in the packaging specification or standard in part 178 or 179, as applicable, of this subchapter.

[Amdt. 173–224, 55 FR 52612, Dec. 21, 1990]

§ 173.27 General requirements for transportation by aircraft.

(a) The requirements of this section are in addition to requirements prescribed elsewhere under this part and apply to packages offered or intended for transportation aboard aircraft. Except for materials not subject to performance packaging requirements in subpart E of this part, a packaging containing a Packing Group III material with a primary or subsidiary risk of Division 4.1, 4.2, 4.3, 5.1, or Class 8 must meet the Packing Group II performance level when offered for transportation by aircraft.

(b) *Packages authorized onboard aircraft.* (1) When Column 9a of the § 172.101 table indicates that a material is ''Forbidden'', that material may not be offered for transportation or transported aboard passenger-carrying aircraft.

(2) When Column 9b of the § 172.101 table indicates that a material is ''Forbidden'', that material may not be offered for transportation or transported aboard aircraft.

(3) The maximum quantity of hazardous material in a package that may be offered for transportation or transported aboard a passenger-carrying aircraft or cargo aircraft may not exceed that quantity prescribed for the material in Column 9a or 9b, respectively, of the § 172.101 table.

(4) A package containing a hazardous material which is authorized aboard cargo aircraft but not aboard passenger aircraft must be labeled with the CARGO AIRCRAFT ONLY label required by § 172.402(c) of this subchapter and may not be offered for transportation or transported aboard passenger-carrying aircraft.

(c) *Pressure requirements.* (1) Packagings must be designed and constructed to prevent leakage that may be caused by changes in altitude and temperature during transportation aboard aircraft.

(2) Packagings for which retention of liquid is a basic function must be capable of withstanding without leakage the greater of—

(i) An internal pressure which produces a gauge pressure of not less than 75 kPa (11 psig) for liquids in Packing Group III of Class 3 or Division 6.1; or 95 kPa (14 psig) for other liquids; or

(ii) A pressure related to the vapor pressure of the liquid to be conveyed, determined by one of the following:

(A) The total gauge pressure measured in the receptacle (i.e., the vapor pressure of the material and the partial pressure of air or other inert gases, less 100 kPa (15 psia)) at 55 °C (131 °F), multiplied by a safety factor of 1.5; determined on the basis of a filling temperature of 15 °C (59 °F) and a degree of filling such that the receptacle is not completely liquid full at a temperature of 55 °C (131 °F) or less;

(B) 1.75 times the vapor pressure at 50 °C (122 °F) less 100 kPa (15 psia); or

(C) 1.5 times the vapor pressure at 55 °C (131 °) less 100 kPa (15 psia).

(3) Notwithstanding the provisions of paragraph (c)(2) of this section—

(i) Hazardous materials may be contained in an inner packaging which does not itself meet the pressure requirement provided that the inner packaging is packed within a supplementary packaging which does meet the pressure requirement and other applicable packaging requirements of this subchapter.

(ii) Packagings which are subject to the hydrostatic pressure test and marking requirements of §§ 178.605 and 178.503(a)(5), respectively, of this subchapter must have a marked test pressure of not less than 250 kPa (36 psig) for liquids in Packing Group I, 80 kPa (12 psig) for liquids in Packing Group

III of Class 3 or Division 6.1, and 100 kPa (15 psig) for other liquids.

(d) *Closures.* The body and closure of any packaging must be constructed to be able to adequately resist the effects of temperature and vibration occurring in conditions normally incident to air transportation. Inner packaging or receptacle closures of combination packages containing liquids must be held securely, tightly and effectively in place by secondary means. Examples of such secondary methods include: Adhesive tape, friction sleeves, welding or soldering, locking wires, locking rings, induction heat seals, and child-resistant closures. The closure device must be designed so that it is unlikely that it can be incorrectly or incompletely closed. Closures must be as follows:

(1) *Packing Group I.* An inner packaging containing liquids of Packing Group I must have a secondary means of closure applied and packed in accordance with paragraph (e) of this section.

(2) *Packing Groups II and III.* When a secondary means of closure cannot be applied or is impracticable to apply to an inner packaging containing liquids of Packing Groups II and III, this requirement may be satisfied by securely closing the inner packaging and placing it in a leakproof liner or bag before placing the inner packaging in its outer packaging.

(e) *Absorbent materials.* Except as otherwise provided in this subchapter, Packing Group I liquid hazardous materials of Classes 3, 4, or 8, or Divisions 5.1 or 6.1 that are packaged in combination packagings and offered for air transport in glass, earthenware, plastic, or metal inner packagings must be packed using absorbent material as follows:

(1) Inner packagings must be packed in a rigid and leakproof receptacle or intermediate packaging containing sufficient absorbent material to absorb the entire contents of the inner packaging before packing the inner packaging in its outer package.

(2) Absorbent material must not react dangerously with the liquid (see §§ 173.24 and 173.24a.).

(f) *Combination packagings.* (1) *Excepted quantities.* For authorized materials and inner and outer package quantity limits for combination packages of *excepted quantities* intended for transportation by aircraft, *see* § 173.4a of this part. Unless otherwise specified in this part, or in Subpart C of part 171 of this subchapter, when combination packagings are intended for transportation aboard an aircraft, inner packagings must conform to the quantity limitations set forth in table 1 of this paragraph for transport aboard passenger-carrying aircraft and table 2 of this paragraph for transport aboard cargo-only aircraft.

(2) *Limited quantities.* (i) Unless otherwise specified in this part, or in subpart C of part 171 of this subchapter, when a limited quantity of hazardous material packaged in a combination packaging is intended for transportation aboard an aircraft, the inner and outer packagings must conform to the quantity limitations set forth in Table 3 of this paragraph. Substances and articles must be authorized for transportation aboard a passenger-carrying aircraft (see Column (9A) of the § 172.101 Hazardous Materials Table of this subchapter). As such, not all unauthorized substances or articles may be indicated in this section. Unless otherwise excepted, packages must be marked and labeled in accordance with this section and any additional requirements in subparts D and E, respectively, of part 172 of this subchapter. Materials or articles *not* authorized as limited quantity by aircraft are:

(A) Those in Packing Group I;

(B) Class 1 (explosive) material (see § 173.63(b) of this part for exceptions provided to certain articles of Division 1.4S) and Class 7 (radioactive) material (see §§ 173.421 through 173.425 of this part, as applicable, for exceptions provided to certain substances, instruments or articles of Class 7);

(C) Divisions 2.1 (flammable gas) (*except* Aerosols (UN1950) and Receptacles, small (UN2037) without subsidiary risk) and Division 2.3 (toxic gas);

(D) Divisions 4.1 (self-reactive), 4.2 (spontaneously combustible) (primary or subsidiary risk), and 4.3 (dangerous when wet) (liquids);

(E) Division 5.2 (organic peroxide) (*except* when contained in a Chemical or First aid kit (UN3316) or Polyester

resin kit (UN3269) (Types D, E and F non-temperature controlled only));

(F) Class 8 (corrosive) materials UN2794, UN2795, UN2803, UN2809, 3028; and

(G) All Class 9 (miscellaneous) materials *except for* UN1941, UN1990, UN2071, UN3077, UN3082, UN3316, UN3334, UN3335, and ID8000.

(ii) Effective January 1, 2012, packages must be marked with the limited quantity ''Y'' mark as prescribed in §172.315 of this part when conforming to Table 3 of this paragraph. Until December 31, 2012, a package may instead be marked with the proper shipping name ''Consumer commodity'' and ''ORM–D–AIR'' (including ''Charcoal, NA1361) if it contains a consumer commodity, as authorized by this subchapter in effect on October 1, 2010.

(iii) Strong outer packagings are required and a completed package may not exceed 30 kg (66 lbs) gross weight.

(iv) A secondary means of closure required for all liquids contained in inner packagings. If this requirement cannot be satisfied, the use of an intermediate and leakproof form of containment, such as a liner, is required.

(v) Packages must be capable of passing a 1.2 m drop test on to a rigid, nonresilient, flat and horizontal surface, in the position most likely to cause damage. The criteria for passing the test is that the outer packaging must not exhibit any damage affecting safety in transport and there must be no leakage from the inner packagings.

(vi) Each package must be capable of withstanding, without breakage or leakage of any inner packaging, a force applied to the top surface for a duration of 24 hours equivalent to the total weight of identical packages if stacked to a height of 3 m (including the test sample).

(vii) Except for UN3082, inner packagings of combination packagings containing liquids must be capable of passing the appropriate pressure differential test prescribed in paragraph (c) of this section.

(3) The tables are as follows:

TABLE 1—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON PASSENGER-CARRYING AIRCRAFT

Maximum net quantity per package from Column 9a of the § 172.101 table	Maximum authorized net capacity *of each inner packaging*	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 0.5L	0.5L	0.5L.
Greater than 0.5L. not greater than lL	0.5L	lL.
Greater than 1L, not greater than 5L	1L	5L.
Greater than 5L, not greater than 60L	2.5L	10L.
Greater than 60L, not greater than 220L	5L	25L.
Greater than 220L	No limit	No limit.
Solids:		
Not greater than 5 kg	0.5 kg	1 kg.
Greater than 5 kg, not greater than 25 kg	1 kg	2.5 kg.
Greater than 25 kg, not greater than 200 kg	5 kg	10 kg.
Greater than 200 kg	No limit	No limit.

TABLE 2—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON CARGO AIRCRAFT

Maximum net quantity per package from Column 9b of the § 172.101 table	Maximum authorized net capacity *of each inner packaging*	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 2.5L	1L	1L.
Greater than 2.5L, not greater than 30L	2.5L	2.5L.
Greater than 30L, not greater than 60L	5L	10L.
Greater than 60L, not greater than 220L	5L	25L.
Greater than 220L	No limit	No limit.
Solids:		
Not greater than 15 kg	1 kg	2.5 kg.
Greater than 15 kg, not greater than 50 kg	2.5 kg	5 kg.

TABLE 2—MAXIMUM NET CAPACITY OF INNER PACKAGING FOR TRANSPORTATION ON CARGO AIRCRAFT—Continued

Maximum net quantity per package from Column 9b of the § 172.101 table	Maximum authorized net capacity *of each inner packaging*	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Greater than 50 kg, not greater than 200 kg	5 kg	10 kg.
Greater than 200 kg	No limit	No limit.

TABLE 3—MAXIMUM NET QUANTITY OF EACH INNER AND OUTER PACKAGING FOR MATERIALS AUTHORIZED FOR TRANSPORTATION AS LIMITED QUANTITY BY AIRCRAFT

Hazard class or division	Maximum authorized net quantity *of each inner packaging*		Maximum authorized net quantity *of each outer package*	Notes
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings		
Class 1	Forbidden (See note).			See § 173.63(b) of this part for exceptions provided to certain articles of Division 1.4S.
Class 2			30 kg Gross	*Authorized materials:* Aerosols (UN1950) in Divisions 2.1 and 2.2, and Receptacles, small (UN2037) in Divisions 2.1 and 2.2 without subsidiary risk and Fuel cells cartridges (UN3478, UN3479), see § 173.230 of this part.
Class 3	PG I: Forbidden.			
	PG II: 0.5L	PG II: 0.5L	PG II: 1L*	*Maximum net quantity per outer package with corrosive subsidiary risk (e.g., UN2924, UN3286) is 0.5L. For Class 3 base materials as part of a Polyester resin kit (UN3269), see § 173.165 of this part for additional requirements, as applicable. Inner packaging limit for UN3269 base material is 1.0 L. For Fuel cell cartridges *containing flammable liquids* (UN3473), see § 173.230 of this part.
	PG III: 2.5L* *Corrosive subsidiary risk (e.g., UN2924) or toxic (e.g., UN1992) is 1L.	PG III: 5.0L* *Corrosive subsidiary risk (e.g., UN2924) or toxic (e.g., UN1992) is 1L.	PG III: 10L*	*Maximum net quantity per outer package with corrosive subsidiary risk (e.g., UN2924) is 1L and toxic subsidiary risk (e.g., UN1992) is 2L. For Class 3 base materials as part of a Polyester resin kit (UN3269), see § 173.165 of this part for additional requirements, as applicable. Inner packaging limit for UN3269 base material is 1.0 L.
Division 4.1 (does not include self-reactive material).	PG I: Forbidden.			
	PG II: 0.5 kg	PG II: 0.5 kg	PG II: 5 kg*	*Maximum net quantity per outer package with toxic subsidiary risk (e.g., UN3179) is 1 kg.
	PG III: 1 kg	PG III: 1 kg	PG III: 10 kg*	*Maximum net quantity per outer package with corrosive subsidiary risk (e.g., UN3180) is 5 kg.
Division 4.2 (Primary or subsidiary).	Forbidden*		25 kg (net mass)*	*Until December 31, 2012, Charcoal (NA1361), PG III, may be transported as a limited quantity and may be renamed Consumer commodity and reclassed ORM-D-AIR, if eligible.
Division 4.3 (solid material only).	PG I solids and all liquids regardless of Packing Group: Forbidden.			

TABLE 3—MAXIMUM NET QUANTITY OF EACH INNER AND OUTER PACKAGING FOR MATERIALS AUTHORIZED FOR TRANSPORTATION AS LIMITED QUANTITY BY AIRCRAFT—Continued

Hazard class or division	Maximum authorized net quantity *of each inner packaging*		Maximum authorized net quantity *of each outer package*	Notes
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings		
	PG II: 0.5 kg	PG II: 0.5 kg	PG II: 5 kg*	*Maximum net quantity per outer package with toxic subsidiary risk (e.g., UN3134) is 1 kg. For fuel cell cartridges *containing water reactive substances* (UN3476), see § 173.230 of this part.
	PG III: 1 kg	PG III: 1 kg	PG III: 10 kg*	*Maximum net quantity per outer package with corrosive or flammable subsidiary risk (e.g., UN3131 or UN3132, respectively) is 5 kg.
Division 5.1 (Liquid or solid material).	PG I: Forbidden.			
Division 5.1 (liquid material).	PG II: 0.1L	PG II: 0.1L	PG II: 0.5L.	
	PG III: 0.5L	PG III: 0.5L	PG III: 1.0L.	
Division 5.1 (solid material).	PG II: 0.5 kg	PG II: 0.5 kg	PG II: 2.5 kg*	*Maximum net quantity per outer package with toxic subsidiary risk (e.g., UN3087) is 1 kg.
	PG III: 1.0 kg	PG III: 1.0 kg	PG III: 10 kg*	*Maximum net quantity per outer package with corrosive subsidiary risk (e.g., UN3085) is 1 kg.
Division 5.2 (liquid material).	30 mL	30 mL	1 kg	*Authorized materials:* Types D, E and F are authorized only as part of a Chemical or First aid kit (UN3316) packaged in accordance with § 173.161 of this part or a Polyester resin kit (UN3269) packaged in accordance with § 173.165 of this part. See §§ 173.161 and 173.165, as applicable, for additional requirements.
Division 5.2 (solid material).	100g	100g	1 kg	Solid activators of Types D, E and F are limited to 100 g per inner packaging for UN3316 and UN3269. See §§ 173.161 and 173.165, as applicable, for additional requirements.
Division 6.1	PG I (Inhalation or otherwise): Forbidden.			
Division 6.1 (liquid material).	PG II: 0.1L	PG II: 0.1L	PG II: 1.0L*	*Maximum net quantity per outer package with corrosive subsidiary risk (e.g., UN3289) is 0.5L.
	PG III: 0.5L	PG III: 0.5L	PG III: 2.0L.	
Division 6.1 (solid material).	PG II: 0.5 kg	PG II: 0.5 kg	PG II: 1.0 kg.	
	PG III: 1.0 kg	PG III: 1.0 kg	PG III: 10 kg.	
Class 7	Forbidden (See note).			See §§ 173.421 through 173.425 of this part, as applicable, for exceptions provided to certain substances, instruments or articles of Class 7.
Class 8	PG I: Forbidden.			
Class 8 (liquid material).	PG II: 0.1L	PG II: 0.1L	PG II: 0.5L	For ''Fuel cell cartridges *containing corrosive substances''* (UN3477), see § 173.230 of this part.
	PG III: 0.5L	PG III: 0.5L	PG III: 1.0L.	
Class 8 (solid material).	PG II: 0.5 kg	PG II: 0.5 kg	PG II: 5.0 kg*	*Maximum net quantity per outer package for UN2430 is 1.0 kg. UN2794, UN2795, UN2803, UN2809, UN3028 are not authorized as limited quantity.
	PG III: 1.0 kg	PG III: 1.0 kg	PG III: 5.0 kg.	

TABLE 3—MAXIMUM NET QUANTITY OF EACH INNER AND OUTER PACKAGING FOR MATERIALS AUTHORIZED FOR TRANSPORTATION AS LIMITED QUANTITY BY AIRCRAFT—Continued

Hazard class or division	Maximum authorized net quantity *of each inner packaging*		Maximum authorized net quantity *of each outer package*	Notes
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings		
Class 9 (liquid material).	30 mL (UN3316); 5.0L (UN1941, UN1990, UN3082).	30 mL (UN3316); 5.0L (UN1941, UN1990, UN3082).	1 kg (UN3316); 30 kg gross (all other authorized Class 9 material).	*Authorized materials:* UN1941, UN1990, UN2071, UN3077, UN3082, UN3334, and UN3335. Additionally, Consumer commodity (ID8000) in accordance with §173.167 of this part and Chemical kit or First aid kit (UN3316) in accordance with §173.161 of this part are authorized.
Class 9 (solid material).	100 g (UN3316); 5.0 kg (UN2071, UN3077).	100 g (UN3316); 5.0 kg (UN2071, UN3077).	1 kg (UN3316); 30 kg gross (all other authorized Class 9 material).	

(g) *Cylinders.* For any cylinder containing hazardous materials and incorporating valves, sufficient protection must be provided to prevent operation of, and damage to, the valves during transportation, by one of the following methods:

(1) By equipping each cylinder with securely attached valve caps or protective headrings; or

(2) By boxing or crating the cylinder.

(h) Tank cars and cargo tanks. Any tank car or cargo tank containing a hazardous material may not be transported aboard aircraft.

(i) Effective October 1, 2006, each person who offers a hazardous material for transportation by aircraft must include the certification statement specified in §172.204(c)(3).

[Amdt. 173–224, 55 FR 52612, Dec. 21, 1990, as amended at 56 FR 66266, Dec. 20, 1991; Amdt. 173–138, 59 FR 49133, Sept. 26, 1994; 65 FR 58629, Sept. 29, 2000; 66 FR 45380, Aug. 28, 2001; 68 FR 45032, July 31, 2003; 69 FR 76155, Dec. 20, 2004; 71 FR 14602, Mar. 22, 2006; 73 FR 57006, Oct. 1, 2008; 75 FR 53597, Sept. 1, 2010; 76 FR 3368, Jan. 19, 2011; 76 FR 82175, Dec. 30, 2011; 77 FR 22509, Apr. 16, 2012]

§173.28 Reuse, reconditioning and remanufacture of packagings.

(a) *General.* Packagings and receptacles used more than once must be in such condition, including closure devices and cushioning materials, that they conform in all respects to the prescribed requirements of this subchapter. Before reuse, each packaging must be inspected and may not be reused unless free from incompatible residue, rupture, or other damage which reduces its structural integrity. Packagings not meeting the minimum thickness requirements prescribed in paragraph (b)(4)(i) of this section may not be reused or reconditioned for reuse.

(b) *Reuse of non-bulk packaging.* A non-bulk packaging used more than once must conform to the following provisions and limitations:

(1) A non-bulk packaging which, upon inspection, shows evidence of a reduction in integrity may not be reused unless it is reconditioned in accordance with paragraph (c) of this section.

(2) Before reuse, packagings subject to the leakproofness test with air prescribed in §178.604 of this subchapter shall be—

(i) Retested without failure in accordance with §178.604 of this subchapter using an internal air pressure (gauge) of at least 48 kPa (7.0 psig) for Packing Group I and 20 kPa (3.0 psig) for Packing Group II and Packing Group III; and

(ii) Marked with the letter ''L'', with the name and address or symbol of the person conducting the test, and the last two digits of the year the test was conducted. Symbols, if used, must be registered with the Associate Administrator.

(3) Packagings made of paper (other than fiberboard), plastic film, or textile are not authorized for reuse;

(4) Metal and plastic drums and jerricans used as single packagings or the outer packagings of composite packagings are authorized for reuse only when they are marked in a permanent manner (e.g., embossed) in mm with the nominal (for metal packagings) or minimum (for plastic packagings) thickness of the packaging material, as required by §178.503(a)(9) of this subchapter, and—

(i) Except as provided in paragraph (b)(4)(ii) of this section, conform to the following minimum thickness criteria:

Maximum capacity not over	Minimum thickness of packaging material	
	Metal drum or jerrican	Plastic drum or jerrican
20 L	0.63 mm (0.025 inch)	1.1 mm (0.043 inch).
30 L	0.73 mm (0.029 inch)	1.1 mm (0.043 inch).
40 L	0.73 mm (0.029 inch)	1.8 mm (0.071 inch).
60 L	0.92 mm (0.036 inch)	1.8 mm (0.071 inch).
120 L	0.92 mm (0.036 inch)	2.2 mm (0.087 inch).
220 L	0.92 mm (0.036 inch) [1].	2.2 mm (0.087 inch).
450 L	1.77 mm (0.070 inch)	5.0 mm (0.197 inch).

[1] Metal drums or jerricans with a minimum thickness of 0.82 mm body and 1.09 mm heads which are manufactured and marked prior to January 1, 1997 may be reused. Metal drums or jerricans manufactured and marked on or after January 1, 1997, and intended for reuse, must be constructed with a minimum thickness of 0.82 mm body and 1.11 mm heads.

(ii) For stainless steel drums and jerricans, conform to a minimum wall thickness as determined by the following equivalence formula:

FORMULA FOR METRIC UNITS

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

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, for U.S. Standard units, use inches).

e_0 = required minimum wall thickness for the reference steel (in mm or, for U.S. Standard units, use inches).

Rm_1 = guaranteed minimum tensile strength of the metal to be used (in N/mm^2 or for U.S. Standard units, use psi).

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

(5) Plastic inner receptacles of composite packagings must have a minimum thickness of 1.0 mm (0.039 inch).

(6) A previously used non-bulk packaging may be reused for the shipment of hazardous waste, not subject to the reconditioning and reuse provisions of this section, in accordance with §173.12(c).

(7) Notwithstanding the provisions of paragraph (b)(2) of this section, a packaging otherwise authorized for reuse may be reused without being leakproofness tested with air provided the packaging—

(i) Is refilled with a material which is compatible with the previous lading:

(ii) Is refilled and offered for transportation by the original filler;

(iii) Is transported in a transport vehicle or freight container under the exclusive use of the refiller of the packaging; and

(iv) Is constructed of—

(A) Stainless steel, monel or nickel with a thickness not less than one and one-half times the minimum thickness prescribed in paragraph (b)(4) of this section;

(B) Plastic, provided the packaging is not refilled for reuse on a date more than five years from the date of manufacture marked on the packaging in accordance with §178.503(a)(6) of this subchapter; or

(C) Another material or thickness when approved under the conditions established by the Associate Administrator for reuse without retesting.

(c) *Reconditioning of non-bulk packaging.* (1) For the purpose of this subchapter, reconditioning of metal drums is:

(i) Cleaning to base material of construction, with all former contents, internal and external corrosion, and any external coatings and labels removed;

(ii) Restoring to original shape and contour, with chimes (if any) straightened and sealed, and all non-integral gaskets replaced: and

(iii) Inspecting after cleaning but before painting, Packagings that have visible pitting, significant reduction in material thickness, metal fatigue, damaged threads or closures, or other significant defects, must be rejected.

(2) For the purpose of this subchapter, reconditioning of a non-bulk packaging other than a metal drum includes:

(i) Removal of all former contents, external coatings and labels, and cleaning to the original materials of construction;

(ii) Inspection after cleaning with rejection of packagings with visible damage such as tears, creases or cracks, or damaged threads or closures, or other significant defects;

(iii) Replacement of all non-integral gaskets and closure devices with new or refurbished parts, and cushioning and cushioning materials; and components including gaskets, closure devices and cushioning and cushioning material. (For a UN 1H1 plastic drum, replacing a removable gasket or closure device with another of the same design and material that provides equivalent performance does not constitute reconditioning); and

(iv) Ensuring that the packagings are restored to a condition that conforms in all respects with the prescribed requirements of this subchapter.

(3) A person who reconditions a packaging manufactured and marked under the provisions of subpart L of part 178 of this subchapter, shall mark that packaging as required by §178.503(c) and (d) of this subchapter. The marking is the certification of the reconditioner that the packaging conforms to the standard for which it is marked and that all functions performed by the reconditioner which are prescribed by this subchapter have been performed in compliance with this subchapter.

(4) The markings applied by the reconditioner may be different from those applied by the manufacturer at the time of original manufacture, but may not identify a greater performance capability than that for which the original design type had been tested (for example, the reconditioner may mark a drum which was originally marked as 1A1/Y1.8 as 1A1/Y1.2 or 1A1/Z2.0).

(5) Packagings which have significant defects which cannot be repaired may not be reused.

(d) *Remanufacture of non-bulk packagings.* For the purpose of this subchapter, remanufacture is the conversion of a non-specification, non-bulk packaging to a DOT specification or U.N. standard, the conversion of a packaging meeting one specification or standard to another specification or standard (for example, conversion of 1A1 non-removable head drums to 1A2 removable head drums) or the replacement of integral structural packaging components (such as non-removable heads on drums). A person who remanufactures a non-bulk packaging to conform to a specification or standard in part 178 of this subchapter is subject to the requirements of part 178 of this subchapter as a manufacturer.

(e) *Non-reusable containers.* A packaging marked as NRC according to the DOT specification or UN standard requirements of part 178 of this subchapter may be reused for the shipment of any material not required by this subchapter to be shipped in a DOT specification or UN standard packaging.

(f) A Division 6.2 packaging to be reused must be disinfected prior to reuse by any means effective for neutralizing the infectious substance the packaging previously contained. A secondary packaging or outer packaging conforming to the requirements of §173.196 or §173.199 need not be disinfected prior to reuse if no leakage from the primary receptacle has occurred. Drums or jerricans not meeting the minimum thickness requirements prescribed in paragraph (b)(4)(i) of this section may not be reused or reconditioned for reuse.

[Amdt. 173–224, 55 FR 52614, Dec. 21, 1990]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §173.28, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§ 173.29 Empty packagings.

(a) General. Except as otherwise provided in this section, an empty packaging containing only the residue of a hazardous material shall be offered for transportation and transported in the same manner as when it previously contained a greater quantity of that hazardous material.

(b) Notwithstanding the requirements of paragraph (a) of this section, an empty packaging is not subject to any other requirements of this subchapter if it conforms to the following provisions:

(1) Any hazardous material shipping name and identification number markings, any hazard warning labels or placards, and any other markings indicating that the material is hazardous (e.g., RQ, INHALATION HAZARD) are removed, obliterated, or securely covered in transportation. This provision does not apply to transportation in a transport vehicle or a freight container if the packaging is not visible in transportation and the packaging is loaded by the shipper and unloaded by the shipper or consignee;

(2) The packaging—

(i) Is unused;

(ii) Is sufficiently cleaned of residue and purged of vapors to remove any potential hazard;

(iii) Is refilled with a material which is not hazardous to such an extent that any residue remaining in the packaging no longer poses a hazard; or

(iv) Contains only the residue of—

(A) An ORM-D material; or

(B) A Division 2.2 non-flammable gas, other than ammonia, anhydrous, and with no subsidiary hazard, at a gauge pressure less than 200 kPa (29.0 psig); at 20 °C (68 °F); and

(3) Any material contained in the packaging does not meet the definitions in § 171.8 of this subchapter for a hazardous substance, a hazardous waste, or a marine pollutant.

(c) A non-bulk packaging containing only the residue of a hazardous material covered by Table 2 of § 172.504 of this subchapter that is not a material poisonous by inhalation or its residue shipped under the subsidiary placarding provisions of § 172.505—

(1) Does not have to be included in determining the applicability of the placarding requirements of subpart F of part 172 of this subchapter; and

(2) Is not subject to the shipping paper requirements of this subchapter when collected and transported by a contract or private carrier for reconditioning, remanufacture or reuse.

(d) Notwithstanding the stowage requirements in Column 10a of the § 172.101 table for transportation by vessel, an empty drum or cylinder may be stowed on deck or under deck.

(e) Specific provisions for describing an empty packaging on a shipping paper appear in § 172.203(e) of this subchapter.

(f) [Reserved]

(g) A package which contains a residue of an elevated temperature material may remain marked in the same manner as when it contained a greater quantity of the material even though it no longer meets the definition in § 171.8 of this subchapter for an elevated temperature material.

(h) A package that contains a residue of a hazardous substance, Class 9, listed in the § 172.101 Table, Appendix A, Table I, that does not meet the definition of another hazard class and is not a hazardous waste or marine pollutant, may remain marked, labeled and, if applicable, placarded in the same manner as when it contained a greater quantity of the material even though it no longer meets the definition in § 171.8 of this subchapter for a hazardous substance.

[Amdt. 173–224, 55 FR 52614, Dec. 21, 1990, as amended by Amdt. 173–227, 56 FR 49989, Oct. 2, 1991; Amdt. 173–231, 57 FR 52939, Nov. 5, 1992; Amdt. 173–251, 61 FR 28676, June 5, 1996; Amdt. 173–260, 62 FR 1236, Jan. 8, 1997; 64 FR 10776, Mar. 5, 1999; 68 FR 48569, Aug. 14, 2003; 69 FR 64473, Nov. 4, 2004; 75 FR 72, Jan. 4, 2010]

§ 173.30 Loading and unloading of transport vehicles.

A person who is subject to the loading and unloading regulations in this subchapter must load or unload hazardous materials into or from a transport vehicle or vessel in conformance with the applicable loading and unloading requirements of parts 174, 175, 176, and 177 of this subchapter.

[68 FR 61941, Oct. 30, 2003]

§ 173.31 Use of tank cars.

(a) *General.* (1) No person may offer a hazardous material for transportation in a tank car unless the tank car meets the applicable specification and packaging requirements of this subchapter or, when this subchapter authorizes the use of a non-DOT specification tank car, the applicable specification to which the tank was constructed.

(2) Tank cars and appurtenances may be used for the transportation of any commodity for which they are authorized in this part and specified on the certificate of construction (AAR Form 4–2 or by addendum on Form R–1). See §179.5 of this subchapter. Transfer of a tank car from one specified service on its certificate of construction to another may be made only by the owner or with the owner's authorization. A tank car proposed for a commodity service other than specified on its certificate of construction must be approved for such service by the AAR's Tank Car Committee.

(3) No person may fill a tank car overdue for periodic inspection with a hazardous material and then offer it for transportation. Any tank car marked as meeting a DOT specification and any non-specification tank car transporting a hazardous material must have a periodic inspection and test conforming to subpart F of part 180 of this subchapter.

(4) No railroad tank car, regardless of its construction date, may be used for the transportation in commerce of any hazardous material unless the air brake equipment support attachments of such tank car conform to the standards for attachments set forth in §§179.100–16 and 179.200–19 of this subchapter.

(5) No railroad tank car, regardless of its construction date, may be used for the transportation in commerce of any hazardous material with a self-energized manway located below the liquid level of the lading.

(6) Unless otherwise specifically provided in this part:

(i) When the tank car delimiter is an ''A,'' offerors may also use tank cars with a delimiter ''S,'' ''J'' or ''T''.

(ii) When the tank car delimiter is an ''S,'' offerors may also use tank cars with a delimiter ''J'' or ''T''.

(iii) When a tank car delimiter is a ''T'' offerors may also use tank cars with a delimiter of ''J''.

(iv) When a tank car delimiter is a ''J'', offerors may not use a tank car with any other delimiter.

(7) A class DOT-103 or DOT-104 tank car may continue to be used for the transportation of a hazardous material if it meets the requirements of this subchapter and the design requirements in Part 179 of this subchapter in effect on September 30, 2003; however, no new construction is authorized.

(8) A tank car authorized by the Transport Canada TDG Regulations (IBR, see §171.7 of this subchapter) may be used provided it conforms to the applicable requirements in §171.12 of this subchapter.

(b) *Safety systems*—(1) *Coupler vertical restraint.* Each tank car conforming to a DOT specification and any other tank car used for transportation of a hazardous material must be equipped with a coupler vertical restraint system that meets the requirements of §179.14 of this subchapter.

(2) *Pressure relief devices.* (i) Pressure relief devices on tank cars must conform to part 179 of this subchapter.

(ii) A single-unit tank car transporting a Division 6.1 PG I or II, or Class 2, 3, or 4 material must have a reclosing pressure relief device. However, a single-unit tank car built before January 1, 1991, and equipped with a nonreclosing pressure relief device may be used to transport a Division 6.1 PG I or II material or a Class 4 liquid provided such materials do not meet the definition of a material poisonous by inhalation.

(3) *Tank-head puncture-resistance requirements.* The following tank cars must have a tank-head puncture-resistance system that conforms to the requirements in §179.16 of this subchapter, or to the corresponding requirements in effect at the time of installation:

(i) Tank cars transporting a Class 2 material.

(ii) Tank cars constructed from aluminum or nickel plate that are used to transport hazardous material.

(iii) Except as provided in paragraph (b)(3)(iv) of this section, those tank cars specified in paragraphs (b)(3)(i)

and (ii) of this section not requiring a tank-head puncture resistance system prior to July 1, 1996, must have a tank-head puncture resistance system installed no later than July 1, 2006.

(iv) Class DOT 105A tank cars built prior to September 1, 1981, having a tank capacity less than 70 kl (18,500 gallons), and used to transport a Division 2.1 (flammable gas) material, must have a tank-head puncture-resistant system installed no later than July 1, 2001.

(4) *Thermal protection requirements.* The following tank cars must have thermal protection that conforms to the requirements of §179.18 of this subchapter:

(i) Tank cars transporting a Class 2 material, except for a class 106, 107A, 110, and 113 tank car. A tank car equipped with a thermal protection system conforming to §179.18 of this subchapter, or that has an insulation system having an overall thermal conductance of no more than 0.613 kilojoules per hour, per square meter, per degree Celsius temperature differential (0.03 B.t.u. per square foot, per hour, per degree Fahrenheit temperature differential), conforms to this requirement.

(ii) A tank car transporting a Class 2 material that was not required to have thermal protection prior to July 1, 1996, must be equipped with thermal protection no later than July 1, 2006.

(5) *Bottom-discontinuity protection requirements.* No person may offer for transportation a hazardous material in a tank car with bottom-discontinuity protection unless the tank car has bottom-discontinuity protection that conforms to the requirements of E9.00 and E10.00 of the AAR Specifications for Tank Cars (IBR, see §171.7 of this subchapter). Tank cars not requiring bottom-discontinuity protection under the terms of Appendix Y of the AAR Specifications for Tank Cars as of July 1, 1996, must conform to these requirements no later than July 1, 2006, except that tank cars transporting a material that is hazardous only because it meets the definition of an elevated temperature material or because it is molten sulfur do not require bottom discontinuity protection.

(6) *Scheduling of modifications and progress reporting.* The date of conformance for the continued use of tank cars subject to paragraphs (b)(4), (b)(5), and (f) of this section and §173.314(j) is subject to the following conditions and limitations.

(i) Each tank car owner shall modify, reassign, retire, or remove at least 50 percent of their in-service tank car fleet within the first half of the compliance period and the remainder of their in-service tank car fleet during the second half of the compliance period.

(ii) By October 1 of each year, each owner of a tank car subject to this paragraph (b)(6) shall submit to the Federal Railroad Administration, Hazardous Materials Division, Office of Safety Assurance and Compliance, 1120 Vermont Avenue, Mail Stop 25, Washington, DC 20590, a progress report that shows the total number of in-service tank cars that need head protection, thermal protection, or bottom-discontinuity protection; the number of new or different tank cars acquired to replace those tank cars required to be upgraded to a higher service pressure; and the total number of tank cars modified, reassigned, acquired, retired, or removed from service the previous year.

(c) *Tank car test pressure.* A tank car used for the transportation of a hazardous material must have a tank test pressure equal to or greater than the greatest of the following:

(1) Except for shipments of carbon dioxide, anhydrous hydrogen chloride, vinyl fluoride, ethylene, or hydrogen, 133 percent of the sum of lading vapor pressure at the reference temperature of 46 °C (115 °F) for non-insulated tank cars or 41 °C (105 °F) for insulated tank cars plus static head, plus gas padding pressure in the vacant space of a tank car;

(2) 133 percent of the maximum loading or unloading pressure, whichever is greater;

(3) 20.7 Bar (300 psig) for materials that are poisonous by inhalation (see §173.31(e)(2)(ii) for compliance dates);

(4) The minimum pressure prescribed by the specification in part 179 of this subchapter; or

(5) The minimum test pressure prescribed for the specific hazardous material in the applicable packaging section in subpart F or G of this part.

(d) *Examination before shipping.* (1) No person may offer for transportation a tank car containing a hazardous material or a residue of a hazardous material unless that person determines that the tank car is in proper condition and safe for transportation. As a minimum, each person offering a tank car for transportation must perform an external visual inspection that includes:

(i) Except where insulation or a thermal protection system precludes an inspection, the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or any other condition that makes the tank car unsafe for transportation;

(ii) The piping, valves, fittings, and gaskets for corrosion, damage, or any other condition that makes the tank car unsafe for transportation;

(iii) For missing or loose bolts, nuts, or elements that make the tank car unsafe for transportation;

(iv) All closures on tank cars and determine that the closures and all fastenings securing them are properly tightened in place by the use of a bar, wrench, or other suitable tool;

(v) Protective housings for proper securement;

(vi) The pressure relief device, including a careful inspection of the rupture disc in non-reclosing pressure relief devices, for corrosion or damage that may alter the intended operation of the device. The rupture disc is not required to be removed prior to visual inspection if the tank car contains the residue, as defined in §171.8 of this subchapter, of a Class 8, PG II or PG III material with no subsidiary hazard or the residue of a Class 9 elevated temperature material;

(vii) Each tell-tale indicator after filling and prior to transportation to ensure the integrity of the rupture disc;

(viii) The external thermal protection system, tank-head puncture resistance system, coupler vertical restraint system, and bottom discontinuity protection for conditions that make the tank car unsafe for transportation;

(ix) The required markings on the tank car for legibility; and

(x) The periodic inspection date markings to ensure that the inspection and test intervals are within the prescribed intervals.

(2) Closures on tank cars are required, in accordance with this subchapter, to be designed and closed so that under conditions normally incident to transportation, including the effects of temperature and vibration, there will be no identifiable release of a hazardous material to the environment. ln any action brought to enforce this section, the lack of securement of any closure to a tool-tight condition, detected at any point, will establish a rebuttable presumption that a proper inspection was not performed by the offeror of the car. That presumption may be rebutted by any evidence indicating that the lack of securement resulted from a specific cause not within the control of the offeror.

(e) *Special requirements for materials poisonous by inhalation*—(1) *Interior heater coils.* Tank cars used for materials poisonous by inhalation may not have interior heater coils.

(2) Tank car specifications. A tank car used for a material poisonous by inhalation must have a tank test pressure of 20.7 Bar (300 psig) or greater, head protection, and a metal jacket (e.g., DOT 105S300W), except that—

(i) A higher test pressure is required if otherwise specified in this subchapter; and

(ii) Each tank car constructed on or after March 16, 2009, and used for the transportation of PIH materials must meet the applicable authorized tank car specifications and standards listed in §173.244(a)(2) or (3) and §173.314(c) or (d).

(iii) A tank car meeting the applicable authorized tank car specifications listed in §173.244(a)(2) or (3), or §173.314(c) or (d) is authorized for the transportation of a material poisonous by inhalation for a period of 20 years after the date of original construction.

(iv) A tank car owner retiring or otherwise removing a tank car from service transporting materials poisonous by inhalation, other than because of

damage to the car, must retire or remove cars constructed of non-normalized steel in the head or shell before removing any car in service transporting materials poisonous by inhalation constructed of normalized steel meeting the applicable DOT specification.

(f) *Special requirements for hazardous substances.* (1) A tank car used for a hazardous substance listed in paragraph (f)(2) of this section must have a tank test pressure of at least 13.8 Bar (200 psig), head protection and a metal jacket, except that—

(i) No metal jacket is required if—

(A) The tank test pressure is 23.4 Bar (340 psig) or higher; or

(B) The tank shell and heads are manufactured from AAR steel specification TC–128, normalized;

(ii) A higher test pressure is required if otherwise specified in this subchapter; and

(iii) Other than as provided in paragraph (b)(6) of this section, a tank car which does not conform to the requirements of this paragraph (f)(1), and was authorized for a hazardous substance under the regulations in effect on June 30, 1996, may continue in use until July 1, 2006.

(2) *List of hazardous substances.* Hazardous substances for which the provisions of this paragraph (f) apply are as follows:

Aldrin
Allyl chloride
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC
Bis(2-chloroethyl) ether
Bromoform
Carbon tetrachloride
Chlordane
p-Chloroaniline
Chlorobenzene
Chlorobenzilate
p-Chloro-m-cresol
2-Chloroethyl vinyl ether
Chloroform
2-Chloronapthalene
o-Chlorophenol
3-Chloropropionitrile
DDE
DDT
1,2-Dibromo-3-chloropropane
m-Dichlorobenzene
o-Dichlorobenzene
p-Dichlorobenzene
3,3′-Dichlorobenzidine
1,4-Dichloro-2-butene
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
Dichloroisopropyl ether
Dichloromethane @
2,4-Dichlorophenol
2,6-Dichlorophenol
1,2-Dichloropropane
1,3-Dichloropropene
Dieldrin
alpha-Endosulfan
beta-Endosulfan
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorobutadiene
Hexachloroethane
Hexachlorophene
Hexachloropropene
Isodrin
Kepone
Methoxychlor
4,4′-Methylenebis(2-chloroaniline)
Methylene bromide
Pentachlorobenzene
Pentachloroethane
Pentachloronitrobenzene (PCNB)
Pentachlorophenol
Polychlorinated biphenyls (PCBs)
Pronamide
Silvex (2,4,5-TP)
2,4,5-T
TDE
1,2,4,5-Tetrachlorobenzene
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
Tetrachloroethane
Tetrachloroethylene
2,3,4,6-Tetrachlorophenol
Toxaphene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
Tris(2,3-dibromopropyl) phosphate

(g) *Tank car loading and unloading.* When placed for loading or unloading and before unsecuring any closure, a tank car must be protected against movement or coupling as follows:

(1) Each hazmat employee who is responsible for loading or unloading a tank car must secure access to the track to prevent entry by other rail equipment, including motorized service vehicles. Derails, lined and locked switches, portable bumper blocks, or other equipment that provides an equivalent level of security may be used to satisfy this requirement.

(2) Caution signs must be displayed on the track or on the tank cars to

warn persons approaching the cars from the open end of the track and must be left up until after all closures are secured and the cars are in proper condition for transportation. The caution signs must be of metal or other durable material, rectangular, at 30.48 cm (12 inches) high by 38.10 cm (15 inches) wide, and bear the word ''STOP.'' The word ''STOP'' must appear in letters at least 10.16 cm (4 inches) high. The letters must be white on a blue background. Additional words, such as ''Tank Car Connected'' or ''Crew at Work,'' may also appear in white letters under the word ''STOP.''

(3) At least one wheel on the tank car must be blocked against movement in both directions, and the hand brakes must be set. If multiple tank cars are coupled together, sufficient hand brakes must be set and wheels blocked to prevent movement in both directions.

[Amdt. 173–245, 60 FR 49072, Sept. 21, 1995, as amended by Amdt. 173–245, 61 FR 33254, June 26, 1996; Amdt. 173–256, 61 FR 51338, Oct. 1, 1996; 65 FR 58629, Sept. 29, 2000; 66 FR 33427, June 21, 2001; 66 FR 45379, 45381, Aug. 28, 2001; 68 FR 48569, Aug. 14, 2003; 68 FR 75743, Dec. 31, 2003; 68 FR 61941, Oct. 30, 2003; 70 FR 34075, June 13, 2005; 72 FR 25176, May 3, 2007; 72 FR 55692, Oct. 1, 2007; 74 FR 1799, Jan. 13, 2009; 75 FR 27215, May 14, 2010]

§ 173.32 Requirements for the use of portable tanks.

(a) *General requirements.* No person may offer a hazardous material for transportation in a portable tank except as authorized by this subchapter.

(1) Except as otherwise provided in this subpart, no person may use a portable tank for the transportation of a hazardous material unless it meets the requirements of this subchapter.

(2) No person may fill and offer for transportation a portable tank when the prescribed periodic test or inspection under subpart G of part 180 of this subchapter has become due until the test or inspection has been successfully completed. This requirement does not apply to any portable tank filled prior to the test or inspection due date.

(3) When a portable tank is used as a cargo tank motor vehicle, it must conform to all the requirements prescribed for cargo tank motor vehicles. (See §173.33.)

(b) *Substitute packagings.* A particular Specification portable tank may be substituted for another portable tank as follows:

(1) An IM or UN portable tank may be used whenever an IM or UN portable tank having less stringent requirements is authorized provided the portable tank meets or exceeds the requirements for pressure-relief devices, bottom outlets and any other special provisions specified in §172.102(c)(7)(vi) of this subchapter.

(2) Where a Specification IM101 or IM102 portable tank is prescribed, a UN portable tank or Specification 51 portable tank otherwise conforming to the special commodity requirements of §172.102(c)(7) of this subchapter for the material to be transported may be used.

(3) A DOT Specification 51 portable tank may be used whenever a DOT Specification 56, 57, or 60 portable tank is authorized. A DOT Specification 60 portable tank may be used whenever a DOT Specification 56 or 57 portable tank is authorized. A higher integrity tank used instead of a specified portable tank must meet the same design profile; for example, a DOT Specification 51 portable tank must be lined if used instead of a lined DOT Specification 60 portable tank.

(4) A portable tank authorized by the Transport Canada TDG Regulations (IBR, see §171.7 of this subchapter) may be used provided it conforms to the applicable requirements in §171.12 of this subchapter.

(c) *Grandfather provisions for portable tanks*—(1) *Continued use of Specification 56 and 57 portable tanks.* Continued use of an existing portable tank constructed to DOT Specification 56 or 57 is authorized only for a portable tank constructed before October 1, 1996. A stainless steel portable tank internally lined with polyethylene that was constructed on or before October 1, 1996, and that meets all requirements of DOT Specification 57 except for being equipped with a polypropylene discharge ball valve and polypropylene secondary discharge opening closure, may be marked as a Specification 57 portable tank and used in accordance with the provisions of this section.

(2) A DOT Specification 51, IM 101, or IM 102 portable tank may not be manufactured after January 1, 2003; however, such tanks may continue to be used for the transportation of a hazardous material provided they meet the requirements of this subchapter, including the specification requirements and the requirements of this subchapter for the transportation of the particular hazardous material according to the T codes in effect on September 30, 2001 or the new T codes in §172.102(c)(7)(i), and provided the portable tanks conform to the periodic inspection and tests specified for the particular portable tank in subpart G of part 180 of this subchapter. After January 1, 2003, all newly manufactured portable tanks must conform to the requirements for the design, construction and approval of UN portable tanks as specified in §§178.273, 178.274, 178.275, 178.276, 178.277 and part 180, subpart G, of this subchapter.

(3) A DOT Specification portable tank manufactured prior to January 1, 1992 that is equipped with a non-reclosing pressure relief device may continue in service for the hazardous materials for which it is authorized. Except for a DOT Specification 56 or 57 portable tank, a DOT Specification portable tank manufactured after January 1, 1992, used for materials meeting the definition for Division 6.1 liquids, Packing Group I or II, Class 2 gases, or Class 3 or 4 liquids, must be equipped with a reclosing pressure relief valve having adequately sized venting capacity unless otherwise specified in this subchapter (see §§178.275(f)(1) and 178.277 of this subchapter).

(4) Any portable tank container constructed prior to May 15, 1950, complying with the requirements of either the ASME Code for Unfired Pressure Vessels, 1946 Edition, or the API ASME Code for Unfired Pressure Vessels, 1943 Edition, may be used for the transportation of liquefied compressed gas, provided it fulfills all the requirements of the part and specifications for the particular gas or gases to be transported. Such portable tanks must be marked ''ICC Specification 51X'' on the plate required by the specification, except as modified by any or all of the following:

(i) Portable tanks designed and constructed in accordance with Pars. U–68, U–69, or U–201 of the ASME Code, 1943 and 1946 editions, may be used. Portable tanks designed and constructed in accordance with Par. U–68 or Par. U–69 may be re-rated at a working pressure 25 percent in excess of the design pressure for which the portable tank was originally constructed. If the portable tank is re-rated, the re-rated pressure must be marked on the plate as follows: ''Re-rated working pressure—psig''.

(ii) Loading and unloading accessories, valves, piping, fittings, safety and gauging devices, do not have to comply with the requirements for the particular location on the portable tank.

(5) Any ICC Specification 50 portable tank fulfilling the requirements of that specification may be continued in service for transportation of a liquefied petroleum gas if it is retested every five years in accordance with the requirements in §180.605 of this subchapter. Use of existing portable tanks is authorized. New construction is not authorized.

(d) *Determination of an authorized portable tank.* Prior to filling and offering a portable tank for transportation, the shipper must ensure that the portable tank conforms to the authorized specification and meets the applicable requirements in this subchapter for the hazardous material. The shipper must ensure that the MAWP, design pressure or test pressure of the portable tank, as applicable, is appropriate for the hazardous material being transported. Determination of the applicable pressure must take into account the maximum pressure used to load or unload the hazardous material, the vapor pressure, static head and surge pressures of the hazardous material and the temperatures that the hazardous material will experience during transportation.

(e) *External inspection prior to filling.* Each portable tank must be given a complete external inspection prior to filling. Any unsafe condition must be corrected prior to its being filled and offered for transportation. The external inspection shall include a visual inspection of:

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

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

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

(4) All required markings on the tank for legibility; and

(5) Any device for tightening manhole covers to ensure such devices are operative and adequate to prevent leakage at the manhole cover.

(f) *Loading requirements.* (1) A hazardous material may not be loaded into a portable tank if the hazardous material would:

(i) Damage the portable tank;

(ii) React with the portable tank; or

(iii) Otherwise compromise its product retention capability.

(2) A hazardous material may not be loaded in a DOT Specification 51, DOT Specification 60, an IM or UN portable tank unless the portable tank has a pressure relief device that provides total relieving capacity meeting the requirements of this subchapter.

(3) Except during a pressure test, a portable tank may not be subjected to a pressure greater than its marked maximum allowable working pressure or, when appropriate, its marked design pressure.

(4) A portable tank may not be loaded to a gross mass greater than the maximum allowable gross mass specified on its identification plate.

(5) Except for a non-flowable solid or a liquid with a viscosity of 2,680 centistokes (millimeters squared per second) or greater at 20 °C (68 °F), an IM or UN portable tank, or compartment thereof, having a volume greater than 7,500 L (1,980 gallons) may not be loaded to a filling density of more than 20% and less than 80% by volume. This filling restriction does not apply if a portable tank is divided by partitions or surge plates into compartments of not more than 7,500 L (1,980 gallons) capacity; this portable tank must not be offered for transportation in an ullage condition liable to produce an unacceptable hydraulic force due to surge.

(6) The outage for a portable tank may not be less than 2% at a temperature of 50 °C (122 °F) unless otherwise specified in this subchapter. For UN portable tanks, the applicable maximum filling limits apply as specified according to the assigned TP codes in Column (7) of the §172.101 Table of this subchapter except when transported domestically.

(7) Each tell-tale indicator or pressure gauge located in 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.

(8) During filling, the temperature of the hazardous materials shall not exceed the limits of the design temperature range of the portable tank.

(9) The maximum mass of liquefied compressed gas per liter (gallon) of shell capacity (kg/L or lbs./gal.) may not exceed the density of the liquefied compressed gas at 50 °C (122 °F). The portable tank must not be liquid full at 60 °C (140 °F).

(g) *Additional requirements for specific modal transport.* In addition to other applicable requirements, the following apply:

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

(2) An IM or UN portable tank used for the transportation of flammable liquids by rail may not be fitted with non-reclosing pressure relief devices except in series with reclosing pressure relief valves.

(3) A portable tank or Specification 106A or 110A multi-unit tank car containing a hazardous material may not be offered for transportation aboard a passenger vessel unless:

(i) The vessel is operating under a change to its character of vessel certification as defined in §171.8 of this subchapter; and

(ii) The material is permitted to be transported aboard a passenger vessel in the §172.101 Table of this subchapter.

(h) *Additional general commodity-specific requirements.* In addition to other applicable requirements, the following requirements apply:

(1) Each uninsulated portable tank used for the transportation of a liquefied compressed gas must have an exterior surface finish that is significantly reflective, such as a light-reflecting color if painted, or a bright reflective metal or other material if unpainted.

(2) If a hazardous material is being transported in a molten state, the portable tank must be thermally insulated with suitable insulation material of sufficient thickness that the overall thermal conductance is not more than 0.080 Btu per hour per square foot per degree Fahrenheit differential.

(3) No person may offer a liquid hazardous material of Class 3, PG I or II, or PG III with a flash point of less than 100 °F (38 °C); Division 5.1, PG I or II; or Division 6.1, PG I or II, in an IM or UN portable tank that is equipped with a bottom outlet as authorized in Column (7) of the §172.101 Table of this subchapter by assignment of a T Code in the appropriate proper shipping name entry, for unloading to a facility while it remains on a transport vehicle with the power unit attached unless—

(i) The tank outlets conform to §178.275(d)(3) of this subchapter; or

(ii) The facility at which the IM or UN portable tank is to be unloaded conforms to the requirements in §177.834(o) of this subchapter.

(i) *Additional requirements for portable tanks other than IM specification and UN portable tanks.* (1) The bursting strength of any piping and fittings must be at least four times the design pressure of the tank, and at least four times the pressure to which, in any instance, it may be subjected in service by the action of a pump or other device (not including safety relief valves) that may subject piping to pressures greater than the design pressure of the tank.

(2) Pipe joints must be threaded, welded or flanged. If threaded pipe is used, the pipe and pipe fittings must not be lighter than Schedule 80 weight. Where copper tubing is permitted, joints must be brazed or be of equally strong metal union type. The melting point of brazing material may not be lower than 1,000 °F (537.8 °C). The method of joining tubing must not decrease the strength of the tubing such as by the cutting of threads.

(3) Non-malleable metals may not be used in the construction of valves or fittings.

(4) Suitable provision must be made in every case to allow for expansion, contraction, jarring and vibration of all pipe. Slip joints may not be used for this purpose.

(5) Piping and fittings must be grouped in the smallest practicable space and must be protected from damage as required by the specification.

(6) All piping, valves and fittings on every portable tank must be leakage tested with gas or air after installation and proved tight at not less than the design pressure of the portable tank on which they are used. In the event of replacement, all such piping, valves, or fittings must be tested in accordance with the requirements of this section before the portable tank is returned to transportation service. The requirements of this section apply to all hoses used on portable tanks, except that hoses may be tested either before or after installation on the portable tank.

(7) All materials used in the construction of portable tanks and their appurtenances may not be subject to destructive attack by the contents of the portable tank.

(8) No aluminum, copper, silver, zinc nor their alloys may be used. Brazed joints may not be used. All parts of a portable tank and its appurtenances used for anhydrous ammonia must be steel.

(9) Each outlet of a portable tank used for the transportation of non-refrigerated liquefied compressed gases, except carbon dioxide, must be provided with a suitable automatic excess-flow valve (see definition in §178.337–1(g) of this subchapter). The valve must be located inside the portable tank or at a point outside the portable tank where the line enters or leaves the portable tank. The valve seat must be located inside the portable tank or may be located within a welded flange or its companion flange, or within a

nozzle or within a coupling. The installation must be made in such a manner as to reasonably assure that any undue strain which causes failure requiring functioning of the valve shall cause failure in such a manner that it will not impair the operation of the valve.

(i) A safety device connection or liquid level gauging device that is constructed so that the outward flow of the tank contents will not exceed that passed by an opening of 0.1397 cm (0.0550 inches) is not required to be equipped with excess-flow valves.

(ii) An excess-flow valve must close automatically if the flow reaches the rated flow of gas or liquid specified by the original valve manufacturer when piping mounted directly on the valve is sheared off before the first valve, pump, or fitting downstream from the excess flow valve.

(iii) An excess-flow valve may be designed with a by-pass, not to exceed a 0.1016 cm (0.040 inches) diameter opening to allow equalization of pressure.

(iv) Filling and discharge lines must be provided with manually operated shut-off valves located as close to the tank as practical. Unless this valve is manually operable at the valve, the line must also have a manual shut-off valve. The use of ''Stop-Check'' valves to satisfy with one valve the requirements of this section is forbidden. For portable tanks used for refrigerated liquefied gases, a ''stop check'' valve may be used on the vapor side of the pressure buildup circuit.

(10) Each portable tank used for carbon dioxide or nitrous oxide must be lagged with a suitable insulation material of such thickness that the overall thermal conductance is not more than 0.08 Btu per square foot per degree Fahrenheit differential in temperature per hour. The conductance must be determined at 60 °Fahrenheit. Insulation material used on portable tanks for nitrous oxide must be noncombustible.

(11) Refrigerating or heating coils must be installed in portable tanks used for carbon dioxide and nitrous oxide. Such coils must be tested externally to at least the same pressure as the test pressure of the portable tank. The coils must also be tested internally to at least twice the working pressure of the heating or refrigerating system to be used, but in no case less than the test pressure of the portable tank. Such coils must be securely anchored. In the event of leakage, the refrigerant or heating medium to be circulated through the coil or coils must have no adverse chemical reaction with the portable tank or its contents.

(12) Excess flow valves are not required for portable tanks used for the transport of refrigerated liquefied gases.

[66 FR 33427, June 21, 2001, as amended at 67 FR 15743, Apr. 3, 2002; 68 FR 32413, May 30, 2003; 68 FR 57632, Oct. 6, 2003; 68 FR 75742, 75743, Dec. 31, 2003; 69 FR 54046, Sept. 7, 2004; 72 FR 25176, May 3, 2007; 76 FR 81400, Dec. 28, 2011]

§ 173.33 Hazardous materials in cargo tank motor vehicles.

(a) *General requirements.* (1) No person may offer or accept a hazardous material for transportation in a cargo tank motor vehicle except as authorized by this subchapter.

(2) Two or more materials may not be loaded or accepted for transportation in the same cargo tank motor vehicle if, as a result of any mixture of the materials, an unsafe condition would occur, such as an explosion, fire, excessive increase in pressure or heat, or the release of toxic vapors.

(3) No person may fill and offer for transportation a specification cargo tank motor vehicle for which the prescribed periodic retest or reinspection under subpart E of part 180 of this subchapter is past due until the retest or inspection has been successfully completed. This requirement does not apply to a cargo tank supplied by a motor carrier who is other than the person offering the hazardous material for transportation (see §180.407(a)(1) of this subchapter), or to any cargo tank filled prior to the retest or inspection due date.

(b) *Loading requirements.* (1) A hazardous material may not be loaded in a cargo tank if during transportation any part of the tank in contact with the hazardous material lading would have a dangerous reaction with the hazardous material.

(2) A cargo tank may not be loaded with a hazardous material that will

have an adverse effect on the tank's integrity or—

(i) May combine chemically with any residue or contaminants in the tank to produce an explosion, fire, excessive increase in pressure, release of toxic vapors or other unsafe condition.

(ii)–(iii) [Reserved]

(iv) May severely corrode or react with the tank material at any concentration and temperature that will exist during transportation.

(v) Is prohibited by §173.21 or §173.24 of this subchapter.

(3) Air pressure in excess of ambient atmospheric pressure may not be used to load or unload any lading which may create an air-enriched mixture within the flammability range of the lading in the vapor space of the tank.

(4) To prevent cargo tank rupture in a loading or unloading accident, the loading or unloading rate used must be less than or equal to that indicated on the cargo tank specification plate, except as specified in §173.318(b)(6). If no loading or unloading rate is marked on the specification plate, the loading or unloading rate and pressure used must be limited such that the pressure in the tank may not exceed 130% of the MAWP.

(c) *Maximum Lading Pressure.* (1) Prior to loading and offering a cargo tank motor vehicle for transportation with material that requires the use of a specification cargo tank, the person must confirm that the cargo tank motor vehicle conforms to the specification required for the lading and that the MAWP of the cargo tank is greater than or equal to the largest pressure obtained under the following conditions:

(i) For compressed gases and certain refrigerated liquids that are not cryogenic liquids, the pressure prescribed in §173.315 of this subchapter.

(ii) For cryogenic liquids, the pressure prescribed in §173.318 of this subchapter.

(iii) For liquid hazardous materials loaded in DOT specification cargo tanks equipped with a 1 psig normal vent, the sum of the tank static head plus 1 psig. In addition, for hazardous materials loaded in these cargo tanks, the vapor pressure of the lading at 115 °F must be not greater than 1 psig, except for gasoline transported in accordance with Special Provision B33 in §172.102(c)(3) of this subchapter.

(iv) For liquid hazardous materials not covered in paragraph (c)(1)(i), (ii), or (iii) of this section, the sum of the vapor pressure of the lading at 115 °F, plus the tank static head exerted by the lading, plus any pressure exerted by the gas padding, including air in the ullage space or dome.

(v) The pressure prescribed in subpart B, D, E, F, G, or H of this part, as applicable.

(vi) The maximum pressure in the tank during loading or unloading.

(2) Any Specification MC 300, MC 301, MC 302, MC 303, MC 305, MC 306 or MC 312, cargo tank motor vehicle with no marked design pressure or marked with a design pressure of 3 psig or less may be used for an authorized lading where the pressure derived from §173.33(c)(1) is less than or equal to 3 psig. After December 31, 1990, a cargo tank may not be loaded and offered for transportation unless marked or remarked with an MAWP or design pressure in accordance with 49 CFR 180.405(k).

(3) Any Specification MC 310 or MC 311 cargo tank motor vehicle may be used for an authorized lading where the pressure derived from §173.33(c)(1) is less than or equal to the MAWP or MWP, respectively, as marked on the specification plate.

(4) Any cargo tank marked or certified before August 31, 1995, marked with a design pressure rather than an MAWP may be used for an authorized lading where the largest pressure derived from §173.33(c)(1) is less than or equal to the design pressure marked on the cargo tank.

(5) Any material that meets the definition of a Division 6.1, Packing Group I or II (poisonous liquid) material must be loaded in a cargo tank motor vehicle having a MAWP of 25 psig or greater.

(6) *Substitute packagings.* Unless otherwise specified, where MC 307, MC 312, DOT 407 or DOT 412 cargo tanks are authorized, minimum tank design pressure is 172.4 kPa (25 psig) for any Packing Group I or Packing Group II liquid lading that meets more than one hazard class definition.

(d) *Relief system.* (1) Non-reclosing pressure relief devices are not authorized in any cargo tank except when in series with a reclosing pressure relief device. However, a cargo tank marked or certified before August 31, 1995 which is fitted with non-reclosing pressure relief devices may continue to be used in any hazardous material service for which it is authorized. The requirements in this paragraph do not apply to MC 330, MC 331 and MC 338 cargo tanks.

(2) Each cargo tank motor vehicle used to transport a liquid hazardous material with a gas pad must have a pressure relief system that provides the venting capacity prescribed in §178.345–10(e) of this subchapter. The requirements in this paragraph do not apply to MC 330, MC 331 and MC 338 cargo tanks.

(3) A cargo tank motor vehicle made to a specification listed in column 1 may have pressure relief devices or outlets conforming to the applicable specification to which the tank was constructed, or the pressure relief devices or outlets may be modified to meet the applicable requirement for the specification listed in column 2 without changing the markings on the tank specification plate. The venting capacity requirements of the original DOT cargo tank specification must be met whenever a pressure relief valve is modified.

Column 1	Column 2
MC 300, MC 301, MC 302, MC 303, MC 305.	MC 306 or DOT 406.
MC 306	DOT 406.
MC 304	MC 307 or DOT 407.
MC 307	DOT 407.
MC 310, MC 311	MC 312 or DOT 412.
MC 312	DOT 412.
MC 330	MC 331.

(e) *Retention of hazardous materials in product piping during transportation.* DOT specification cargo tanks used for the transportation of any material that is a Division 6.1 (poisonous liquid) material, oxidizer liquid, liquid organic peroxide or corrosive liquid (corrosive to skin only) may not be transported with hazardous materials lading retained in the piping, unless the cargo tank motor vehicle is equipped with bottom damage protection devices meeting the requirements of §178.337–10 or §178.345–8(b) of this subchapter, or the accident damage protection requirements of the specification under which it was manufactured. This requirement does not apply to a residue which remains after the piping is drained. A sacrificial device (see §178.345–1 of this subchapter) may not be used to satisfy the accident damage protection requirements of this paragraph.

(f) An MC 331 type cargo tank may be used where MC 306, MC 307, MC 312, DOT 406, DOT 407 or DOT 412 type cargo tanks are authorized. An MC 307, MC 312, DOT 407 or DOT 412 type cargo tank may be used where MC 306 or DOT 406 type cargo tanks are authorized. A higher integrity tank used instead of a specified tank must meet the same design profile (for example, an MC 331 cargo tank must be lined if used in place of a lined MC 312 cargo tank.)

(g) *Remote control of self-closing stop valves—MC 330, MC 331 and MC 338 cargo tanks.* Each liquid or vapor discharge opening in an MC 330 or MC 331 cargo tank and each liquid filling and liquid discharge line in an MC 338 cargo tank must be provided with a remotely controlled internal self-closing stop valve, except when an MC 330 or MC 331 cargo tank is marked and used exclusively to transport carbon dioxide, or except when an MC 338 is used to transport argon, carbon dioxide, helium, krypton, neon, nitrogen, and xenon. However, if the cargo tank motor vehicle was certified before January 1, 1995, this requirement is applicable only when an MC 330 or MC 331 cargo tank is used to transport a flammable liquid, flammable gas, hydrogen chloride (refrigerated liquid), or anhydrous ammonia; or when an MC 338 cargo tank is used to transport flammable ladings.

(h) A cargo tank motor vehicle authorized by the Transport Canada TDG Regulations (IBR, see §171.7 of this subchapter) may be used provided it conforms to the applicable requirements in §171.12 of this subchapter.

[Amdt. 173–212, 54 FR 25005, June 12, 1989]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §173.33, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§ 173.34 [Reserved]

§ 173.35 Hazardous materials in IBCs.

(a) No person may offer or accept a hazardous material for transportation in an IBC except as authorized by this subchapter. Each IBC used for the transportation of hazardous materials must conform to the requirements of its specification and regulations for the transportation of the particular commodity. A specification IBC, for which the prescribed periodic retest or inspection under subpart D of part 180 of this subchapter is past due, may not be filled and offered for transportation until the retest or inspection have been successfully completed. This requirement does not apply to any IBC filled prior to the retest or inspection due date.

(b) *Initial use and reuse of IBCs.* (Also see § 180.352 of this subchapter.) An IBC other than a multiwall paper IBC (13M1 and 13M2) may be reused. If an inner liner is required, the inner liner must be replaced before each reuse. Before an IBC is filled and offered for transportation, the IBC and its service equipment must be given an external visual inspection, by the person filling the IBC, to ensure that:

(1) The IBC is free from corrosion, contamination, cracks, cuts, or other damage which would render it unable to pass the prescribed design type test to which it is certified and marked; and

(2) The IBC is marked in accordance with requirements in § 178.703 of this subchapter. Additional marking allowed for each design type may be present. Required markings that are missing, damaged or difficult to read must be restored or returned to original condition.

(c) A metal IBC, or a part thereof, subject to thinning by mechanical abrasion or corrosion due to the lading, must be protected by providing a suitable increase in thickness of material, a lining or some other suitable method of protection. Increased thickness for corrosion or abrasion protection must be added to the wall thickness specified in § 178.705(c)(1)(iv) of this subchapter.

(d) Notwithstanding requirements in § 173.24b of this subpart, when filling an IBC with liquids, sufficient ullage must be left to ensure that, at the mean bulk temperature of 50 °C (122 °F), the IBC is not filled to more than 98 percent of its water capacity.

(e) Where two or more closure systems are fitted in series, the system nearest to the hazardous material being carried must be closed first.

(f) During transportation—

(1) No hazardous material may remain on the outside of the IBC; and

(2) Each IBC must be securely fastened to or contained within the transport unit.

(g) Each IBC used for transportation of solids which may become liquid at temperatures likely to be encountered during transportation must also be capable of containing the substance in the liquid state.

(2) Liquids having a vapor pressure greater than 110 kPa (16 psig) at 50 °C (122 °F) or 130 kPa (18.9 psig) at 55 °C (131 °F) may not be transported in metal IBCs.

(1) A rigid plastic or composite IBC may only be filled with a liquid having a vapor pressure less than or equal to the greater of the following two values: the first value is determined from any of the methods in paragraphs (h)(1) (i), (ii) or (iii) of this section. The second value is determined by the method in paragraph (h)(1)(iv) of this section.

(i) The gauge pressure (pressure in the IBC above ambient atmospheric pressure) measured in the IBC at 55 °C (131 °F). This gauge pressure must not exceed two-thirds of the marked test pressure and must be determined after the IBC was filled and closed at 15 °C (60 °F) to less than or equal to 98 percent of its capacity.

(ii) The absolute pressure (vapor pressure of the hazardous material plus atmospheric pressure) in the IBC at 50 °C (122 °F). This absolute pressure must not exceed four-sevenths of the sum of the marked test pressure and 100 kPa (14.5 psia).

(iii) The absolute pressure (vapor pressure of the hazardous material plus atmospheric pressure) in the IBC at 55 °C (131 °F). This absolute pressure must not exceed two-thirds of the sum of the marked test pressure and 100 kPa (14.5 psia).

(iv) Twice the static pressure of the substance, measured at the bottom of

the IBC. This value must not be less than twice the static pressure of water.

(2) Gauge pressure (pressure in the IBC above ambient atmospheric pressure) in metal IBC must not exceed 110 kPa (16 psig) at 50 °C (122 °F) or 130 kPa (18.9 psig) at 55 °C (131 °F).

(i) The requirements in this section do not apply to DOT-56 or –57 portable tanks.

(j) No IBC may be filled with a Packing Group I liquid. Rigid plastic, composite, flexible, wooden or fiberboard IBC used to transport Packing Group I solid materials may not exceed 1.5 cubic meters (53 cubic feet) capacity. For Packing Group I solids, a metal IBC may not exceed 3 cubic meters (106 cubic feet) capacity.

(k) When an IBC is used for the transportation of liquids with a flash point of 60 °C (140 °F) (closed cup) or lower, or powders with the potential for dust explosion, measures must be taken during product loading and unloading to prevent a dangerous electrostatic discharge.

(l) *IBC filling limits.* (1) Except as provided in this section, an IBC may not be filled with a hazardous material in excess of the maximum gross mass marked on that container.

(2) An IBC which is tested and marked for Packing Group II liquid materials may be filled with a Packing Group III liquid material to a gross mass not exceeding 1.5 times the maximum gross mass marked on that container, if all the performance criteria can still be met at the higher gross mass.

(3) An IBC which is tested and marked for liquid hazardous materials may be filled with a solid hazardous material to a gross mass not exceeding the maximum gross mass marked on that container. In addition, an IBC intended for the transport of liquids which is tested and marked for Packing Group II liquid materials may be filled with a Packing Group III solid hazardous material to a gross mass not exceeding the marked maximum gross mass multiplied by 1.5 if all the performance criteria can still be met at the higher gross mass.

(4) An IBC which is tested and marked for Packing Group I solid materials may be filled with a Packing Group II solid material to a gross mass not exceeding the maximum gross mass marked on that container, multiplied by 1.5, if all the performance criteria can be met at the higher gross mass; or a Packing Group III solid material to a gross mass not exceeding the maximum gross mass marked on the IBC, multiplied by 2.25, if all the performance criteria can be met at the higher gross mass. An IBC which is tested and marked for Packing Group II solid materials may be filled with a Packing Group III solid material to a gross mass not exceeding the maximum gross mass marked on the IBC, multiplied by 1.5.

[Amdt. 173–238, 59 FR 38064, July 26, 1994, as amended by Amdt. 173–243, 60 FR 40038, Aug. 4, 1995; 64 FR 10777, Mar. 5, 1999; 66 FR 45380, 45381, Aug. 28, 2001; 68 FR 48569, Aug. 14, 2003; 71 FR 78631, Dec. 29, 2006; 75 FR 5393, Feb. 2, 2010]

§ 173.36 Hazardous materials in Large Packagings.

(a) No person may offer or accept a hazardous material for transportation in a Large Packaging except as authorized by this subchapter. Except as otherwise provided in this subchapter, no Large Packaging may be filled with a Packing Group I or II material. Each Large Packaging used for the transportation of hazardous materials must conform to the requirements of its specification and regulations for the transportation of the particular commodity.

(b) *Packaging design.* (1) *Inner packaging closures.* A Large Packaging containing liquid hazardous materials must be packed so that closures on inner packagings are upright.

(2) *Flexible Large Packagings.* Flexible Large Packagings (*e.g.*, 51H) are only authorized for use with flexible inner packagings.

(3) *Friction.* The nature and thickness of the outer packaging must be such that friction during transportation is not likely to generate an amount of heat sufficient to dangerously alter the chemical stability of the contents.

(4) *Securing and cushioning.* Inner packagings of Large Packagings must be packed, secured and cushioned to prevent their breakage or leakage and to control their shifting within the

outer packaging under conditions normally incident to transportation. Cushioning material must not be capable of reacting dangerously with the contents of the inner packagings or having its protective properties significantly weakened in the event of leakage.

(5) *Metallic devices.* Nails, staples and other metallic devices must not protrude into the interior of the outer packaging in such a manner as to be likely to damage inner packagings or receptacles.

(c) *Initial use and reuse of Large Packagings.* A Large Packaging may be reused. If an inner packaging is constructed of paper or flexible plastic, the inner packaging must be replaced before each reuse. Before a Large Packaging is filled and offered for transportation, the Large Packaging must be given an external visual inspection, by the person filling the Large Packaging, to ensure:

(1) The Large Packaging is free from corrosion, contamination, cracks, cuts, or other damage which would render it unable to pass the prescribed design type test to which it is certified and marked; and

(2) The Large Packaging is marked in accordance with requirements in §178.910 of this subchapter. Additional marking allowed for each design type may be present. Required markings that are missing, damaged or difficult to read must be restored or returned to original condition.

(d) During transportation—

(1) No hazardous material may remain on the outside of the Large Packaging; and

(2) Each Large Packaging must be securely fastened to or contained within the transport unit.

(e) Each Large Packaging used for transportation of solids which may become liquid at temperatures likely to be encountered during transportation may not be transported in paper or fiber inner packagings. The inner packagings must be capable of containing the substance in the liquid state.

(f) Liquid hazardous materials may only be offered for transportation in inner packagings appropriately resistant to an increase of internal pressure likely to develop during transportation.

(g) A Large Packaging used to transport hazardous materials may not exceed 3 cubic meters (106 cubic feet) capacity.

(h) *Mixed contents.* (1) An outer Large Packaging may contain more than one hazardous material only when—

(i) The inner and outer packagings used for each hazardous material conform to the relevant packaging sections of this part applicable to that hazardous material, and not result in a violation of §173.21;

(ii) The package as prepared for shipment meets the performance tests prescribed in part 178 of this subchapter for the hazardous materials contained in the package;

(iii) Corrosive materials (except ORM–D) in bottles are further packed in securely closed inner receptacles before packing in outer packagings; and

(iv) For transportation by aircraft, the total net quantity does not exceed the lowest permitted maximum net quantity per package as shown in Column 9a or 9b, as appropriate, of the §172.101 table. The permitted maximum net quantity must be calculated in kilograms if a package contains both a liquid and a solid.

(2) A packaging containing inner packagings of Division 6.2 materials may not contain other hazardous materials, except dry ice.

(i) When a Large Packaging is used for the transportation of liquids with a flash point of 60.5 °C (141 °F) (closed cup) or lower, or powders with the potential for dust explosion, measures must be taken during product loading and unloading to prevent a dangerous electrostatic discharge.

[75 FR 5393, Feb. 2, 2010]

§173.40 General packaging requirements for toxic materials packaged in cylinders.

When this section is referenced for a Hazard Zone A or B hazardous material elsewhere in this subchapter, the requirements in this section are applicable to cylinders used for that material.

(a) *Authorized cylinders.* (1) A cylinder must conform to a DOT specification or a UN standard prescribed in subpart C of part 178 of this subchapter, except that acetylene cylinders and non-refillable cylinders are not authorized. The

use of UN tubes and MEGCs is prohibited for Hazard Zone A materials.

(2) The use of a specification 3AL cylinder made of aluminum alloy 6351–T6 is prohibited for a Division 2.3 Hazard Zone A material or a Division 6.1 Hazard Zone A material.

(3) A UN composite cylinder certified to ISO–11119–3 is not authorized for a Division 2.3 Hazard Zone A or B material.

(4) For UN seamless cylinders used for Hazard Zone A materials, the maximum water capacity is 85 L.

(b) *Outage and pressure requirements.* For DOT specification cylinders, the pressure at 55 °C (131 °F) of Hazard Zone A and Hazard Zone B materials may not exceed the service pressure of the cylinder. Sufficient outage must be provided so that the cylinder will not be liquid full at 55 °C (131 °F).

(c) *Closures.* Each cylinder containing a Hazard Zone A material must be closed with a plug or valve conforming to the following:

(1) Each plug or valve must have a taper-threaded connection directly to the cylinder and be capable of withstanding the test pressure of the cylinder without damage or leakage. For UN pressure receptacles, each valve must be capable of withstanding the test pressure of the pressure receptacle and be connected directly to the pressure receptacle by either a taper thread or other means which meets the requirements of ISO 10692–2: (IBR, *see* §171.7 of this subchapter).

(2) Each valve must be of the packless type with non-perforated diaphragm, except that, for corrosive materials, a valve may be of the packed type with an assembly made gas-tight by means of a seal cap with gasketed joint attached to the valve body or the cylinder to prevent loss of material through or past the packing.

(3) Each valve outlet must be sealed by a threaded cap or threaded solid plug and inert gasketing material.

(4) The materials of construction for the cylinder, valves, plugs, outlet caps, luting, and gaskets must be compatible with each other and with the lading.

(d) *Additional handling protection.* Each cylinder or cylinder overpack combination offered for transportation containing a Division 2.3 or 6.1 Hazard Zone A or B material must conform to the valve damage protection performance requirements of this section. In addition to the requirements of this section, overpacks must conform to the overpack provisions of §173.25.

(1) DOT specification cylinders must conform to the following:

(i) Each cylinder with a wall thickness at any point of less than 2.03 mm (0.08 inch) and each cylinder that does not have fitted valve protection must be overpacked in a box. The box must conform to overpack provisions in §173.25. Box and valve protection must be of sufficient strength to protect all parts of the cylinder and valve, if any, from deformation and breakage resulting from a drop of 2.0 m (7 ft) or more onto a non-yielding surface, such as concrete or steel, impacting at an orientation most likely to cause damage. ''Deformation''means a cylinder or valve that is bent, distorted, mangled, misshapen, twisted, warped, or in a similar condition.

(ii) Each cylinder with a valve must be equipped with a protective metal cap, other valve protection device, or an overpack which is sufficient to protect the valve from breakage or leakage resulting from a drop of 2.0 m (7 ft) onto a non-yielding surface, such as concrete or steel. Impact must be at an orientation most likely to cause damage.

(2) Each UN cylinder containing a Hazard Zone A or Hazard Zone B material must have a minimum test pressure in accordance with P200 of the UN Recommendations (IBR, see §171.7 of this subchapter). For Hazard Zone A gases, the cylinder must have a minimum wall thickness of 3.5 mm if made of aluminum alloy or 2 mm if made of steel or, alternatively, cylinders may be packed in a rigid outer packaging that meets the Packing Group I performance level when tested as prepared for transport, and that is designed and constructed to protect the cylinder and valve from puncture or damage that may result in release of the gas.

(e) *Interconnection.* Cylinders may not be manifolded or connected. This provision does not apply to MEGCs containing Hazard Zone B materials in accordance with §173.312.

[67 FR 51642, Aug. 8, 2002, as amended at 67 FR 61289, Sept. 30, 2002; 68 FR 24660, May 8, 2003; 71 FR 33880, June 12, 2006; 76 FR 3371, Jan. 19, 2011]

Subpart C—Definitions, Classification and Packaging for Class 1

SOURCE: Amdt. 173–224, 55 FR 52617, Dec. 21, 1990, unless otherwise noted.

§173.50 Class 1—Definitions.

(a) *Explosive.* For the purposes of this subchapter, an *explosive* means any substance or article, including a device, which is designed to function by explosion (*i.e.*, an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion, unless the substance or article is otherwise classed under the provisions of this subchapter. The term includes a pyrotechnic substance or article, unless the substance or article is otherwise classed under the provisions of this subchapter.

(b) Explosives in Class 1 are divided into six divisions as follows:

(1) *Division 1.1* consists of explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

(2) *Division 1.2* consists of explosives that have a projection hazard but not a mass explosion hazard.

(3) *Division 1.3* consists of explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

(4) *Division 1.4* consists of explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

(5) *Division 1.5*[1] consists of very insensitive explosives. This division is comprised of substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

(6) *Division 1.6*[2] consists of extremely insensitive articles which do not have a mass explosive hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

[Amdt. 173–224, 55 FR 52617 Dec. 21, 1990, as amended at 56 FR 66267, Dec. 20, 1991; 66 FR 45183, Aug. 28, 2001; 68 FR 48569, Aug. 14, 2003]

§173.51 Authorization to offer and transport explosives.

(a) Unless otherwise provided in this subpart, no person may offer for transportation or transport an explosive, unless it has been tested and classed and approved by the Associate Administrator (§173.56).

(b) Reports of explosives approved by the Department of Defense or the Department of Energy must be filed with, and receive acknowledgement in writing by, the Associate Administrator prior to such explosives being offered for transportation.

[Amdt. 173–224, 55 FR 52617, Dec. 21, 1990, as amended by 66 FR 45379, Aug. 28, 2001]

§173.52 Classification codes and compatibility groups of explosives.

(a) The classification code for an explosive, which is assigned by the Associate Administrator in accordance with this subpart, consists of the division number followed by the compatibility group letter. Compatibility group letters are used to specify the controls for the transportation, and storage related thereto, of explosives and to prevent an increase in hazard that might result if certain types of explosives were stored or transported together. Transportation compatibility requirements for

[1] The probability of transition from burning to detonation is greater when large quantities are transported in a vessel.

[2] The risk from articles of Division 1.6 is limited to the explosion of a single article.