

(c) *Consumer commodities.* The following provisions apply to consumer commodities:

(1) A limited quantity which conforms to the provisions of paragraph (b) of this section and is a “consumer commodity” as defined in §171.8 of this subchapter, may be renamed “Consumer commodity” and reclassified as ORM-D material.

(2) A poisonous material which is a drug or medicine and is a “consumer commodity” as defined in §171.8 of this subchapter, may be renamed “Consumer commodity” and reclassified as ORM-D material if packaged in a combination packaging not exceeding 30 kg (66 pounds) with inner packagings not over 250 ml (8 ounces) net capacity for liquids or 250 g (8.8 ounces) net capacity for solids packed in strong outer packagings. Each package must conform to the packaging requirements of Subpart B of this part.

(3) Packages of ORM-D material are excepted from the specification packaging requirements of this subchapter and from the labeling requirements of Subpart E of Part 172 of this subchapter. Shipments of ORM-D material are eligible for the exceptions provided in §173.156 and in paragraph (b) of this section and are not subject to the shipping paper requirements of Subpart C of Part 172 of this subchapter unless the material meets the definition of a hazardous substance, a hazardous waste or a marine pollutant or unless offered for transportation or transported by aircraft.

**§173.154 Exceptions for Class 8 (corrosive materials).**

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the §172.101 Table of this subchapter.

(b) *Limited quantities.* Limited quantities of corrosive materials (Class 8 in Packing Groups II and III) are excepted from labeling, unless offered or intended for transportation by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of these limited quantities are not subject to Subpart F (Placarding) of Part 172 of this subchapter. Each package must conform to the packaging requirements of Subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For corrosive materials in Packing Group II, in inner packagings not over 1.0 L (0.3 gallon) net capacity each for liquids or not over 1.0 kg (2.2 pounds) net capacity each for solids, packed in strong outer packagings.

(2) For corrosive materials in Packing Group III, in inner packagings not over 4.0 L (1 gallon) net capacity each for liquids or not over 5.0 kg (11 pounds) net capacity each for solids, packed in strong outer packagings.

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section and is a “consumer commodity” as defined in §171.8 of this subchapter may be renamed “Consumer commodity” and reclassified as ORM-D material. In addition to the exceptions provided by paragraph (b) of this section, shipments of ORM-D materials are not subject to the shipping paper requirements of Subpart C of Part 172 of this subchapter, unless the material meets the definition of a hazardous substance, a hazardous waste, or marine pollutant or unless offered or intended for transportation by aircraft, and are eligible for the exceptions provided in §173.156.

(d) *Materials corrosive to aluminum or steel only.* Except for a hazardous substance, a hazardous waste or a marine pollutant, a material classed as a Class 8, Packing Group III, material solely because of its corrosive effect —

(1) On aluminum is not subject to any other requirements of this subchapter when transported by motor vehicle or rail car in a packaging constructed of materials that will not react dangerously with or be degraded by the corrosive material; or

(2) On steel is not subject to any other requirements of this subchapter when transported by motor vehicle or rail car in a bulk packaging constructed of materials that will not react dangerously with or be degraded by the corrosive material.

**§173.155 Exceptions for Class 9 (miscellaneous hazardous materials).**

(a) *General.* Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the §172.101 Table of this subchapter.

(b) *Limited quantities.* Limited quantities of miscellaneous hazardous materials (Class 9) are excepted from labeling, unless offered or intended for transportation by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of these limited quantities are not subject to Subpart F (Placarding) of Part 172 of this subchapter. Each package must conform to the packaging requirements of Subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following combination packagings are authorized:

(1) For liquids, inner packagings not over 5.0 L (1.3 gallons) net capacity each, packed in strong outer packagings.

(2) For solids, inner packagings not over 5.0 kg (11 pounds) net capacity each, packed in strong outer packagings.

(c) *Consumer commodities.* A limited quantity which conforms to the provisions of paragraph (b) of this section and is a “consumer commodity” as defined in §171.8 of this subchapter, may be renamed “Consumer commodity” and reclassified as ORM-D material. In addition to the exceptions provided by paragraph (b) of this section, shipments of ORM-D materials are not subject to the shipping paper requirements of Subpart C of Part 172 of this subchapter, unless the material meets the definition of a hazardous substance, a hazardous waste or a marine pollutant or unless offered for transportation or transported by aircraft, and are eligible for the exceptions provided in §173.156.

**§173.156 Exceptions for ORM materials.**

(a) Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the §172.101 Table or in a packaging section in this part.

(b) *ORM-D.* Packagings for ORM-D materials are specified according to hazard class in Secs. 173.150 through 173.155 and in §173.306. In addition to other exceptions specified for ORM-D materials in this part:

(1) Strong outer packagings as specified in this part, marking requirements specified in subpart D of part 172 of this subchapter, and the 30 kg (66 pounds) gross weight limitation are not required for materials classed as ORM-D when—

(i) Unitized in cages, carts, boxes or similar overpacks;

(ii) Offered for transportation or transported by:

(A) Rail;

(B) Private or contract motor carrier; or

(C) Common carrier in a vehicle under exclusive use for such service; and

(iii) Transported to or from a manufacturer, a distribution center, or a retail outlet, or transported to a disposal facility from one offeror.

(2) The 30 kg (66 pounds) gross weight limitation does not apply to materials classed as ORM-D when offered for transportation, or transported, by highway or rail between a manufacturer, a distribution center, and a retail outlet provided—

(i) Inner packagings conform to the quantity limits for inner packagings specified in Secs. 173.150(b), 173.152(b), 173.154(b), 173.155(b) and 173.306

(a) and (b), as appropriate;

(ii) The inner packagings are packed into corrugated fiberboard trays to prevent them from moving freely;

(iii) The trays are placed in a fiberboard box which is banded and secured to a wooden pallet by metal, fabric, or plastic straps, to form a single palletized unit;

(iv) The package conforms to the general packaging requirements of subpart B of this part;

(v) The maximum net quantity of hazardous material permitted on one palletized unit is 250 kg (550 pounds); and

(vi) The package is properly marked in accordance with §172.316 of this subchapter.

**Subpart E — Non-Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7**

**§173.158 Nitric acid.**

(a) Nitric acid exceeding 40 percent concentration may not be packaged with any other material.

(b) Nitric acid in any concentration which does not contain sulfuric acid or hydrochloric acid as impurities, when offered for transportation or transported by rail, highway, or water shall be packaged in specification containers as follows:

(1) 1A1 stainless steel drums are authorized, subject to the following limitations:

(i) Stainless steel used in drums must conform to the following thicknesses:

Nominal (marked) capacity (in liters) of 1A1 drum	Minimum thickness (in millimeters) of stainless steel
55	0.9
115	1.2
210	1.5
450	2.0

(ii) Drums weighing less than 85 percent of their original tare weight may not be used.

(iii) Type 304 or other grades of equivalent corrosion-resistant steels in the as-welded condition are permissible for nitric acid concentrations up to and including 78 percent.

(iv) For all concentrations of nitric acid, the following are permissible:

(A) Type 304 heat-treated (quenched in water at 1040°C (1900°F)).

(B) Stabilized Type 347 in the as-welded condition,

(C) Stabilized Type 347 stress-relieved (845-900°C (1550-1650°F)),

(D) Stabilized Type 347 heat-treated (quenched in water at 1040°C (1900°F)), or

(E) Other grades of equivalent corrosion resistance,

(v) All parts of drum exposed to lading must be capable of withstanding the corrosive effect of nitric acid to the extent that 65 percent boiling nitric acid does not penetrate the metal more than 0.0381 mm (0.002 inches) per month. (ASTM A262-68 may be used for a suitable corrosion test procedure.)

(vi) In addition to marking required by §178.503 of this subchapter, the following marks, in lettering of at least 12.7 mm (0.5 inch) height, must be placed on drums used to transport nitric acid:

(A) The type of steel used in body and head sheets as identified by American Iron and Steel Institute type number, and, in addition, the letters "HT" following the steel designation on containers subject to stress relieving or heat treatment during manufacture.

(B) The thickness in millimeters of metal in thinnest part. When the thickness of metal in the body differs from that in the head, both must be indicated with slanting line between and with the gauge of the body indicated first.

(C) Original tare weight in kilograms, preceded by the letters "TW". An example of the markings required by paragraphs (b)(1)(vi)(A), (B), and (C) of this section is "304HT/1.9/2.7/TW55."

(2) 4H1 expanded plastics outer packagings with glass inner receptacles of not greater than 2.5 L (0.66 gallon) capacity each. No more than four 2.5 L (0.66 gallon) inner receptacles may be packed in one outer packaging.

(c) Nitric acid of 80 percent or greater concentration which does not contain sulfuric acid or hydrochloric acid as impurities, when offered for transportation or transported by rail, highway, or water may be packaged in 1B1 aluminum drums.

(d) Nitric acid of 90 percent or greater concentration, when offered for transportation or transported by rail, highway, or water may be packaged as follows:

(1) In 4C1, 4C2, 4D or 4F wooden boxes with inner packagings consisting of glass bottles further individually overpacked in tightly closed metal packagings. Glass bottles must be of 2.5 L (0.66 gallon) or less capacity and cushioned with a non-reactive, absorbent material within the metal packagings.

(2) In combination packagings with 1A2, 1B2, 1D, 1G, 1H2, 3H2 or 4G outer packagings with inner glass packagings of 2.5 L (0.66 gallons) or less capacity cushioned with a non-reactive, absorbent material and packed within a tightly closed intermediate packaging of metal or plastic.

(e) Nitric acid of less than 90 percent concentration, when offered for transportation or transported by rail, highway, or water may be packaged in 4G fiberboard boxes or 4C1, 4C2, 4D or 4F wooden boxes with inside glass packagings of not over 2.5 L (0.66 gallon) capacity each.

(f) Nitric acid of 70 percent or less concentration, when offered for transportation or transported by rail, highway, or water, may be packaged as follows:

(1) In composite packagings 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PH1, or 6PH2. 6HH1 and 6HA1 composite packaging with plastic inner receptacles meeting the compatibility requirements §173.24(e) (e.g., PFA Teflon) are authorized.

(2) In 4H1 expended plastic boxes with inner glass packagings of not over 2.5 L (0.66 gallon) each.

(3) In combination packagings with 1A2, 1B2, 1D, 1G, 1H2, 3H2, 4C1, 4C2, 4D, 4F or 4G outer packagings and plastic inner packagings not over 2.5 L (0.66 gallon) capacity further individually overpacked in tightly closed metal packagings.

(g) Nitric acid of more than 70 percent concentration, when offered for transportation or transported by cargo aircraft only, must be packaged in combination packagings with 1A2, 1B2, 1D, 1G, 1H2, 3H2, 4C1, 4C2, 4D, 4F or 4G outer packagings with glass or earthenware inner packagings of not over 1 L (0.3 gallon) or glass ampoules of not over 0.5 L (0.1 gallon).

(h) Nitric acid of less than 70 percent concentration, when offered for transportation in cargo aircraft only must be packaged in combination packagings with 1A2, 1B2, 1D, 1G, 1H2, 3H2, 4C1, 4C2, 4D, 4F or 4G outer packagings with inner packagings of —

(1) Glass or earthenware not over 2.5 L (0.66 gallon) capacity;

(2) Plastic not over 2.5 L (0.6 gallon) capacity further individually overpacked in tightly closed metal packagings; or

(3) Glass ampoule not over 0.5 L (0.1 gallon) capacity.

#### **§173.159 Batteries, wet.**

(a) Electric storage batteries, containing electrolyte acid or alkaline corrosive battery fluid, must be completely protected so that short circuits will be prevented; they may not be packed with other materials except as provided in §§173.220 and 173.222 of this part and paragraph (h) of this section.

(b) The following specification packagings are authorized for batteries packed without other materials.

(1) 4C1, 4C2, 4D, or 4F wooden boxes.

(2) 4G fiberboard boxes.

(3) 1D plywood drums.

(4) 1G fiber drums.

(5) 1H2 and 3H2 plastic drums and jerrycans.

(6) 4H2 plastic boxes.

(c) The following non-specification packagings are authorized for batteries packed without other materials:

(1) Electric storage batteries protected against short circuits and firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation, are authorized for transportation by rail, highway, or water. The height of the completed unit must not exceed 1-1/2 times the width of the skid or pallet. The unit must be capable of withstanding, without damage, a superimposed weight equal to two times the weight of the unit or, if the weight of the unit exceeds 907 kg (2000 pounds), a superimposed weight of 1814 kg (4000 pounds). Battery terminals must not be relied upon to support any part of the superimposed weight.

(2) Electric storage batteries weighing 225 kg (500 pounds) or more, consisting of carriers' equipment, may be shipped by rail when mounted on suitable skids and protected against short circuits. Such shipments may not be offered in interchange service.

(3) One to three batteries not over 11.3 kg (25 pounds) each, packed in outer boxes. The maximum authorized gross weight is 34 kg (75 pounds).

(4) Not more than four batteries not over 7 kg (15 pounds) each, packed in strong outer fiberboard or wooden boxes. Batteries must be securely cushioned and packed to prevent short circuits. The maximum authorized gross weight is 30 kg (65 pounds).

(5) Not more than five batteries not over 4.5 kg (10 pounds) each, packed in strong outer fiberboard or wooden boxes. Batteries must be securely cushioned and packed to prevent short circuits. The maximum authorized gross weight is 30 kg (65 pounds).

(6) Single batteries not exceeding 34 kg (75 pounds) each, packed in 5-sided slip covers or in completely closed fiberboard boxes. Slip covers and boxes must be of solid or double-faced corrugated fiberboard of at least 91 kg (200 pounds) Mullen test strength. The slipcover or fiberboard box must fit snugly and provide inside top clearance of at least 1.3 cm (0.5 inch) above battery terminals and filler caps with reinforcement in place. Assembled for shipment, the bottom edges of the slipcover must come to within 2.5 cm (1 inch) of the bottom of the battery. The completed package (battery and box or slip cover) must be capable of withstanding a top-to-bottom compression test of at least 225 kg (500 pounds) without damage to battery terminals, cell covers or filler caps.

(7) Single batteries exceeding 34 kg (75 pounds) each may be packed in completely closed fiberboard boxes. Boxes must be of double-wall corrugated fiberboard of at least 181 kg (400 pounds) test, or solid fiberboard testing at least 181 kg (400 pounds); a box may have hand holes in its ends provided that the handholes will not materially weaken the box. Sides and ends of the box must have cushioning between the battery and walls of the box; combined thickness of cushioning material and walls of the box must not be less than 1.3 cm (0.5 inch); and cushioning must be excelsior pads, corrugated fiberboard, or other suitable cushioning material. The bottom of the battery must be protected by a minimum of one excelsior or double-wall corrugated fiberboard pad. The top of the battery must be protected by a wood frame, corrugated trays or scored sheets of corrugated fiberboard having minimum test of 91 kg (200 pounds), or other equally effective cushioning material. Top protection must bear evenly on connectors and/or edges of the battery cover to facilitate stacking of batteries. No more than one battery may be placed in one box. The maximum authorized gross weight is 91 kg (200 pounds).

(d) Nonspillable wet electric storage batteries capable of withstanding the following two tests without leakage of battery fluid are excepted from all other requirements of this subchapter when protected against short circuits and securely packaged:

(1) *Vibration test.* The battery must be rigidly clamped to the platform of a vibration machine, and a simple harmonic motion having an amplitude of 0.8 mm (0.03 inches), with a 1.6 mm (0.063 inches) maximum total excursion must be applied. The frequency must be varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return must be traversed in 95 ± 5 minutes for each mounting position (direction of vibrator) of the battery. The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

(2) *Pressure differential test.* Following the vibration test, the battery must be stored for six hours at 24°C ± 4°C (75°F ± 7°F) while subjected to a pressure differential of at least 88 kPa (13 psi). The battery must be tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

(e) Electric storage batteries containing electrolyte or corrosive battery fluid are not subject to the requirements of this subchapter for transportation by highway or rail if all of the following requirements are met:

- (1) No other hazardous materials may be transported in the same vehicle;
- (2) The batteries must be loaded or braced so as to prevent damage and short circuits in transit;
- (3) Any other material loaded in the same vehicle must be blocked, braced, or otherwise secured to prevent contact with or damage to the batteries; and
- (4) The transport vehicle may not carry material shipped by any person other than the shipper of the batteries.

(f) Electric storage batteries, containing electrolyte or corrosive battery fluid in a coil from which it is injected into the battery cells by a gas generator and initiator assembled with the battery, and which are nonspillable under the criteria of paragraph (d) of this section, are excepted from other requirements of this subchapter when examined by the Bureau of Explosives and approved by the Associate Administrator for Hazardous Materials Safety.

(g) Electrolyte, acid, or alkaline corrosive battery fluid, packed with storage batteries wet or dry, must be packed in one of the following specification packagings:

- (1) In 4C1, 4C2, 4D, or 4F wooden boxes with inner receptacles of glass, not over 4.0 L (1 gallon) each with not over 8.0 L (2 gallons) total in each outside container. Inside containers must be well-cushioned and separated from batteries by a strong solid wooden partition. The completed package must conform to Packing Group III requirements.
- (2) Electrolyte, acid, or alkaline corrosive battery fluid included with storage batteries and filling kits may be packed in strong plywood or wooden boxes when shipments are made by, for, or to the Departments of the Army, Navy, or Air Force of the United States. Packagings must conform to military specifications. The electrolyte, acid, or alkaline corrosive battery fluid must be packed in polyethylene bottles of not over 1.0L (0.3 gallon) capacity each. Not more than 24 bottles, securely separated from storage batteries and kits, may be offered for transportation or transported in each package.
- (3) In 4G fiberboard boxes with not more than 12 inside packagings of polyethylene or other material resistant to the lading, each not over 2.0 L (0.5 gallon) capacity each. Completed packagings must conform to Packing Group III requirements. Inner packagings must be adequately separated from the storage battery. The maximum authorized gross weight is 29 kg (64 pounds). These packages are not authorized for transportation by aircraft.

(h) Dry storage batteries or battery charger devices may be packaged in 4G fiberboard boxes with inner receptacles containing battery fluid. Completed packagings must conform to Packing Group III requirements. Not more than 12 inner receptacles may be packed in one outer box. The maximum authorized gross weight is 34 kg (75 pounds).

#### **§173.160 Bombs, smoke, non-explosive (corrosive).**

Bombs, smoke, non-explosive may be shipped provided they are without ignition elements, bursting charges, detonating fuses or other explosive components. They must be packaged in wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes, or plywood drums (1D), which meet Packing Group II requirements.

#### **§173.161 Chemical kits.**

(a) Except as otherwise provided, chemical kits must be packed, marked, and labeled as prescribed by this subchapter for the specific corrosive materials contained therein.

(b) Chemical kits containing limited quantities of corrosive liquids in inner receptacles of not over 177 ml (6 fluid ounces) capacity each are excepted

from labeling (except when offered for transportation or transported by air) and the specification packaging requirements of this subchapter if all of the following requirements are met:

- (1) The kit may contain only corrosive liquids for which packaging exceptions are provided in the §172.101 Table.
- (2) This kit must be a strong wooden or metal outer packaging, or must be packed in a strong wooden or metal packaging.
- (3) The corrosive liquids must be cushioned with sufficient absorbent material to completely absorb the contents of the individual containers, and must be protected from damage by other materials in the kit.
- (4) The contents of the kit must be of a nature and packed so there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

In addition, chemical kits meeting these requirements are not subject to Subpart F of Part 172 of this subchapter (Placarding), to Part 174 (Carriage by rail) of this subchapter except §174.24 (Shipping papers), and to Part 177 (Carriage by highway) of this subchapter except §177.817 (Shipping papers).

(c) Except as provided in paragraph (b) of this section, chemical kits must be packed in 4G fiberboard boxes with inner glass receptacles of not over 1 L (0.3 gallon) capacity each, securely cushioned and separated from other inside containers. The contents of the kit must be of such a nature and so packed that there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

#### **§173.162 Gallium.**

Gallium metal must be packaged in packagings intended to contain liquids consisting of semi-rigid plastic inner packagings of not more than 2.5 kg (5.5 pounds) net capacity each, individually enclosed in a sealed leak-tight bag of strong puncture-resistant material. The sealed bags must be packed in wooden (4C1, 4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G) or plastic (4H1, 4H2) boxes or in fiber (1G) or steel (1A2) drums, which are lined with leaktight, puncture-resistant material. Bags and liner material must be chemically resistant to gallium. In order to maintain the gallium in a completely solid state, the above packaging may be overpacked in a strong, water-resistant outer packaging which contains dry ice or other means of refrigeration. If a refrigerant is used, all of the above materials used in the packaging of gallium must be chemically and physically resistant to the refrigerant and must have impact resistance at the low temperatures of the refrigerant employed. If dry ice is used, the outer packaging must permit the release of carbon dioxide gas. Completed packaging must meet Packing Group I requirements for transportation by aircraft and Packing Group III requirements for transportation by vessel. Manufactured articles or apparatuses, each containing not more than 100 mg (0.0035 ounce) of gallium and packaged so that the quantity of gallium per package does not exceed 1 g (0.35 ounce) are not subject to the requirements of this subchapter.

#### **§173.163 Hydrogen fluoride.**

Hydrogen fluoride (hydrofluoric acid, anhydrous) must be offered for transportation or transported in Specification 3, 3A, 3AA, 3B, 3BN, 3C, 3E, 4, 4A, 25, or 38 cylinders; or Specification 4B, 4BA, 4BW or 4C cylinders, if they are not brazed. Filling density must not exceed 85 percent of the water weight capacity of the cylinder. Cylinders used exclusively in this service may, in lieu of the periodic hydrostatic retest required by §173.34(e), be given a complete external visual inspection as described in CGA Pamphlet C-6, at the time such periodic retest becomes due. Such inspections shall be made on cylinders cleaned to bare metal. The results shall be recorded on a data sheet, completed copies of which shall be kept as prescribed in §173.34(e)(8). Items which must be checked and recorded on these data sheets are: Date of inspection (month and year); DOT specification number; cylinder identification (registered symbol and serial number, date of manufacture, and if needed for adequate identification, ownership symbol); tare weight; physical condition (record specifically any leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged footing or protective ring or fire damage); disposition of cylinders (returned to service, to cylinder manufacturer for repairs, or scrapped). A cylinder which passes the inspection prescribed must have the data recorded in the manner presently prescribed for the recording of the retest date except that an "E" is to follow the date (month and year) indicating requalification by the external inspection method. Cylinders removed from this service for any reason must be rendered unfit for any other regulated service.

#### **§173.164 Mercury (metallic and articles containing mercury).**

(a) For transportation by aircraft, mercury must be packaged in packagings which meet the requirements of Part 178 of this subchapter at the Packing Group I performance level, as follows:

- (1) Earthenware or glass or suitable plastic inner packagings of not more than 3.5 kg (7.7 pounds) capacity each, packed in steel drums (1A2), steel

jerricans (3A2), wooden (4C1, 4C2), plywood (4D), fiberboard (4G), reconstituted wood (4F) or solid plastic (4H2) boxes, plywood drums (1D) or fiber drums (1G) with sufficient cushioning material to prevent breakage. Either the inner packagings or the outer packagings must have inner linings or bags of strong leakproof and puncture-resistant material impervious to mercury, completely surrounding the contents, which will prevent the escape of mercury from the package irrespective of its position.

(2) Iron or steel "quicksilver flasks of not more than 3.5 kg (7.7 pounds) capacity each" packaged in steel drums (1A2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D), fiberboard (4G), reconstituted wood (4F) or solid plastic (4H2) boxes, plywood drums (1D) or fiber drums (1G) with leakproof linings as in paragraph (a)(1) of this section.

(3) Welded steel bottles with inner vaulted bottoms as single packagings. The closure must be a bolt with a conical thread, and the opening must not exceed 20 mm (0.79 inches). The maximum net mass must not exceed 35 kg (77 pounds).

(b) Manufactured articles or apparatuses, each containing not more than 100 mg (0.0035 ounce) of mercury and packaged so that the quantity of mercury per package does not exceed 1 g (0.035 ounce) are not subject to the requirements of this subchapter.

(c) Manufactured articles or apparatuses containing not more than 100 mg (0.0035 ounce) mercury are excepted from the specification packaging requirements of this subchapter when packaged as follows:

(1) Manufactured articles or apparatuses of which metallic mercury is a component part, such as manometers, pumps, thermometers, switches, etc. (for electron tubes, mercury vapor tubes and similar tubes, see paragraph (c)(3) of this section), must be in strong outer packagings, having sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position. Mercury switches and relays are excepted from these packaging requirements, if they are totally enclosed, leakproof and in sealed metal or plastic units.

(2) Thermometers, switches and relays, each containing a total quantity of not more than 15 g (0.53 ounces) of mercury, are excepted from the requirements of this subchapter if installed as an integral part of a machine or apparatus and so fitted that shock of impact damage, leading to leakage of mercury, is unlikely to occur under conditions normally incident to transport.

(3) Electron tubes, mercury vapor tubes and similar tubes must be packaged as follows:

(i) Tubes which are packed in strong outer packagings with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the package, are authorized up to a total net quantity of 450 g (15.9 ounces) of mercury per package;

(ii) Tubes with more than 450 g (15.9 ounces) of mercury are authorized only when packed in strong outer packagings, having sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury which will prevent escape of mercury from the package irrespective of its position;

(iii) Tubes which do not contain more than 5 g (0.2 ounce) of mercury each and which are packed in the manufacturer's original packagings, are authorized up to a total net quantity of 30 g (1.1 ounces) of mercury per package;

(iv) Tubes which are completely jacketed in sealed leakproof metal cases are authorized in the manufacturer's original packagings.

(4) A person offering for transportation electron tubes, mercury vapor tubes, and similar tubes shall indicate the quantity of mercury therein on the shipping paper.

(5) Mercurial barometers conforming to paragraph (c)(1) of this section, which are loaded and unloaded from an aircraft under the supervision of, and accompanied in flight by, a National Weather Service official or similar United States agency official, are excepted from any other requirements of this subchapter.

(d) For transportation by other than aircraft, mercury must be packaged —

(1) In any packaging which meets the requirements of Part 178 of this subchapter at the Packing Group III performance level; or

(2) In non-specification reusable metal packagings.

(e) Except for a hazardous substance or a hazardous waste or for transportation by aircraft or vessel, packages containing less than 0.45 kg (1.0 pound) net weight of mercury are not subject to the requirements of this subchapter.

#### **§173.166 Air bag inflators, air bag modules and seat-belt pretensioners.**

(a) *Definitions.* An air bag inflator (consisting of a casing containing an igniter, a booster material and a gas generant) is a gas generator used to inflate an air

bag in a supplemental restraint system in a motor vehicle. An air bag module is the air bag inflator plus an inflatable bag assembly. A seat-belt pre-tensioner contains similar hazardous materials and is used in the operation of a seat-belt restraining system in a motor vehicle.

(b) *Classification.* An air bag inflator, air bag module, or seat-belt pre-tensioner may be classed as Class 9 only if it meets the following requirements —

(1) The manufacturer has submitted each design type air bag inflator or seat-belt pre-tensioner to the a person approved by the Associate Administrator for Hazardous Materials Safety for examination and testing. The submission must contain a detailed description of the inflator or pre-tensioner (or, if more than a single inflator or pre-tensioner is involved, the maximum parameters of each particular inflator or pre-tensioner design type for which approval is sought) and details on the complete package.

(2) Samples of the inflator or pre-tensioner, packaged as for transport, have been subjected to test series 6(c) of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, second revised edition, 1995 with no explosion of the device, no fragmentation of device casings, and no projection hazard or thermal effect which would significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity.

(3) The manufacturer submits an application, including —

(i) The test results and report recommending the shipping description and classification for each device or design type; or

(ii) An approved classification issued by the competent authority of a foreign government, to the Associate Administrator for Hazardous Materials Safety, and is notified in writing by the Associate Administrator that the device has been classed as Class 9 and approved for transportation.

(4) No approval applications are required for air bag modules containing an approved air bag inflator.

(5) Air bag inflators or seat belt pre-tensioners previously reclassified from Class 1 to Division 4.1 under the terms of an exemption may be reclassified as Class 9 materials without further testing.

(c) *EX numbers.* When offered for transportation, the shipping paper must contain the EX number or product code for each approved inflator or pre-tensioner in association with the basic description required by §172.202(a) of this subchapter. Product codes must be traceable to the specific EX number assigned to the inflator or pre-tensioner by the Associate Administrator for Hazardous Materials Safety. A module must be identified with the same EX number or product code of the approved inflator.

(d) *Exceptions.*

(1) An air bag module or seat-belt pretensioner that has been approved by the Associate Administrator for Hazardous Materials Safety and is installed in a motor vehicle or in completed vehicle components, such as steering columns or door panels, is not subject to the requirements of this subchapter.

(2) An air bag module, containing an inflator that has been previously been examined and approved for transportation as a Division 4.1 material, is not required to be submitted for examination or approval.

(e) *Packagings.* The following packagings are authorized:

(1) 1A2, 1B2, 1G or 1H2 drums.

(2) 3A2 or 3H2 jerricans.

(3) 4C1, 4C2, 4D, 4F, 4G or 4H2 boxes.

(4) Reusable high strength plastic or metal containers or dedicated handling devices are authorized for shipment of air bag inflators, air bag modules, and seat-belt pretensioners from a manufacturing facility to the assembly facility, subject to the following conditions:

(i) The gross weight of the container or handling device may not exceed 1000 kg (2205 pounds). The container or handling device structure must provide adequate support to allow them to be stacked at least three high with no damage to the containers or devices.

(ii) If not completely enclosed by design, the container or handling device must be covered with plastic, fiberboard, or metal. The covering must be secured to the container by banding or other comparable methods.

(iii) Internal dunnage must be sufficient to prevent movement of the devices within the container.

(f) *Labeling.* Notwithstanding the provisions of §172.402 of this subchapter, each package or handling device must display a CLASS 9 label. Additional labeling is not required when the package contains no hazardous materials other than the devices.

#### **§173.170 Black powder for small arms.**

Black powder for small arms that has been classed in Division 1.1 may be reclassified as a Division 4.1 material, for domestic transportation by motor vehicle, rail freight, and cargo vessel only, subject to the following conditions:

(a) The powder must be examined and approved for Division 1.1 and Division 4.1 classification in accordance with Secs. 173.56 and 173.58;

(b) The total quantity of black powder in one motor vehicle, rail car, or freight container may not exceed 45.4 kg (100 pounds) net mass, and no more than four freight containers may be on board one cargo vessel;

(c) The black powder must be packed in inner metal or heavy wall conductive plastic receptacles not over 454 g (16 ounces) net capacity each, with no more than 25 cans in one outer UN 4G fiberboard box. The inner packagings must be arranged and protected so as to prevent simultaneous ignition of the contents. The complete package must be of the same type which has been examined as required in §173.56;

(d) Each completed package must be marked “BLACK POWDER FOR SMALL ARMS” and “NA 0027”; and

(e) Each package must bear the FLAMMABLE SOLID label.

#### **§173.171 Smokeless powder for small arms.**

Smokeless powder for small arms which has been classed in Division 1.3 may be reclassified in Division 4.1, for transportation by motor vehicle, rail car, vessel, or cargo-only aircraft, subject to the following conditions:

(a) The powder must be examined and approved for a Division 1.3 and Division 4.1 classification in accordance with §§173.56 and 173.58 of this part.

(b) The total quantity of smokeless powder may not exceed 45.4 kg (100 pounds) net mass in:

- (1) One rail car, motor vehicle, or cargo-only aircraft; or
- (2) One freight container on a vessel, not to exceed four freight containers per vessel.

(c) Only combination packagings with inner packagings not exceeding 3.6 kg (8 pounds) net mass are authorized. Inner packagings must be arranged and protected so as to prevent simultaneous ignition of the contents. The complete package must be of the same type which has been examined as required in §173.56 of this part.

(d) Inside packages that have been examined and approved by the Associate Administrator for Hazardous Materials Safety may be packaged in UN 4G fiberboard boxes meeting the Packing Group I performance level, provided all inside containers are packed to prevent movement and the net weight of smokeless powder in any one box does not exceed 7.3 kg (16 pounds).

#### **§173.172 Aircraft hydraulic power unit fuel tank.**

Aircraft hydraulic power unit fuel tanks containing a mixture of anhydrous hydrazine and monomethyl hydrazine (M86 fuel) and designed for installation as complete units in aircraft are excepted from the specification packaging requirements of this subchapter when they conform to either of the following conditions:

(a) The unit must consist of an aluminum pressure vessel made from tubing and having welded heads. Primary containment of the fuel within this vessel must consist of a welded aluminum bladder having a maximum internal volume of 46 L (12 gallons). The outer vessel must have a minimum design gauge pressure of 1,275 kPa (185 psi) and a minimum burst gauge pressure of 2,755 kPa (400 psi). Each vessel must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 L (11 gallons); or

(b) The unit must consist of an aluminum pressure vessel. Primary containment of the fuel within this vessel must consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 L (12 gallons). The pressure vessel must have a minimum design gauge pressure of 5,170 kPa (750 psi). Each vessel must be leak-checked during manufacture and before shipment and must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 L (11 gallons).

#### **§173.173 Paint, paint-related material, adhesives, ink and resins.**

(a) When the §172.101 Table specifies that a hazardous material be packaged under this section, the following requirements apply. Except as otherwise

provided in this part, the description “Paint” is the proper shipping name for paint, lacquer, enamel, stain, shellac, varnish, liquid aluminum, liquid bronze, liquid gold, liquid wood filler, and liquid lacquer base. The description “Paint-related material” is the proper shipping name for a paint thinning, drying, reducing or removing compound. However, if a more specific description is listed in the §172.101 Table of this subchapter, that description must be used.

(b) Paint, paint-related material, adhesives, ink and resins must be packaged as follows:

(1) As prescribed in §173.202 of this part if it is a Packing Group II material or §173.203 of this part if it is a Packing Group III material; or

(2) In inner glass packagings of not over 1 L (0.3 gallon) capacity each or inner metal packagings of not over 5 L (1 gallon) each, packed in a strong outer packaging. Packages must conform to the packaging requirements of Subpart B of this part but need not conform to the requirements of Part 179 of this subchapter.

#### **§173.174 Refrigerating machines.**

A refrigerating machine assembled for shipment and containing 7 kg (15 pounds) or less of a flammable liquid for its operation in a strong, tight receptacle is excepted from labeling (except when offered for transportation or transported by air) and the specification packaging requirements of this subchapter. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter (Placarding), to Part 174 of this subchapter (Carriage by rail) except §174.24 (Shipping papers) and to Part 177 (Carriage by highway) of this subchapter except §177.817 (Shipping papers).

#### **§173.181 Pyrophoric materials (liquids).**

When the §172.101 Table specifies that a hazardous material be packaged under this section, only the following non-bulk packagings are authorized:

(a) Specification steel or nickel cylinders prescribed for any compressed gas except acetylene having a minimum design pressure of 1206 kPa (175 psi). Cylinders with valves must be:

- (1) Equipped with steel valve protection caps or collars, unless overpacked; or
- (2) Overpacked in a wooden box (4C1, 4C2, 4D or 4F); fiberboard box (4G), or plastic box (4H1 or 4H2). Cylinders must be secured to prevent movement in the box and, when offered for transportation or transported, must be so loaded that pressure relief devices remain in the vapor space of the cylinder. (See §173.34(d)(7), 174.430 and 177.338(h) of this subchapter.)

(b) Wooden boxes (4C1, 4C2, 4D, or 4F) or fiberboard boxes (4G) enclosing not more than four strong, tight metal cans with inner receptacles of glass or metal, not over 1 L (0.3 gallon) capacity each, having positive screwcap closures adequately gasketed. Inner packagings must be cushioned on all sides with dry, absorbent, incombustible material in a quantity sufficient to absorb the entire contents. The strong, tight metal cans must be closed by positive means, not by friction.

(c) Steel drums (1A2) or fiber drums (1G) not exceeding 220 L (58 gallons) capacity each with strong tight inner metal cans not over 4.0 L (1 gallon capacity each, closed by positive means, not friction.

(1) Inner packagings must have no opening exceeding 25 mm (1 inch) diameter and must be surrounded with noncombustible cushioning material.

(2) Net quantity of pyrophoric liquids may not exceed two-thirds of the rated capacity of the outer drum. For example, a 220 L (58 gallons) outer drum may contain no more than 147 L (39 gallons) of pyrophoric liquids.

(3) Each layer of inner containers must be separated by a metal plate separator in addition to cushioning material.

#### **§173.182 Barium azide—50 percent or more water wet.**

Barium azide—50 percent or more water wet, must be packed in wooden boxes (4C1, 4C2, 4D, or 4F) or fiber drums (1G) with inner glass packagings not over 0.5 kg (1.1 pounds) capacity each. Packagings must have rubber stoppers wire tied for securement. If transportation is to take place when and where freezing weather is possible, a suitable antifreeze solution must be used to prevent freezing. Each packaging must conform to the requirements of Part 178 of this subchapter at the Packing Group I performance level.

#### **§173.183 Nitrocellulose base film.**

Films, nitrocellulose base, must be packaged in packagings conforming to the requirements of Part 178 of this subchapter at the Packing Group III performance level, as follows:

(a) In steel drums (1A2), aluminum drums (1B2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes or plywood drums

(1D) with each reel in a tightly closed metal can, polypropylene canister, or strong cardboard or fiberboard inner packaging with cover held in place by adhesive tape or paper; or

(b) In fiberboard (4G) boxes or fiber drums (1G) with a single tightly closed metal can, polypropylene canister, or strong cardboard or fiberboard inner packaging with cover held in place by adhesive tape or paper; authorized only for not over 600 m (1969 feet) of film.

#### **§173.184 Highway or rail fusee.**

(a) A fusee is a device designed to burn at a controlled rate and to produce visual effects for signaling purposes. The composition of the fusee must be such that the fusee will not ignite spontaneously or undergo marked decomposition when subjected to a temperature of 75°C (167°F) for 48 consecutive hours.

(b) Fusees (highway and railway) must be packaged in steel drums (1A2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D) or reconstituted wood (4F) boxes or in fiberboard boxes (4G), plywood (1D) or fiber (1G) drums. If the fusees are equipped with spikes packaging must have reinforced ends to prevent penetration of spikes through the outer packaging; packages must be capable of passing drop test requirements (§178.603 of this subchapter), including at least one drop with spike in a downward position, and other requirements of Part 178 of this subchapter, at the Packing Group II performance level.

#### **§173.185 Lithium batteries and cells.**

(a) Except as otherwise provided in this subpart, a lithium cell or battery is authorized for transportation only if it conforms to the provisions of this section.

(b) *Exceptions.* Cells and batteries are not subject to the requirements of this subchapter if they meet the following requirements:

(1) Each cell with a liquid cathode may contain no more than 0.5 g of lithium or lithium alloy, and each cell with a solid cathode may contain no more than 1.0 g lithium or lithium alloy;

(2) Each battery with a liquid cathode may contain an aggregate quantity of no more than 1.0 g lithium or lithium alloy, and each battery with a solid cathode may contain an aggregate quantity of no more than 2.0 g of lithium or lithium alloy;

(3) Each cell or battery containing a liquid cathode must be hermetically sealed;

(4) Cells and batteries must be packed in such a way so as to prevent short circuits and must be packed in strong packaging, except when installed in equipment; and

(5) If a liquid cathode battery contains more than 0.5 g of lithium or lithium alloy or a solid cathode battery contains more than 1.0 g lithium or lithium alloy, it may not contain a liquid or gas that is a hazardous material according to this subchapter unless the liquid or gas, if free, would be completely absorbed or neutralized by other materials in the battery.

(c) Cells and batteries also are not subject to this subchapter if they meet the following requirements:

(1) Each cell contains not more than 5 g of lithium or lithium alloy;

(2) Each battery contains not more than 25 g of lithium or lithium alloy;

(3) Each cell or battery is of the type proven to be non-dangerous by testing in accordance with tests in the UN Manual of Tests and Criteria, such testing must be carried out on each type prior to the initial transport of that type; and

(4) Cells and batteries are designed or packed in such a way as to prevent short circuits under conditions normally encountered in transportation.

(d) Cells and batteries and equipment containing cells and batteries which were first transported prior to January 1, 1995, and were assigned to Class 9 on the basis of the requirements of this subchapter in effect on October 1, 1993, may continue to be transported in accordance with the applicable requirements in effect on October 1, 1993.

(e) Cells and batteries may be transported as items of Class 9 if they meet the requirements in paragraphs (e)(1) through (e)(9) of this section:

(1) Cells must not contain more than 12 g of lithium or lithium alloy.

(2) Batteries must not contain more than 500 g of lithium or lithium alloy.

(3) Each cell and battery must be equipped with an effective means of preventing external short circuits.

(4) Each cell and battery must incorporate a safety venting device or be designed in a manner that will preclude a violent rupture under conditions normally incident to transportation.

(5) Batteries containing cells or series of cells connected in parallel must be equipped with diodes to prevent reverse current flow.

(6) Cells and batteries must be packed in strong inner packaging containing not more than 500 g of lithium or lithium alloy per inner packaging.

(7) Cells and batteries must be packed in inner packaging in such a manner as to effectively prevent short circuits and to prevent movement which could lead to short circuits.

(8) Cells and batteries must be packaged in packaging conforming to the requirements of part 178 of this subchapter at the Packing Group II performance level: Inner packaging must be packed within metal boxes (4A or 4B), wooden boxes (4C1, 4C2, 4D, or 4F), fiberboard boxes (4G), solid plastic boxes (4H2), fiber drums (1G), metal drums (1A2 or 1B2), plywood drums (1D), plastic jerricans (3H2), or metal jerricans (3A2 or 3B2).

(9) Each cell or battery must be of the type proven to meet the criteria of Class 9 by testing in accordance with tests in the UN Manual of Tests and Criteria.

(10) Except as provided in paragraph (h) of this section, cells or batteries may not be offered for transportation or transported if any cell has been discharged to the extent that the open circuit voltage is less than two volts or is less than 2/3 of the voltage of the fully charged cell, whichever is less.

(f) Equipment containing or packed with cells and batteries meeting the requirements of paragraph (b) or (c) of this section is excepted from all other requirements of this subchapter.

(g) Equipment containing or packed with cells and batteries may be transported as items of Class 9 if the batteries and cells meet all the requirements of paragraph (e) of this section and are packaged as follows:

(1) Equipment containing cells and batteries must be packed in a strong outer packaging that is waterproof or is made waterproof through the use of a liner unless the equipment is made waterproof by nature of its construction. The equipment must be secured within the outer packaging and be packed as to effectively prevent movement, short circuits, and accidental operation during transport; and

(2) Cells and batteries packed with equipment must be packed in inner packaging conforming to paragraph (e)(8) of this section in such a manner as to effectively prevent movement and short circuits. The quantity of lithium contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery. Not more than 5 kg of cells and batteries may be packed with each item of equipment.

(h) Cells and batteries, for disposal, may be offered for transportation or transported to a permitted storage facility and disposal site by motor vehicle when they meet the following requirements:

(1) Cells, when new, may not contain more than 12 g and batteries may not contain more than 500 g of lithium or lithium alloy;

(2) Be equipped with an effective means of preventing external short circuits; and

(3) Be packed in a strong outer packaging conforming to the requirements of §§173.24 and 173.24a. The packaging need not conform to performance requirements of part 178 of this subchapter.

(i) Cells and batteries and equipment containing or packed with cells and batteries which do not comply with the provisions of this section may be transported only if they are approved by the Associate Administrator for Hazardous Materials Safety.

(j) For testing purposes, when not contained in equipment, cells containing not more than 12 g of lithium or lithium alloy and batteries containing not more than 500 g of lithium or lithium alloy may be offered for transportation or transported by highway only as items of Class 9. Packaging must conform with paragraph (e)(8) of this section with not more than 100 cells per package.

#### **§173.186 Matches.**

(a) Matches must be of a type which will not ignite spontaneously or undergo marked decomposition when subjected for 8 consecutive hours to a temperature of 93°C (200°F).

(b) *Definitions.*

(1) "Fusee matches" are matches the heads of which are prepared with a friction-sensitive igniter composition and a pyrotechnic composition which burns with little or no flame, but with intense heat.

(2) *Safety matches* are matches combined with or attached to the box, book or card that can be ignited by friction only on a prepared surface.

(3) *Strike anywhere* matches are matches that can be ignited by friction on a solid surface.

(4) *Wax "Vesta" matches* are matches that can be ignited by friction either on a prepared surface or on a solid surface.

(c) Safety matches and wax 'Vesta' matches must be tightly packed in securely closed inner packagings to prevent accidental ignition under conditions normally incident to transportation, and further packed in outer fiberboard, wooden, or other equivalent-type packagings. These matches in outer packagings not exceeding 23 kg (50 pounds) gross weight are not subject to any other requirement (except marking) of this subchapter. These matches may be packed in the same outer packaging with materials not subject to this subchapter.

(d) Strike-anywhere matches may not be packed in the same outer packaging with any material other than safety matches or wax 'Vesta' matches, which must be packed in separate inner packagings.

(e) *Packagings.* Strike-anywhere matches must be tightly packed in securely closed chipboard, fiberboard, wooden, or metal inner packagings to prevent accidental ignition under conditions normally incident to transportation. Each inner packaging may contain no more than 700 strike-anywhere matches and must be packed in outer steel drums (1A2), aluminum drums (1B2), steel jerricans (3A2), wooden (4C1, 4C2), plywood (4D), reconstituted wood (4F) or fiberboard (4G) boxes, plywood (1D) or fiber (1G) drums. Gross weight of fiberboard boxes (4G) must not exceed 27 kg (60 pounds). Gross weight of other outer packagings must not exceed 45 kg (100 pounds).

#### **§173.187 Pyrophoric solids, metals or alloys, n.o.s.**

Packagings for pyrophoric solids, metals, or alloys, n.o.s. must conform to the requirements of Part 178 of this subchapter at the packing group performance level specified in the §172.101 Table. These materials must be packaged as follows:

(a) In wooden boxes (4C1, 4C2, 4D, or 4F) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 15 kg (33 pounds) each.

(b) In steel drums (1A1 or 1A2) with a gross mass not exceeding 150 kg (331 pounds) per drum.

(c) In fiberboard boxes (4G) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 7.5 kg (17 pounds) each.

(d) In fiber drums (1G) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 15 kg (33 pounds) each.

(e) In plywood drums (1D) with inner metal receptacles which have a positive (not friction) means of closure and contain not more than 15 kg (33 pounds) each.

#### **§173.188 White or yellow phosphorus.**

Phosphorus, white or yellow, when offered for transportation or transported by rail, highway, or water, must be packaged in water or dry in packagings conforming to the requirements of Part 178 of this subchapter at the Packing Group I performance level, as follows:

(a) When placed in water, it must be packaged in specification packagings as follows:

(1) Wooden boxes (4C1, 4C2, 4D, or 4F) with:

(i) inner hermetically sealed (soldered) metal cans, enclosed in other hermetically sealed (soldered) metal cans, or

(ii) inner water-tight metal cans containing not over 0.5 kg (1 pound) of phosphorus with screw-top closures; or

(2) Steel drums (1A1) not over 250 L (66 gallons) capacity each or steel drums (1A2) not over 115 L (30 gallons) capacity each.

(b) When dry, it must be cast solid and shipped in packagings as follows:

(1) Steel drums (1A2) not over 115 L (30 gallons) capacity each, or

(2) In projectiles or bombs when shipped by, for, or to the Departments of the Army, Navy, or Air Force of the United States Government, without bursting elements.

#### **§173.189 Batteries containing sodium or cells containing sodium.**

(a) Batteries and cells may not contain any hazardous material other than sodium, sulfur or polysulfides. Cells not forming a component of a completed battery may not be offered for transportation at a temperature at which any liquid sodium is present in the cell. Batteries may only be offered for transportation, or transported, at a temperature at which any liquid sodium present in the battery conforms to the conditions prescribed in paragraph (d) of this section.

(b) Cells must consist of hermetically sealed metal casings which fully enclose the hazardous materials and which are so constructed and closed as to prevent

the release of the hazardous materials under normal conditions of transport. Cells must be placed in suitable outer packagings with sufficient cushioning material to prevent contact between cells and between cells and the internal surfaces of the outer packaging, and to ensure that no dangerous movement of the cells within the outer packaging occurs in transport. Cells must be packaged in 1A2, 1B2, 1D, 1G, 1H2, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packagings which meet the requirements of part 178 of this subchapter at the Packing Group II performance level.

(c) Batteries must consist of cells secured within, and fully enclosed by a metal casing so constructed and closed as to prevent the release of the hazardous materials under normal conditions of transport. Batteries may be offered for transportation, and transported, unpacked or in protective packagings that are not subject to the requirements of part 178 of this subchapter.

(d) Batteries containing any liquid sodium may not be offered for transportation, or transported, by aircraft. Batteries containing liquid sodium may be transported by motor vehicle, rail car or vessel under the following conditions:

(1) Batteries must be equipped with an effective means of preventing external short circuits, such as by providing complete electrical insulation of battery terminals or other external electrical connectors. Battery terminals or other electrical connectors penetrating the heat insulation fitted in battery casings must be provided with thermal insulation sufficient to prevent the temperature of the exposed surfaces of such devices from exceeding 55°C (130°F).

(2) No battery may be offered for transportation if the temperature at any point on the external surface of the battery exceeds 55°C (130°F).

(3) If any external source of heating is used during transportation to maintain sodium in batteries in a molten state, means must be provided to ensure that the internal temperature of the battery does not reach or exceed 400°C (752°F).

(4) When loaded in a transport vehicle or freight container:

(i) Batteries must be secured so as to prevent significant movement within the transport vehicle or freight container under conditions normally incident to transportation;

(ii) Adequate ventilation and/or separation between batteries must be provided to ensure that the temperature at any point on the external surface of the battery casing will not exceed 240°C (464°F) during transportation; and

(iii) No other hazardous materials, with the exception of cells containing sodium, may be loaded in the same transport vehicle or freight container. Batteries must be separated from all other freight by a distance of not less than 0.5 meters (1.6 feet).

(e) Batteries containing sodium or cells containing sodium, when installed as part of a motor vehicle, are not subject to the requirements of this subchapter.

#### **§173.192 Packaging for certain Packing Group I poisonous materials.**

When §172.101 of this subchapter specifies that a poisonous material be packaged under this section, only specification cylinders are authorized, as follows:

(a) Specification 3A1800, 3AA1800, 3AL1800, 3D, 3E1800, or 33 cylinders, under the following conditions:

(1) Specification 3A, 3AA and 3AL cylinders may not exceed 57 kg (125 pounds) water capacity (nominal).

(2) Specification 3D and 33 cylinders may not exceed 57 kg (125 pounds) water capacity (nominal).

(3) Specification 3AL cylinders containing arsine or phosphine may only be offered for transportation or transported by highway and rail.

(b) Packagings must conform to the requirements of §173.40 of this part.

(c) For cylinders used for phosgene,

(1) The filling density may not exceed 125 percent;

(2) A cylinder may not contain more than 68 kg (150 pounds) of phosgene; and

(3) Each filled cylinder must be tested for leakage before it is offered for transportation or transported and must show absolutely no leakage; this test must consist of immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 66°C (150°F) for at least 30 minutes, during which time frequent examinations must be made to note any escape of gas. The valve of the cylinder must not be loosened after this test and before the cylinder is offered for transportation or transported.

#### **§173.193 Bromoacetone, methyl bromide, chloropicrin and methyl bromide or methyl chloride mixtures, etc.**

(a) Bromoacetone must be packaged as follows in wooden boxes (4C1, 4C2, 4D or 4F) with inner glass receptacles or tubes in hermetically sealed metal receptacles in corrugated fiberboard cartons. Bottles may not contain over 500 g (17.6 ounces) of liquid each and must be cushioned in cans with at least

12.7 mm (0.5 inch) of absorbent material. Total amount of liquid in the outer box must not exceed 11 kg (24 pounds). Packagings must conform to the requirements of Part 178 of this subchapter at the Packing Group I performance level.

(b) Bromoacetone, methyl bromide, chloropicrin and methyl bromide mixtures, chloropicrin and methyl chloride mixtures, and chloropicrin mixtures charged with non-flammable, non-liquefied compressed gas must be packed in Specification 3A, 3AA, 3B, 3C, 3E, 4A, 4B, 4BA, 4BW, or 4C cylinders having not over 113 kg (250 pounds) water capacity (nominal). This capacity does not apply to shipments of methyl bromide.

(c) Methyl bromide mixtures containing up to 2% chloropicrin must be packaged in 4G fiberboard boxes with inside metal cans containing not over one pound each, or inside metal cans with a minimum wall thickness of 0.007 inch containing not over 1-3/4 pounds each. The one-pound can must be capable of withstanding an internal pressure of 130 psig without leakage or permanent distortion. Vapor pressure of the contents must not exceed 130 psig at 55°C (130°F). The 1-3/4-pound can must be capable of withstanding an internal pressure of 140 psig without leakage or permanent distortion. Vapor pressure of the contents must not exceed 140 psig at 55°C (130°F). Cans must not be liquid full at 130°F. Cans must be constructed of tinplate or lined with suitable material and must have concave or pressure ends.

(d) Cylinders, except those containing methyl bromide, must conform to §173.40 of this part.

#### §173.194 Gas identification sets.

Gas identification sets containing poisonous material must be packaged in packagings conforming to the requirements of Part 178 of this subchapter at the Packing Group I performance level as follows:

(a) In glass inner receptacles, hermetically sealed, of not over 40 ml (1.4 fluid ounces) each. Each glass inner receptacle must in turn be placed in a sealed fiberboard receptacle, cushioned with absorbent material. Not more than 12 fiberboard receptacles must in turn be placed in a 4G fiberboard box. No more than four boxes, well-cushioned, may in turn be placed in a steel cylinder. The cylinder must have a wall thickness of at least 3.7 mm (0.146 inch) and must have a hermetically sealed steel closure.

(b) When the poisonous material is absorbed in a medium such as activated charcoal or silica gel, gas identification sets may be shipped as follows:

(1) If the poisonous material does not exceed 5 ml (0.2 fluid ounce) if a liquid or 5 g (0.2 ounce) if a solid, it may be packed in glass inner receptacles of not over 120 ml (4.1 fluid ounces) each. Each glass receptacle, cushioned with absorbent material must be packed in a hermetically sealed metal can of not less than 0.30 mm (0.012 inch) wall thickness. Metal cans, surrounded on all sides by at least 25 mm (1 inch) of dry sawdust, must be packed in 4C1, 4C2, 4D or 4F wooden boxes. Not more than 100 ml (3.4 fluid ounces) or 100 g (3.5 ounces) of poisonous materials may be packed in one outer wooden box.

(2) If the poisonous material does not exceed 5 ml (0.2 fluid ounce) if a liquid or 20 g (0.7 ounce) if a solid, it may be packed in glass inner receptacles with screw-top closures of not less than 60 ml (2 ounces), hermetically sealed. Twelve bottles containing poisonous material, not to exceed 100 ml (3.4 ounces) or 100 g (3.5 ounces), or both, may be placed in a plastic carrying case, each glass receptacle surrounded by absorbent cushioning and each separated from the other by sponge rubber partitions. The plastic carrying case must be placed in a tightly fitting fiberboard box which in turn must be placed in a tightly fitting 4C1, 4C2, 4D or 4F wooden box.

#### §173.195 Hydrogen cyanide, anhydrous, stabilized (hydrocyanic acid, aqueous solution).

(a) Hydrogen cyanide, anhydrous, stabilized, must be packed in specification cylinders as follows:

(1) As prescribed in §173.192, or  
(2) Specification 3A480, 3A480X, 3AA480, or 3A1800 metal cylinders of not over 126 kg (278 pounds) water capacity (nominal). Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(b) Cylinders may not be charged with more than 0.27 kg (0.6 pound) of liquid per 0.45 kg (1 pound) water capacity of cylinder. Each filled cylinder must be tested for leakage before being offered for transportation or transported and must show absolutely no leakage; this test must consist of passing a piece of Guignard's sodium picrate paper over the closure of the cylinder, without the protection cap attached, to detect any escape of hydrogen cyanide from the

cylinder. Other equally efficient test methods may be used in place of sodium picrate paper.

(c) Packagings for hydrogen cyanide must conform to §173.40.

#### §173.196 Infectious substances (etiologic agents).

(a) Authorized packagings and components are as follows:

- (1) Inner packagings comprising:
  - (i) A watertight primary receptacle;
  - (ii) A watertight secondary packaging; and
  - (iii) An absorbent material must be placed between the primary receptacle and the secondary packaging. If multiple-primary receptacles are placed in a single secondary packaging they must be wrapped individually to ensure that contact between them is prevented. The absorbent material, such as cotton wool, must be sufficient to absorb the entire contents of all primary receptacles.
- (2) An outer packaging must be of adequate strength for its capacity, mass and intended use.

(b) Each package for infectious substances must be capable of passing the tests specified in §178.609 of this subchapter.

(c) Packages consigned as freight must be at least 100 mm (3.9 inches) in the smallest overall external dimensions.

(d) For all packages containing infectious substances, an itemized list of contents must be enclosed between the secondary packaging and the outer packaging.

(e) Although exceptional cases, such as whole organs, may require special packaging, the great majority of infectious substances can and must be packaged according to the following guidelines.

(1) *Lyophilized substances.* Primary receptacles include flame-sealed glass ampoules or rubber-stopped glass vials fitted with metal seals.

(2) *Liquid or solid substances —*

(i) *Substances shipped at ambient temperatures or higher.* Primary receptacles include those of glass, metal or plastic. Positive means of ensuring a leakproof seal, such as heat seal, skirted stopper or metal crimp seal must be provided. If screw caps are used, they must be reinforced with adhesive tape.

(ii) *Substances shipped refrigerated or frozen (ice, pre-frozen packs, dry ice).* Ice or dry ice must be placed outside the secondary packagings. Interior supports must be provided to secure the secondary packagings in the original position after the ice or dry ice has dissipated. If ice is used, the packaging must be leakproof. If dry ice is used, the outer packaging must permit the release of carbon dioxide gas.

(iii) *Substances shipped in liquid nitrogen.* Plastic primary receptacles capable of withstanding very low temperatures must be used. Secondary packaging must also withstand very low temperatures and in most cases will need to be fitted over individual primary receptacles. Requirements for shipment of liquid nitrogen must also be observed.

(f) Whatever the intended temperature of shipment, the primary receptacle or secondary packaging used for infectious substances must be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than 95 kPa (14 psi) and temperatures in the range of -40°C to +55°C (-40°F to +131°F).

(g) The requirements of this section supplement the requirements of the Department of Health and Human Services contained in 42 CFR Part 72.

(h) *Exceptions.* The following substances are not subject to any requirements of this subchapter if the items as packaged do not contain any material otherwise subject to the requirements of this subchapter.

- (1) Diagnostic specimens.
- (2) Biological products.

#### §173.197 Regulated medical waste.

(a) Regulated medical waste must be packaged in packagings conforming to the requirements of Part 178 of this subchapter at the Packing Group II performance level. The packagings must be:

- (1) Rigid;
- (2) Leak resistant;
- (3) Impervious to moisture;
- (4) Of sufficient strength to prevent tearing or bursting under normal conditions of use and handling;
- (5) Sealed to prevent leakage during transport;
- (6) Puncture resistant for sharps and sharps with residual fluids; and
- (7) Break-resistant and tightly lidded or stoppered for fluids in quantities greater than 20 cubic centimeters.



(b) Until October 1, 1994, packages do not have to be marked or tested but must be capable of meeting the requirements in Subpart M of Part 178 of this subchapter.

#### **§173.198 Nickel carbonyl.**

(a) Nickel carbonyl must be packed in specification steel or nickel cylinders as prescribed for any compressed gas except acetylene. A cylinder used exclusively for nickel carbonyl may be given a complete external visual inspection in lieu of the interior hydrostatic pressure test required by §173.34(e). Visual inspection must be in accordance with CGA Pamphlet C-6.

(b) Packagings for nickel carbonyl must conform to §173.40.

#### **§173.201 Non-bulk packagings for liquid hazardous materials in Packing Group I.**

(a) When §172.101 of this subchapter specifies that a liquid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each packaging must conform to the general packaging requirements of Subpart B of Part 173, to the requirements of Part 178 of this subchapter at the Packing Group I performance level, and to the requirements of the special provisions of Column 7 of the §172.101 Table.

(b) The following combination packagings are authorized:

##### *Outer packagings:*

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plywood drum: 1D  
Fiber drum: 1G  
Plastic drum: 1H1 or 1H2  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Steel box: 4A  
Aluminum box: 4B  
Natural wood box: 4C1 or 4C2  
Plywood box: 4D  
Reconstituted wood box: 4F  
Fiberboard box: 4G  
Expanded plastic box: 4H1  
Solid plastic box: 4H2

##### *Inner packagings:*

Glass or earthenware receptacles  
Plastic receptacles  
Metal receptacles  
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel, or aluminum: 1N1 or 1N2  
Plastic drum: 1H1 or 1H2  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Plastic receptacle in steel, aluminum, fiber or plastic drum: 6HA1, 6HB1, 6HG1, 6HH1  
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
Glass, porcelain or stoneware in steel, aluminum or fiber drum: 6PA1, 6PB1 or 6PG1  
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
Glass, porcelain or stoneware in solid or expanded plastic packaging: 6PH1 or 6PH2  
Cylinders, specification, as prescribed for any compressed gas, except for Specifications 8 and 3HT

#### **§173.202 Non-bulk packagings for liquid hazardous materials in Packing Group II.**

(a) When §172.101 of this subchapter specifies that a liquid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each packaging must conform to the general packaging requirements of Subpart B of Part 173, to the requirements of Part 178 of this subchapter at the Packing Group I or II performance level

(unless otherwise excepted), and to the particular requirements of the special provisions of Column 7 of the §172.101 Table.

(b) The following combination packagings are authorized:

##### *Outer packagings:*

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plywood drum: 1D  
Fiber drum: 1G  
Plastic drum: 1H1 or 1H2  
Wooden barrel: 2C2  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Steel box: 4A  
Aluminum box: 4B  
Natural wood box: 4C1 or 4C2  
Plywood box: 4D  
Reconstituted wood box: 4F  
Fiberboard box: 4G  
Expanded plastic box: 4H1  
Solid plastic box: 4H2

##### *Inner packagings:*

Glass or earthenware receptacles  
Plastic receptacles  
Metal receptacles  
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plastic drum: 1H1 or 1H2  
Fiber drum: 1G (with liner)  
Wooden barrel: 2C1  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Plastic receptacle in steel, aluminum, fiber or plastic drum: 6HA1, 6HB1, 6HG1 or 6HH1  
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
Glass, porcelain or stoneware in steel, aluminum or fiber drum: 6PA1, 6PB1 or 6PG1  
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
Glass, porcelain or stoneware in solid or expanded plastic packaging: 6PH1 or 6PH2  
Plastic receptacle in plywood drum: 6HD1  
Glass, porcelain or stoneware in plywood drum or wickerwork hamper: 6PD1 or 6PD2  
Cylinders, specification, as prescribed for any compressed gas except for Specifications 8 and 3HT

#### **§173.203 Non-bulk packagings for liquid hazardous materials in Packing Group III.**

(a) When §172.101 of this subchapter specifies that a liquid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each packaging must conform to the general packaging requirements of Subpart B of Part 173, to the requirements of Part 178 of this subchapter at the Packing Group I, II or III performance level, and to the requirements of the special provisions of Column 7 of the §172.101 Table.

(b) The following combination packagings are authorized:

##### *Outer packagings:*

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plywood drum: 1D  
Fiber drum: 1G  
Plastic drum: 1H1 or 1H2  
Wooden barrel: 2C2  
Steel jerrican: 3A1 or 3A2

Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Steel box: 4A  
Aluminum box: 4B  
Natural wood box: 4C1 or 4C2  
Plywood box: 4D  
Reconstituted wood box: 4F  
Fiberboard box: 4G  
Expanded plastic box: 4H1  
Solid plastic box: 4H2

*Inner packagings:*

Glass or earthenware receptacles  
Plastic receptacles  
Metal receptacles  
Glass ampoules

(c) The following single packagings are authorized:

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1  
Plastic drum: 1H1 or 1H2  
Fiber drum: 1G (with liner)  
Wooden barrel: 2C1  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Plastic receptacle in steel, aluminum, fiber or plastic drum: 6HA1, 6HB1, 6HG1 or 6HH1  
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
Glass, porcelain or stoneware in steel, aluminum or fiber drum: 6PA1, 6PB1 or 6PG1  
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
Glass, porcelain or stoneware in solid or expanded plastic packaging: 6PH1 or 6PH2  
Plastic receptacle in plywood drum: 6HD1  
Glass, porcelain or stoneware in plywood drum or wickerwork hamper: 6PD1 or 6PD2  
Cylinders, as prescribed for any compressed gas, except for Specifications 8 and 3HT

**§173.204 Non-bulk, non-specification packagings for certain hazardous materials.**

When §172.101 of this subchapter specifies that a liquid or solid hazardous material be packaged under this section, any appropriate non-bulk packaging which conforms to the general packaging requirements of Subpart B of Part 173 may be used for its transportation. Packagings need not conform to the requirements of Part 178 of this subchapter.

**§173.205 Specification cylinders for liquid hazardous materials.**

When §172.101 of this subchapter specifies that a hazardous material be packaged under this section, any specification cylinder, except those specified for acetylene, is authorized. Cylinders used for poisonous materials (Division 6.1 or 2.3) must conform to the requirements of §173.40.

**§173.211 Non-bulk packagings for solid hazardous materials in Packing Group I.**

(a) When §172.101 of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of Subpart B of Part 173, to the requirements of Part 178 of this subchapter at the Packing Group I performance level, and to the requirements of the special provisions of Column 7 of the §172.101 Table.

(b) The following combination packagings are authorized:

*Outer packagings:*

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plywood drum: 1D  
Fiber drum: 1G  
Plastic drum: 1H1 or 1H2  
Wooden barrel: 2C2  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2

Aluminum jerrican: 3B1 or 3B2  
Steel box: 4A  
Aluminum box: 4B  
Natural wood box: 4C1 or 4C2  
Plywood box: 4D  
Reconstituted wood box: 4F  
Fiberboard box: 4G  
Solid plastic box: 4H2

*Inner packagings:*

Glass or earthenware receptacles  
Plastic receptacles  
Metal receptacles  
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plastic drum: 1H1 or 1H2  
Fiber drum: 1G  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Steel box with liner: 4A2  
Aluminum box with liner: 4B2  
Natural wood box, sift proof: 4C2  
Plastic receptacle in steel, aluminum, plywood, fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1  
Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1  
Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2

**§173.212 Non-bulk packagings for solid hazardous materials in Packing Group II.**

(a) When §172.101 of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of Subpart B of Part 173, to the requirements of Part 178 of this subchapter at the Packing Group I or II performance level, and to the requirements of the special provisions of Column 7 of the §172.101 Table.

(b) The following combination packagings are authorized:

*Outer packagings:*

Steel drum: 1A1 or 1A2  
Aluminum drum: 1B1 or 1B2  
Metal drum other than steel or aluminum: 1N1 or 1N2  
Plywood drum: 1D  
Fiber drum: 1G  
Plastic drum: 1H1 or 1H2  
Wooden barrel: 2C2  
Steel jerrican: 3A1 or 3A2  
Plastic jerrican: 3H1 or 3H2  
Aluminum jerrican: 3B1 or 3B2  
Steel box: 4A  
Aluminum box: 4B  
Natural wood box: 4C1 or 4C2  
Plywood box: 4D  
Reconstituted wood box: 4F  
Fiberboard box: 4G  
Solid plastic box: 4H2

*Inner packagings:*

Glass or earthenware receptacles  
Plastic receptacles  
Metal receptacles  
Glass ampoules

(c) Except for transportation by passenger aircraft, the following single packagings are authorized:

Steel drum: 1A1 or 1A2

Aluminum drum: 1B1 or 1B2  
 Plywood drum: 1D  
 Plastic drum: 1H1 or 1H2  
 Fiber drum: 1G  
 Metal drum other than steel or aluminum: 1N1 or 1N2  
 Wooden barrel: 2C1 or 2C2  
 Steel jerrican: 3A1 or 3A2  
 Plastic jerrican: 3H1 or 3H2  
 Aluminum jerrican: 3B1 or 3B2  
 Steel box: 4A1  
 Steel box with liner: 4A2  
 Aluminum box: 1B1  
 Aluminum box with liner: 4B2  
 Natural wood box: 4C1  
 Natural wood box, sift proof: 4C2  
 Plywood box: 4D  
 Reconstituted wood box: 4F  
 Fiberboard box: 4G  
 Expanded plastic box: 4H1  
 Solid plastic box: 4H2  
 Bag, woven plastic: 5H1, 5H2 or 5H3  
 Bag, plastic film: 5H4  
 Bag, textile: 5L1, 5L2 or 5L3  
 Bag, paper, multiwall, water resistant: 5M2  
 Plastic receptacle in steel, aluminum, plywood fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1  
 Plastic receptacle in steel aluminum, wood, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
 Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1  
 Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
 Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2

**§173.213 Non-bulk packagings for solid hazardous materials in Packing Group III.**

(a) When §172.101 of this subchapter specifies that a solid hazardous material be packaged under this section, only non-bulk packagings prescribed in this section may be used for its transportation. Each package must conform to the general packaging requirements of Subpart B of Part 173, to the requirements of Part 178 of this subchapter at the Packing Group I, II or III performance level, and to the requirements of the special provisions of Column 7 of the §172.101 Table.

(b) The following combination packagings are authorized:

*Outer packagings:*

Steel drum: 1A1 or 1A2  
 Aluminum drum: 1B1 or 1B2  
 Metal drum other than steel or aluminum: 1N1 or 1N2  
 Plywood drum: 1D  
 Fiber drum: 1G  
 Plastic drum: 1H1 or 1H2  
 Wooden barrel: 2C2  
 Steel jerrican: 3A1 or 3A2  
 Plastic jerrican: 3H1 or 3H2  
 Aluminum jerrican: 3B1 or 3B2  
 Steel box: 4A  
 Aluminum box: 4B  
 Natural wood box: 4C1 or 4C2  
 Plywood box: 4D  
 Reconstituted wood box: 4F  
 Fiberboard box: 4G  
 Solid plastic box: 4H2

*Inner packagings:*

Glass or earthenware receptacles  
 Plastic receptacles  
 Metal receptacles  
 Glass ampoules

(c) The following single packagings are authorized:

Steel drum: 1A1 or 1A2  
 Aluminum drum: 1B1 or 1B2  
 Plywood drum: 1D  
 Fiber drum: 1G  
 Plastic drum: 1H1 or 1H2

Metal drum other than steel or aluminum: 1N1 or 1N2  
 Wooden barrel: 2C1 or 2C2  
 Steel jerrican: 3A1 or 3A2  
 Plastic jerrican: 3H1 or 3H2  
 Aluminum jerrican: 3B1 or 3B2  
 Steel box with liner: 4A2  
 Steel box: 4A1  
 Aluminum box with liner: 4B2  
 Natural wood box: 4C1  
 Natural wood box, sift proof: 4C2  
 Plywood box: 4D  
 Reconstituted wood box: 4F  
 Fiberboard box: 4G  
 Expanded plastic box: 4H1  
 Solid plastic box: 4H2  
 Bag, woven plastic: 5H1, 5H2 or 5H3  
 Bag, plastic film: 5H4  
 Bag, textile: 5L1, 5L2 or 5L3  
 Bag, paper, multiwall, water resistant: 5M2  
 Plastic receptacle in steel, aluminum, plywood, fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1  
 Plastic receptacle in steel, aluminum, wooden, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2 or 6HG2  
 Glass, porcelain or stoneware in steel, aluminum, plywood or fiber drum: 6PA1, 6PB1, 6PD1 or 6PG1  
 Glass, porcelain or stoneware in steel, aluminum, wooden or fiberboard box: 6PA2, 6PB2, 6PC or 6PG2  
 Glass, porcelain or stoneware in expanded or solid plastic packaging: 6PH1 or 6PH2

**§173.214 Packagings which require approval by the Associate Administrator for Hazardous Materials Safety.**

When §172.101 of this subchapter specifies that a hazardous material be packaged under this section, packagings and method of shipment must be approved by the Associate Administrator for Hazardous Materials Safety prior to the first shipment.

**§173.216 Asbestos, blue, brown or white.**

(a) Asbestos, blue, brown or white, includes each of the following hydrated mineral silicates: chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, actinolite asbestos, and every product containing any of these materials.

(b) Asbestos which is immersed or fixed in a natural or artificial binder material (such as cement, plastic, asphalt, resins or mineral ore), and manufactured products containing asbestos are not subject to the requirements of this subchapter.

(c) Packagings for asbestos must conform to the general packaging requirements of Subpart B of this part but need not conform to the requirements of Part 178 of this subchapter. Asbestos must be offered for transportation and transported in—

(1) Rigid, leaktight packagings, such as metal, plastic or fiber drums, portable tanks, hopper-type rail cars, or hopper-type motor vehicles:

(2) Bags or other non-rigid packagings in closed freight containers, motor vehicles, or rail cars that are loaded by and for the exclusive use of the consignor and unloaded by the consignee;

(3) Bags or other non-rigid packagings which are dust and sift-proof. When transported by other than private carrier by highway, such packagings containing asbestos must be palletized and unitized by methods such as shrinkwrapping in plastic film or wrapping in fiberboard secured by strapping. Pallets need not be used during transportation by vessel for loads with slings that are unitized by methods such as shrinkwrapping, if the slings adequately and evenly support the loads and the unitizing method prevents shifting of the bags or other non-rigid packagings during conditions normally incident to transportation; or

(4) Bags or other non-rigid packagings which are dust and sift-proof in strong outside fiberboard or wooden boxes.

**§173.217 Carbon dioxide, solid (dry ice).**

(a) Carbon dioxide, solid (dry ice), when offered for transportation or transported by aircraft or water, must be packed in packagings designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packagings. Packagings must conform to the general packaging requirements of Subpart B of this part but need not conform to the requirements of Part 178 of this subchapter. For each shipment by air exceeding 2.3 kg (5 lbs) per package, advance arrangements must be made between the shipper and each carrier.

(b) Railroad cars and motor vehicles containing solid carbon dioxide, when accepted for transportation on board ocean vessels, must be conspicuously marked on two sides "WARNING CO<sub>2</sub> SOLID (DRY ICE)."

(c) Other packagings containing solid carbon dioxide, when offered or accepted for transportation on board ocean vessels, must be marked "CARBON DIOXIDE, SOLID—DO NOT STOW BELOW DECKS."

(d) Not more than 200 kg (441 pounds) of solid carbon dioxide may be transported in any one cargo compartment or bin on any aircraft except by specific and special written arrangement between the shipper and the aircraft operator.

(e) Carbon dioxide, solid (dry ice) is excepted from the shipping paper and certification requirements of this subchapter if the requirements of paragraphs (a) and (d) of this section are complied with and the package is marked "Carbon dioxide, solid" or "Dry ice" and marked with an indication that the material being refrigerated is used for diagnostic or treatment purposes (e.g., frozen medical specimens).

#### **§173.218 Fish meal or fish scrap.**

(a) Except as provided in paragraph (b) of this section, fish meal or fish scrap, containing at least 6 percent but not more than 12 percent water, is authorized for transportation by water only when packaged as follows:

- (1) Burlap (jute) bag;
- (2) Multi-wall paper bag;
- (3) Polyethylene-lined burlap or paper bag;
- (4) Cargo tank;
- (5) Portable tank;
- (6) Rail car; or
- (7) Freight container.

(b) Fish meal or fish scrap may not be offered for transportation if the temperature of the material exceeds 49°C (120°F).

(c) When fish scrap or fish meal is offered for transportation by vessel in bulk in freight containers, the fish meal must contain at least 100 ppm of antioxidant (ethoxyquin) at the time of shipment.

#### **§173.219 Life-saving appliances.**

(a) A life-saving appliance, self-inflating or non-self-inflating, containing small quantities of hazardous materials which are required as part of the lifesaving appliance must conform to the requirements of this section. Packagings must conform to the general packaging requirements of Subpart B of this part but need not conform to the requirements of Part 178 of this subchapter.

(b) Hazardous materials therein must be packaged as follows:

- (1) Nonflammable compressed gases must be packaged in cylinders in accordance with the requirements of this subchapter;
- (2) Smoke and illumination signal flares must be in plastic or fiberboard receptacles;
- (3) Strike-anywhere matches must be cushioned to prevent movement or friction in a cylindrical metal or composition receptacle with a screw-type closure;
- (4) Flammable liquids must be in strong inner packagings in a repair kit; and
- (5) Limited quantities of other hazardous materials are permitted if packaged in accordance with the requirements of this subchapter.

(c) Materials therein not subject to the requirements of this subchapter which are an integral part of the life-saving appliance must be packaged in a strong fiberglass kit case which is overpacked in a waterproof fiberboard packaging, or be packaged in other strong outer packagings.

#### **§173.220 Internal combustion engines, self-propelled vehicles, and mechanical equipment containing internal combustion engines or wet batteries.**

(a) *Applicability.* An internal combustion engine, self-propelled vehicle, or mechanized equipment is subject to the requirements of this subchapter when transported as cargo on a transport vehicle, vessel or aircraft, if —

- (1) The engine or fuel tank contains a flammable liquid or gaseous fuel;
- (2) It is equipped with a wet electric storage battery other than a nonspillable battery; or
- (3) It contains other hazardous materials subject to the requirements of this subchapter.

(b) *Flammable liquid fuel.* Except as provided in this paragraph, flammable liquid fuel tanks must be completely drained and securely closed. Up to 500

ml (17 ounces) of fuel may be left in engine components and fuel lines provided the lines are securely closed to prevent leakage of fuel. Fuel may remain in engines and tanks installed in self-propelled vehicles and mechanical equipment under the following conditions:

- (1) For transportation by motor vehicle or rail car, the fuel tanks must be securely closed.
- (2) For transportation by vessel, the shipment must conform to §176.905 of this subchapter; and
- (3) For transportation by aircraft, the shipment must conform to §175.305 of this subchapter.

(c) *Wet batteries.* Wet batteries must either be installed, securely fastened in an upright position, and protected against short circuits and leakage or be removed and packaged separately under §173.159. In addition —

- (1) For transportation by vessel, the provisions of this subchapter do not apply to a motor vehicle or mechanical equipment which is electrically powered by a wet electric storage battery.
- (2) For transportation by passenger-carrying aircraft, a wheelchair equipped with a wet battery must conform to §173.222.

(d) *Truck bodies or trailers on cars.* Truck bodies or trailers with automatic heating or refrigerating equipment of the flammable liquid type may be shipped with fuel tanks filled and equipment operating or inoperative, when used for the transportation of other freight and loaded on flat cars as part of a joint rail and highway movement, provided the equipment and fuel supply conform to the requirements of §177.834(l) of this subchapter and are of a type which has been examined by the Bureau of Explosives and approved by the Associate Administrator for Hazardous Materials Safety.

(e) *Gases.* Compressed gas tanks and cylinders, containing gases, which are component parts of vehicles or mechanical equipment must conform to §173.306.

(f) *Other hazardous materials.* Other hazardous materials must be packaged and transported in accordance with the requirements of this subchapter.

(g) *Exceptions.* Except as provided in paragraph (f) of this section, shipments made under the provisions of this section —

- (1) Are not subject to any other requirements of this subchapter, for transportation by motor vehicle or rail car; and
- (2) Are not subject to the requirements of subparts D, E, and F (marking, labeling, and placarding, respectively) of part 172 or §172.604 (emergency response telephone number) of this subchapter for transportation by vessel or aircraft.

#### **§173.221 Polymeric beads, expandable.**

Polymeric beads or granules, expandable, impregnated with flammable gas or liquid as a blowing agent and plastic moulding materials in dough, sheet or extruded rope form must be packed in wooden (4C1 or 4C2), plywood (4D), fiberboard (4G) or reconstituted wood (4F) boxes with sealed inner plastic liners, plywood drums (1D), fiber drums (1G) with sealed inner plastic liner or in metal (1A1, 1A2, 1B1 or 1B2) packagings.

#### **§173.222 Wheelchairs equipped with wet electric storage batteries.**

Wheelchairs equipped with wet storage batteries are not subject to the requirements of this subchapter other than the provisions of §175.10(a)(19 and (20) of this subchapter.

#### **§173.224 Packaging and control and emergency temperatures for self-reactive materials.**

(a) *General.* When the §172.101 Table of this subchapter specifies that a Division 4.1 material be packaged in accordance with this section, only packagings which conform to the provisions of this section may be used. Each packaging must conform to the general packaging requirements of subpart B of this part and the applicable requirements of part 178 of this subchapter. Non-bulk packagings must meet Packing Group II performance levels. To avoid unnecessary confinement, metallic non-bulk packagings meeting Packing Group I are not authorized. Self-reactive materials which require temperature control are subject to the provisions of §173.21(f). Packagings required to bear a Class 1 subsidiary label must conform to §§173.60 through 173.62.

(b) *Self-Reactive Materials Table.* The Self-Reactive Materials Table specifies, by technical name, those self-reactive materials that are authorized for transportation and not subject to the approval provisions of §173.124(a)(2)(iii). A self-reactive material identified by technical name in the following table is authorized for transportation only if it conforms to all applicable provisions

of the table. The column headings of the Self-Reactive Materials Table are as follows:

- (1) *Technical name.* Column 1 specifies the technical name.
- (2) *ID number.* Column 2 specifies the identification number which is used to identify the proper shipping name in the §172.101 Table.
- (3) *Concentration of self-reactive material.* Column 3 specifies the concentration (percent) limitations, if any, in mixtures or solutions for the self-reactive material. Limitations are given as minimums, maximums, or a range, as appropriate. A range includes the lower and upper limits (i.e., “53-100” means from, and including, 53 percent to, and including 100 percent).
- (4) *Packing method.* Column 4 specifies the highest packing method which is authorized for the self-reactive material. A packing method corresponding

to a smaller package size may be used, but a packing method corresponding to a larger package size may not be used. The Table of Packing Methods in §173.225(d) defines the packing methods. Additional bulk packagings are authorized in paragraph (d) of this section for Type F self-reactive materials.

(5) *Control temperature.* Column 5 specifies the control temperature in °C. Temperatures are specified only when temperature controls are required (see §173.21(f)).

(6) *Emergency temperature.* Column 6 specifies the emergency temperature in °C. Temperatures are specified only when temperature controls are required (see §173.21(f)).

(7) *Notes.* Column 7 specifies other applicable provisions, as set forth in notes following the table.

#### Self-Reactive Substances

Self-reactive substance (1)	Identifi- cation number (2)	Concen- tration- (%) (3)	Pack- ing method (4)	Control tempera- ture- ( C ) (5)	Emer- gency tempera- ture- ( C ) (6)	Notes (7)
Azodicarbonamide formulation type B, temperature controlled	3232	<100	OP5			1
Azodicarbonamide formulation type C	3224	<100	OP6			
Azodicarbonamide formulation type C, temperature controlled	3234	<100	OP6			1
Azodicarbonamide formulation type D	3226	<100	OP7			
Azodicarbonamide formulation type D, temperature controlled	3236	<100	OP7			1
2,2'-Azodi(2,4-dimethyl-4-methoxyvaleronitrile)	3236	100	OP7	-5	+5	
2,2'-Azodi(2,4-dimethylvaleronitrile)	3236	100	OP7	+10	+15	
2,2'-Azodi(ethyl 2-methylpropionate)	3235	100	OP7	+20	+25	
1,1-Azodi(hexahydrobenzonitrile)	3226	100	OP7			
2,2-Azodi(isobutyronitrile)	3234	100	OP6	+40	+45	
2,2-Azodi(2-methylbutyronitrile)	3236	100	OP7	+35	+40	
Benzene-1,3-disulphohydrazide, as a paste	3226	52	OP7			
Benzene sulphohydrazide	3236	100	OP7			
4-(Benzyl(ethyl)amino)-3-ethoxybenzenediazonium zinc chloride	3226	100	OP7			
4-(Benzyl(methyl)amino)-3-ethoxybenzenediazonium zinc chloride	3236	100	OP7	+40	+45	
3-Chloro-4-Diethylaminobenzenediazonium zinc chloride	3226	100	OP7			
2-Diazo-1-Naphthol-4-sulphochloride	3222	100	OP5			
2-Diazo-1-Naphthol-5-sulphochloride	3222	100	OP5			
2,5-Diethoxy-4-morpholinobenzenediazonium zinc chloride	3236	67-100	OP7	+35	+40	
2,5-Diethoxy-4-morpholinobenzenediazonium zinc chloride	3236	66	OP7	+40	+45	
2,5-Diethoxy-4-morpholinobenzenediazonium tetrafluoroborate	3236	100	OP7	+30	+35	
2,5-Diethoxy-4-(phenylsulphonyl)benzenediazonium zinc chloride	3236	67	OP7	+40	+45	
Diethylene glycol bis(allyl carbonate) + Diisopropylperoxydicarbonate	3237	≥88+≤12	OP8	-10	0	
2,5-Dimethoxy-4-(4-methylphenylsulphonyl) benzenediazonium zinc chloride	3236	79	OP7	+40	+45	
4-Dimethylamino-6-(2-dimethylaminoethoxy) toluene-2-diazonium zinc chloride	3236	100	OP7	+ 40	+ 45	
N,N'-Dinitroso-N,N'-dimethyl-terephthalamide, as a paste	3224	72	OP6			2
N,N'-Dinitrosopentamethylenetetramine	3224	82	OP6			
Diphenyloxide-4,4'-Disulphohydrazide	3226	100	OP7			
4-Dipropylaminobenzenediazonium zinc chloride	3226	100	OP7			
2-(N,N-Ethoxycarbonylphenylamino)-3-methoxy-4-(N-methyl-N-cyclohexylamino) benzenediazonium zinc chloride	3236	63-92	OP7	+ 40	+ 45	
2-(N,N-Ethoxycarbonylphenylamino)-3-methoxy-4-(N-methyl-N-cyclohexylamino) benzenediazonium zinc chloride	3236	62	OP7	+ 35	+ 40	
N-Formyl-2-(nitromethylene)-1,3-perhydrothiazine	3236	100	OP7	+45	+50	
2-(2-Hydroxyethoxy)-1-(pyrrolidin-1-yl)benzene-4-diazonium zinc chloride	3236	100	OP7	+ 45	+ 50	
3-(2-Hydroxyethoxy)-4-(pyrrolidin-1-yl)benzenediazonium zinc chloride	3236	100	OP7	+ 40	+ 45	
2-(N,N-Methylaminoethylcarbonyl)-4-(3,4-dimethyl-phenylsulphonyl) benzene-diazonium zinc chloride	3236	96	OP7	+45	+50	
4-Methylbenzenesulphonylhydrazide	3236	100	OP7			
3-Methyl-4-(pyrrolidin-1-yl)benzenediazonium tetrafluoroborate	3234	95	OP6	+ 45	+ 50	
4-Nitrosophenol	3236	100	OP7	+ 35	+ 40	
Self-reactive liquid, sample	3223		OP2			3
Self-reactive liquid, sample, temperature controlled	3233		OP2			3
Self-reactive solid, sample	3224		OP2			3
Self-reactive solid, sample, temperature controlled	3234		OP2			3
Sodium 2-diazo-1-naphthol-4-sulphonate	3226	100	OP7			
Sodium 2-diazo-1-naphthol-5-sulphonate	3226	100	OP7			
Tetramine palladium (II) nitrate	3234	100	OP6	+ 30	+ 35	

#### Notes:

1. The emergency and control temperatures must be determined in accordance with §173.21(f).
2. With a compatible diluent having a boiling point of not less than 150°C.
3. Samples may only be offered for transportation under the provisions of paragraph (c)(4) of this section.

(c) *New self-reactive materials, formulations and samples.*

(1) Except as provided for samples in paragraph (c)(3) of this section, no person may offer, accept for transportation, or transport a self-reactive material which is not identified by technical name in the Self-Reactive Materials Table of this section, or a formulation of one or more self-reactive materials which are identified by technical name in the table, unless the self-reactive material is assigned a generic type and shipping description and is approved by the Associate Administrator for Hazardous Materials Safety under the provisions of §173.124(a)(2)(iii).

(2) Except as provided by an approval issued under §173.124(a)(2)(iii), intermediate bulk and bulk packagings are not authorized.

(3) *Samples.* Samples of new self-reactive materials or new formulations of self-reactive materials identified in the Self-Reactive Materials Table in paragraph (b) of this section, for which complete test data are not available, and which are to be transported for further testing or evaluation, may be assigned an appropriate shipping description for Self-reactive materials Type C, packaged and offered for transportation under the following conditions:

(i) Data available to the person offering the material for transportation must indicate that the sample would pose a level of hazard no greater than that of a self-reactive material Type B and that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation;

(ii) The sample must be packaged in accordance with packing method OP2;

(iii) Packages of the self-reactive material may be offered for transportation and transported in a quantity not to exceed 10 kg (22 pounds) per transport vehicle; and

(iv) One of the following shipping descriptions must be assigned:

(A) Self-reactive, liquid, type C, 4.1, UN3223.

(B) Self-reactive, solid, type C, 4.1, UN3224.

(C) Self-reactive, liquid, type C, temperature controlled, 4.1, UN3233.

(D) Self-reactive, solid, type C, temperature controlled, 4.1, UN3234.

(d) Self-reactive substances of Type F may not be transported in bulk or intermediate bulk containers except as approved, in writing, by the Associate Administrator for Hazardous Materials Safety.

#### §173.225 Packaging requirements and other provisions for organic peroxides.

(a) *General.* When the §172.101 Table specifies that an organic peroxide be packaged under this section, the organic peroxide must be packaged and offered for transportation in accordance with the provisions of this section. Each packaging must conform to the general requirements of Subpart B of Part 173 and to the applicable requirements of Part 178 of this subchapter. Non-bulk packagings must meet Packing Group II performance levels. To avoid unnecessary confinement, metallic non-bulk packagings meeting Packing Group I are not authorized. No used material, other than production residues or reground from the same production process, may be used in plastic packagings. Organic peroxides which require temperature control are subject to the provisions of §173.21(f).

(b) *Organic peroxides table.* The following Organic Peroxides Table specifies, by technical name, those organic peroxides that are authorized for transportation

and not subject to the approval provisions of §173.128 of this part. An organic peroxide identified by technical name in the following table is authorized for transportation only if it conforms to all applicable provisions of the table. For an organic peroxide not identified in the table by technical name or a formulation of identified organic peroxides, the provisions of paragraph (c) of §173.128 apply. The column headings of the Organic Peroxides table are as follows:

(1) *Technical name.* The first column specifies the technical name.

(2) *ID number.* The second column specifies the identification (ID) number which is used to identify the proper shipping name in the §172.101 Table. The word “EXEMPT” appearing in the column denotes that the material is not regulated as an organic peroxide.

(3) *Concentration of organic peroxide.* The third column specifies concentration (mass percent) limitations, if any, in mixtures or solutions for the organic peroxide. Limitations are given as minimums, maximums, or a range, as appropriate. A range includes the lower and upper limits (i.e., “53-100” means from, and including, 53 percent to, and including 100 percent).

(4) *Concentration of diluents.* The fourth column specifies the type and concentration (mass percent) of diluent or inert solid, when required. Other types and concentrations of diluents may be authorized if approved by the Associate Administrator for Hazardous Materials Safety.

(i) The required mass percent of “Diluent type A” is specified in Column 4a. A diluent type A is an organic liquid that does not detrimentally affect the thermal stability or increase the hazard of the organic peroxide and with a boiling point not less than 150°C at atmospheric pressure. Type A diluents may be used for desensitizing all organic peroxides.

(ii) The required mass percent of “Diluent type B” is specified in Column 4b. A diluent type B is an organic liquid which is compatible with the organic peroxide and which has a boiling point, at atmospheric pressure, of less than 150°C (302°F) but at least 60°C (140°F), and a flash point greater than 5°C (41°F). Type B diluents may be used for desensitizing all organic peroxides provided that the boiling point is at least 60°C (140°F) above the SADT of the peroxide in a 50 kg (110 lbs) package. A type A diluent may be used to replace a type B diluent in equal concentration.

(iii) The required mass percent of “inert solid” is specified in column 4c. An inert solid is a solid that does not detrimentally affect the thermal stability or increase the hazard of the organic peroxide.

(5) *Concentration of water.* Column 5 specifies, in mass percent, the minimum amount of water, if any, which must be in formulation.

(6) *Packing method.* Column 6 specifies the highest packing method (largest packaging capacity) authorized for the organic peroxide. Lower numbered packing methods (smaller packaging capacities) are also authorized. For example, if OP3 is specified, then OP2 and OP1 are also authorized. When an IBC or bulk packaging is authorized and meets the requirements of paragraph (e) of this section, lower control temperatures than those specified for non-bulk packagings are required. The Table of Packing Methods in paragraph (d) of this section defines the non-bulk packing methods.

(7) *Temperatures.* Column 7a specifies the control temperature. Column 7b specifies the emergency temperature. Temperatures are specified only when temperature controls are required. (See §173.21(f)).

(8) *Notes.* Column 8 specifies other applicable provisions, as set forth in notes following the table.

Organic Peroxide Table

Technical Name (1)	ID Number (2)	Concen- tration (Mass %) (3)	Diluent (Mass %)			Water (Mass %) (5)	Packing Method (6)	Control (7a)	Temperature ( C )	
			A (4a)	B (4b)	I (4c)				Emer- gency (7b)	Notes (8)
Acetyl acetone peroxide	UN3105	≤42	≥48			≥8	OP7			2
Acetyl acetone peroxide as a paste	UN3106	≤32					OP7			21
Acetyl benzoyl peroxide	UN3105	≤45	≥55				OP7			
Acetyl cyclohexanesulfonyl peroxide	UN3112	≤82				≥12	OP4	-10	0	
Acetyl cyclohexanesulfonyl peroxide	UN3115	≤32		≥68			OP7	-10	0	
tert-Amyl hydroperoxide	UN3107	≤88	≥6			≥6	OP8			
tert-Amyl peroxyacetate	UN3107	≤62	≥38				OP8			
tert-Amyl peroxybenzoate	UN3105	≤96	≥4				OP7			
tert-Amyl peroxy-2-ethylhexanoate	UN3115	≤100					OP7	+20	+25	
tert-Amyl peroxy-2-ethylhexyl carbonate	UN3105	≤100					OP7			
tert-Amyl peroxyneodecanoate	UN3115	≤77		≥23			OP7	0	+10	
tert-Amyl peroxyvalerate	UN3113	≤77		≥23			OP5	+10	+15	
tert-Amylperoxy-3,5,5-trimethylhexanoate	UN3101	≤100					OP5			
tert-Butyl cumyl peroxide	UN3105	>42 -100					OP7			1,9
tert-Butyl cumyl peroxide	UN3106	≤42		≥58			OP7			1,9
n-Butyl-4,4-di-(tert-butylperoxy) valerate	UN3103	>52 -100					OP5			

Organic Peroxide Table — continued

Technical Name (1)	ID Number (2)	Concen- tration (Mass %) (3)	Diluent (Mass %)			Water (Mass %) (5)	Packing Method (6)	Control (7a)	Temperature ( C )	
			A (4a)	B (4b)	I (4c)				Emer- gency (7b)	Notes (8)
n-Butyl-4,4-di-(tert-butylperoxy) valerate	UN3106	≤52			≥48		OP7			
n-Butyl-4,4-di-(tert-butylperoxy) valerate	UN3108	≤42			≥58		OP8			
tert-Butyl hydroperoxide	UN3103	>79 -90				≥10	OP5			13
tert-Butyl hydroperoxide	UN3105	≤80	≥20				OP7			4, 13
tert-Butyl hydroperoxide	UN3107	≤79				>14	OP8			13, 16
tert-Butyl hydroperoxide	UN3109	≤72				≥28	OP8			7, 13
tert-Butyl hydroperoxide and Di-tert-butylperoxide	UN3103	<82 +>9				≥7	OP5			13
tert-Butyl monoperoxymaleate	UN3102	>52 -100					OP5			
tert-Butyl monoperoxymaleate	UN3103	≤52	≥48				OP6			
tert-Butyl monoperoxymaleate	UN3108	≤52			≥48		OP8			
tert-Butyl monoperoxymaleate as a paste	UN3108	≤52					OP8			
tert-Butyl monoperoxymaleate as a paste	UN3110	≥42					OP8			7
tert-Butyl monoperoxyphthalate	UN3102	≤100					OP5			
tert-Butyl peroxyacetate	UN3101	>52 -77	≥23				OP5			
tert-Butyl peroxyacetate	UN3103	>32 -52	≥48				OP6			
tert-Butyl peroxyacetate	UN3109	≥32	≥68				OP8			10
tert-Butyl peroxyacetate	UN3119	≥32		≥68			Bulk	+30	+35	7
tert-Butyl peroxyacetate	UN3109	≥22		≥78			OP8			14
tert-Butyl peroxybenzoate	UN3103	>77 -100	≥22				OP5			
tert-Butyl peroxybenzoate	UN3105	<52 -77	≥23				OP7			1
tert-Butyl peroxybenzoate	UN3106	≤52			≥48		OP7			
tert-Butyl peroxybutyl fumarate	UN3105	≤52	≥48				OP7			
tert-Butyl peroxycrotonate	UN3105	≤77	≥23				OP7			
tert-Butyl peroxydiethylacetate	UN3113	≤100					OP5	+20	+25	
tert-Butyl peroxydiethylacetate and tert-Butyl peroxybenzoate	UN3105	≤33 +≤33	≥33				OP7			
tert-Butyl peroxy-2-ethylhexanoate	UN3113	>52 -100					OP6	+20	+25	
tert-Butyl peroxy-2-ethylhexanoate	UN3117	≤52		≥48			OP8	+30	+35	
tert-Butyl peroxy-2-ethylhexanoate	UN3118	≤52			≥48		OP8	+20	+25	
tert-Butyl peroxy-2-ethylhexanoate	UN3119	≤32		≥68			OP8	+40	+45	
tert-Butyl peroxy-2-ethylhexanoate	UN3119	≤32		≥68			IBC	+30	+35	10
tert-Butyl peroxy-2-ethylhexanoate	UN3119	≤32		≥68			Bulk	+10	+15	14
tert-Butyl peroxy-2-ethylhexanoate and 2,2-di-(tert-Butylperoxy)butane	UN3115	≤31 +≤36		≥33			OP7	+35	+40	
tert-Butyl peroxy-2-ethylhexanoate and 2,2-di-(tert-Butylperoxy)butane	UN3106	≤12 +≤14	≥14		≥60		OP7			
tert-Butyl peroxy-2-ethylhexylcarbonate	UN3105	≤100					OP7			
tert-Butyl peroxyisobutyrate	UN3111	>52 -77		≥23			OP5	+15	+20	
tert-Butyl peroxyisobutyrate	UN3115	≤52		≥48			OP7	+15	+20	
tert-Butylperoxy isopropylcarbonate	UN3103	≤77	≥23				OP5			
1-(2-tert-Butylperoxy isopropyl)-3-isopropen- ylbenzene	UN3105	≤77	≥23				OP7			
1-(2-tert-Butylperoxy isopropyl)-3-isopropen- ylbenzene	UN3108	≤42			≥58		OP8			
tert-Butyl peroxy-2-methylbenzoate	UN3103	≤100					OP5			
tert-Butyl peroxyneodecanoate	UN3115	>77 -100					OP7	-5	+5	
tert-Butyl peroxyneodecanoate	UN3115	≤77		≥23			OP7	0	+10	
tert-Butyl peroxyneodecanoate as a stable dis- persion in water	UN3117	≤42					OP8	0	+10	
tert-Butyl peroxyneodecanoate as a paste (frozen)	UN3118	≤42					OP8	0	+10	
tert-Butyl peroxyneohexanoate	UN3115	≤77	≥23				OP7	+10	+15	
3-tert-Butylperoxy-3-phenylphthalide	UN3106	≤100					OP7			
tert-Butyl peroxyipivalate	UN3113	>67 -77	≥23				OP5	0	+10	
tert-Butyl peroxyipivalate	UN3115	≤67		≥33			OP7	0	+10	
tert-Butyl peroxyipivalate	UN3119	≤27		≥73			OP8	+30	+35	
tert-Butyl peroxyipivalate	UN3119	≤27		≥73			IBC	+10	+15	10
tert-Butyl peroxyipivalate	UN3119	≤27		≥73			Bulk	-5	+5	14
tert-Butylperoxy stearylcarbonate	UN3106	≤100					OP7			
tert-Butyl peroxy-3,5,5-trimethylhexanoate	UN3105	>32 -100					OP7			
tert-Butyl peroxy-3,5,5-trimethylhexanoate	UN3109	≤32	≥68				OP8			10
tert-Butyl peroxy-3,5,5-trimethylhexanoate	UN3119	≤32		≥68			Bulk	+35	+40	14
3-Chloroperoxybenzoic acid	UN3102	>57 -86			≥14		OP1			
3-Chloroperoxybenzoic acid	UN3106	≤77			≥6	≥17	OP7			
3-Chloroperoxybenzoic acid	UN3106	≤57			≥3	≥40	OP7			
Cumyl hydroperoxide	UN3107	>90 -98	≤10				OP8			13
Cumyl hydroperoxide	UN3109	≤90	≥10				OP8			7, 13, 15
Cumyl peroxyneodecanoate	UN3115	≤77		≥23			OP7	-10	0	

Organic Peroxide Table — continued

Technical Name (1)	ID Number (2)	Concen- tration (Mass %) (3)	Diluent (Mass %)			Water (Mass %) (5)	Packing Method (6)	Control (7a)	Temperature ( C )	
			A (4a)	B (4b)	I (4c)				Emer- gency (7b)	Notes (8)
Cumyl peroxyneodecanoate as a stable disper- sion in water	UN3119	≤52					OP8	-10	0	
Cumyl peroxyneohexanoate	UN3115	≤77	≥23				OP7	0	+10	
Cumyl peroxyisobutyrate	UN3115	≤77		≥23			OP7	-5	+5	
Cyclohexanone peroxide(s)	UN3104	≤91				≥9	OP6			13
Cyclohexanone peroxide(s)	UN3105	≤72		≥28			OP7			5
Cyclohexanone peroxide(s) as a paste	UN3106	≤72					OP7			5, 21
Cyclohexanone peroxide(s)	Exempt	≤32			≥68		Exempt			
Diacetone alcohol peroxides	UN3115	≤57		≥26		≥8	OP7	+40	+45	5
Diacetyl peroxide	UN3115	≤27		≥73			OP7	+20	+25	8, 13
Di-tert-amyl peroxide	UN3107	≤100					OP8			
1,1-Di-(tert-amylperoxy) cyclohexane	UN3103	≤82	≥18				OP6			
Dibenzoyl peroxide	UN3102	>51 -100			≤48		OP2			3
Dibenzoyl peroxide	UN3102	>77 -94				≥6	OP4			3
Dibenzoyl peroxide	UN3104	≤77				≥23	OP6			
Dibenzoyl peroxide	UN3106	≤62			≥28	≥10	OP7			
Dibenzoyl peroxide as a paste	UN3106	>52 -62					OP7			21
Dibenzoyl peroxide as a paste	UN3108	≤56.5				≥15	OP8			
Dibenzoyl peroxide	UN3106	>35 -52			≥48		OP7			
Dibenzoyl peroxide as a paste	UN3108	≤52					OP8			21
Dibenzoyl peroxide as a paste	Exempt	≤50	≥14			≥18	Exempt			
Dibenzoyl peroxide	UN3107	>36 -42	≥18			≤40	OP8			
Dibenzoyl peroxide	UN3107	>36 -42	≥58				OP8			
Dibenzoyl peroxide as a stable dispersion in water	UN3109	≤42					OP8			10
Dibenzoyl peroxide	Exempt	≤35			≥65		Exempt			
Dibenzoyl peroxydicarbonate	UN3112	≤87				≥13	OP5	+25	+30	
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	UN3114	≤100					OP6	+30	+35	
Di-(4-tert-butylcyclohexyl) peroxydicarbonate as a stable dispersion in water	UN3119	≤42					OP8	+30	+35	10
Di-tert-butyl peroxide	UN3107	>32 -100					OP8			
Di-tert-butyl peroxide	UN3109	≤52	≥48				OP8			7, 24
Di-tert-butyl peroxyazelaate	UN3105	≤52	≥48				OP7			
2,2-Di-(tert-butylperoxy)butane	UN3103	≤52	≥48				OP6			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3101	>80 -100					OP5			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3103	>52 -80	≥20				OP5			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3105	≤52	≥48				OP7			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3106	≤42	≥13		≥45		OP7			
1,1-Di-(tert-butylperoxy)cyclohexane	UN3109	≤42	≥58				OP8			10
1,1-Di-(tert-butylperoxy)cyclohexane	UN3107	≤27	≥36				OP8			22
1,1-Di-(tert-butylperoxy)cyclohexane	UN3109	≤25	≥25	≥50			OP8			7
1,1-Di-(tert-butylperoxy)cyclohexane	UN3109	≤13	≥13	≥74			OP8			7
Di-n-butyl peroxydicarbonate	UN3115	>27 -52		≥48			OP7	-15	-5	
Di-n-butyl peroxydicarbonate as a stable dis- persion in water (frozen)	UN3118	≤42					OP8	-15	-5	
Di-n-butyl peroxydicarbonate	UN3117	≤27		≥73			OP8	-10	0	
Di-sec-butyl peroxydicarbonate	UN3113	>52 -100					OP4	-20	-10	6
Di-sec-butyl peroxydicarbonate	UN3115	≤52		≥48			OP7	-15	-5	
Di-(2-tert-butylperoxyisopropyl) benzene(s)	UN3106	>42 -100			≤57		OP7			1, 9
Di-(2-tert-butylperoxyisopropyl) benzene(s)	Exempt	≤42			≥58		Exempt			
Di-(tert-butylperoxy)phthalate	UN3105	>42 -52	≥48				OP7			
Di-(tert-butylperoxy)phthalate as a paste	UN3106	≤52					OP7			21
Di-(tert-butylperoxy)phthalate	UN3107	≤42	≥58				OP8			
2,2-Di-(tert-butylperoxy)propane	UN3105	≤52	≥48				OP7			
2,2-Di-(tert-butylperoxy)propane	UN3106	≤42	≥13		≥45		OP7			
1,1-Di-(tert-butylperoxy)-3,3,5- trimethylcyclohexane	UN3101	>90 -100					OP5			
1,1-Di-(tert-butylperoxy)-3,3,5- trimethylcyclohexane	UN3103	>57 -90	≥10				OP5			
1,1-Di-(tert-butylperoxy)-3,3,5- trimethylcyclohexane	UN3106	≤57			≥43		OP7			
1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclo- hexane	UN3107	≤57	≥43				OP8			
1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclo- hexane	UN3107	≤32	≥26	≥42			OP8			
Dicetyl peroxydicarbonate	UN3116	≤100					OP7	+30	+35	
Dicetyl peroxydicarbonate as a stable disper- sion in water	UN3119	≤42					OP8	+30	+35	10
Di-4-chlorobenzoyl peroxide	UN3102	≤77				≥23	OP5			



Technical Name (1)	ID Number (2)	Concen- tration (Mass %) (3)	Diluent (Mass %)			Water (Mass %) (5)	Packing Method (6)	Control (7a)	Temperature ( C )	
			A (4a)	B (4b)	I (4c)				Emer- gency (7b)	Notes (8)
Di-4-chlorobenzoyl peroxide <i>as a paste</i>	UN3106	≤52					OP7			21
Di-4-chlorobenzoyl peroxide	Exempt	≤32			≥68		Exempt			
Dicumyl peroxide	UN3109	>52 -100		≤48			OP8			7, 9, 11
Dicumyl peroxide	UN3110	>52 -100			≤48		OP8			7, 9, 11
Dicumyl peroxide	Exempt	≤52	≥48				Exempt			
Dicumyl peroxide	Exempt	≤52			≥48		Exempt			
Dicyclohexyl peroxydicarbonate	UN3112	>91 -100					OP3	+5	+10	
Dicyclohexyl peroxydicarbonate	UN3114	≤91				≥9	OP5	+5	+10	
Didecanoyl peroxide	UN3114	≤100					OP6	+30	+35	
2,2-Di-(4,4-di(tert-butylperoxy)cyclohexyl)propane	UN3106	≤42			≥58		OP7			
2,2-Di-(4,4-di(tert-butylperoxy)cyclohexyl)propane	UN3107	≤25		≥75			OP8			
Di-2,4-dichlorobenzoyl peroxide	UN3102	≤77				≥23	OP5			
Di-2,4-dichlorobenzoyl peroxide <i>as a paste with silicon oil</i>	UN3106	≤52					OP7			
Di-(2-ethylhexyl) peroxydicarbonate	UN3113	>77 -100					OP5	-20	-10	
Di-(2-ethylhexyl) peroxydicarbonate	UN3115	≤77					OP7	-15	-5	
Di-(2-ethylhexyl) peroxydicarbonate <i>as a stable dispersion in water</i>	UN3119	≤52					OP8	-15	-5	
Di-(2-ethylhexyl) peroxydicarbonate <i>as a stable dispersion in water (frozen)</i>	UN3118	≤42					OP8	-15	-5	
Diethyl peroxydicarbonate	UN3115	≤27		≥73			OP7	-10	0	
2,2-Dihydroperoxypropane	UN3102	≤27			≥73		OP5			
Di-(1-hydroxycyclohexyl) peroxide	UN3106	≤100					OP7			
Diisobutyl peroxide	UN3111	>32 -52		≥48			OP5	-20	-10	
Diisobutyl peroxide	UN3115	≤32		≥68			OP7	-20	-10	
Di-isopropylbenzene dihydroperoxide	UN3106	≤82	≥5			≥5	OP7			17
Diisopropyl peroxydicarbonate	UN3112	>52 -100					OP2	-15	-5	
Diisopropyl peroxydicarbonate	UN3115	≤52		≥48			OP7	-10	0	
Diisotridecyl peroxydicarbonate	UN3115	≤100					OP7	-10	0	
Dilauroyl peroxide	UN3106	≤100					OP7			
Dilauroyl peroxide <i>as a stable dispersion in water</i>	UN3109	≤42					OP8			10
Di-(2-methylbenzoyl) peroxide	UN3112	≤87				≥13	OP5	+30	+35	
Di-(4-methylbenzoyl) peroxide <i>as a paste with silicone oil</i>	UN3106	≤52					OP7			
2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	UN3102	>82 -100					OP5			
2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	UN3104	≤82				≥18	OP5			
2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	UN3106	≤82			≥18		OP7			
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	UN3105	>52 -100					OP7			
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	UN3101	>87 -100					OP5			
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	UN3103	>52 -86					OP5			
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	UN3106	≤52			≥48		OP7			
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	UN3109	≤52	≥48				OP8			7
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	UN3106	≤52			≥48		OP7			
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane <i>as a paste</i>	UN3108	≤47					OP8			
2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy)hexane	UN3115	≤100					OP7	+20	+25	
2,5-Dimethyl-2,5-dihydroperoxyhexane	UN3104	≤82				≥18	OP6			
2,5-Dimethyl-2,5-di-(3,5,5-trimethylhexanoylperoxy)hexane	UN3105	≤77	≥23				OP7			
1,1-Dimethyl-3-hydroxybutylperoxyneohexanoate	UN3117	≤52		≥48			OP8	+0	+10	
Dimyristyl peroxydicarbonate	UN3116	≤100					OP7	+20	+25	
Dimyristyl peroxydicarbonate <i>as a stable dispersion in water</i>	UN3119	≤42					OP8	+20	+25	
Dimyristyl peroxydicarbonate <i>as a stable dispersion in water</i>	UN3119	≤42					IBC	+15	+25	10
Di-(2-neodecanoylperoxyisopropyl) benzene	UN3115	≤52	≥48				OP7	-10	0	
Di-n-nonanoyl peroxide	UN3116	≤100					OP7	0	+10	
Di-n-octanoyl peroxide	UN3114	≤100					OP5	+10	+15	
Diperoxy azelaic acid	UN3116	≤27			≥73		OP7	+35	+40	
Diperoxy dodecane diacid	UN3116	>13 -42			≥58		OP7	+40	+45	
Diperoxy dodecane diacid	Exempt	≤13			≥87		Exempt			

Organic Peroxide Table — continued

Technical Name (1)	ID Number (2)	Concen- tration (Mass %) (3)	Diluent (Mass %)			Water (Mass %) (5)	Packing Method (6)	Control (7a)	Temperature ( C )	
			A (4a)	B (4b)	I (4c)				Emer- gency (7b)	Notes (8)
Di-(2-phenoxyethyl) peroxydicarbonate	UN3102	>85 -100					OP5			
Di-(2 phenoxyethyl) peroxydicarbonate	UN3106	≤85				≥15	OP7			
Dipropionyl peroxide	UN3117	≤27		≥73			OP8	+15	+20	
Di-n-propyl peroxydicarbonate	UN3113	≤100					OP4	-25	-15	
Distearyl peroxydicarbonate	UN3106	≤87			≥13		OP7			
Disuccinic acid peroxide	UN3102	>72 -100					OP4			18
Disuccinic acid peroxide	UN3116	≤72				≥28	OP7	+10	+15	
Di-(3,5,5-trimethyl-1,2-dioxolanyl-3) peroxide as a paste	UN3116	≤52					OP7	+30	+35	21
Di-(3,5,5-trimethylhexanoyl) peroxide	UN3115	>38 -82	≥18				OP7	0	+10	
Di-(3,5,5-trimethylhexanoyl) peroxide as a sta- ble dispersion in water	UN3117	≤52					OP8	+10	+15	
Di-(3,5,5-trimethylhexanoyl) peroxide	UN3119	≤38	≥62				OP8	+20	+25	
Di-(3,5,5-trimethylhexanoyl) peroxide	UN3119	≤38	≥62				IBC	+10	+15	10
Di-(3,5,5-trimethylhexanoyl) peroxide	UN3119	≤38	≥62				Bulk	-10	0	14
Ethyl-3,3-di-(tert-amylperoxy) butyrate	UN3105	≤67	≥33				OP7			
Ethyl-3,3-di-(tert-butylperoxy) butyrate	UN3103	>77 -100					OP5			
Ethyl-3,3-di-(tert-butylperoxy) butyrate	UN3105	≤77	≥23				OP7			
Ethyl-3,3-di-(tert-butylperoxy) butyrate	UN3106	≤52			≥48		OP7			
3,3,6,6,9,9-Hexamethyl-1,2,4,5- tetraoxacyclononane	UN3102	>52 -100					OP4			
3,3,6,6,9,9-Hexamethyl-1,2,4,5- tetraoxacyclononane	UN3105	≤52	≥48				OP7			
3,3,6,6,9,9-Hexamethyl-1,2,4,5- tetraoxacyclononane	UN3106	≤52			≥48		OP7			
Isopropyl sec-butyl peroxydicarbonate + di- sec-butyl peroxydicarbonate + di-isopropyl peroxydicarbonate	UN3111	≤52 + ≤28 + ≤22					OP5	-20	-10	
Isopropylcumyl hydroperoxide	UN3109	≤72	≥28				OP8			7, 13
p-Menthyl hydroperoxide	UN3105	>72 -100					OP7			13
p-Menthyl hydroperoxide	UN3109	≤72	≥28				OP8			7, 25
Methylcyclohexanone peroxide(s)	UN3115	≤67		≥33			OP7	+35	+40	
Methyl ethyl ketone peroxide(s)	UN3101	≤52	≥48				OP5			5, 13
Methyl ethyl ketone peroxide(s)	UN3105	≤45	≥55				OP7			5
Methyl ethyl ketone peroxide(s)	UN3107	≤40	≥60				OP8			5
Methyl isobutyl ketone peroxide(s)	UN3105	≤62	≥19				OP7			5, 23
Organic peroxide, liquid, sample	UN3103						OP2			12
Organic peroxide, liquid, sample, temperature controlled	UN3113						OP2			12
Organic peroxide, solid, sample	UN3104						OP2			12
Organic peroxide, solid, sample, temperature controlled	UN3114						OP2			12
Peracetic acid with not more than 20% hydro- gen peroxide	Exempt	≤6				≥60	Exempt			
Peracetic acid with not more than 26% hydro- gen peroxide	UN3109	≤17				≥27	OP8;			10, 13
Peracetic acid with 7% hydrogen peroxide	UN3107	≤36				≥15	OP8			13
Peroxyacetic acid, type D, stabilized	UN3105	≤43					OP7			13, 20
Peroxyacetic acid, type E, stabilized	UN3107	≤43					OP8			13, 20
Peroxyacetic acid, type F, stabilized	UN3109	≤43					OP8			13, 20
Pinanyl hydroperoxide	UN3105	>56 -100					OP7			13
Pinanyl hydroperoxide	UN3109	< 56	≥44				OP8			7
Tetrahydronaphthyl hydroperoxide	UN3106	≤100					OP7			
1,1,3,3-Tetramethylbutyl hydroperoxide	UN3105	≤100					OP7			
1,1,3,3-Tetramethylbutylperoxy-2- ethylhexanoate	UN3115	≤100					OP7	+20	+25	
2,4,4-Trimethylpentyl-2-peroxyneodecanoate	UN3115	≤72		≥28			OP7	-5	+5	
2,4,4-Trimethylpentyl-2-peroxyneodecanoate as a stable dispersion in water	UN3119	≤52					OP8	-5	+5	
2,4,4-Trimethylpentyl-2-peroxy phenoxya- cetate	UN3115	≤37		≥63			OP7	-10	0	

**Notes:**

- For domestic shipments, OP8 is authorized.
- Available oxygen must be <4.7%.
- For concentrations <80% OP5 is allowed. For concentrations of at least 80% but <85%, OP4 is allowed. For concentrations of at least 85%, maximum package size is OP2.
- The diluent may be replaced by di-tert-butyl peroxide.
- Available oxygen must be ≤9%.
- For domestic shipments, OP5 is authorized.
- This material may be transported in intermediate bulk containers and bulk packagings under the provisions of paragraph (e) of this section.

8. Only non-metallic packagings are authorized.
9. For domestic shipments, this material may be transported in bulk packagings under the provisions of paragraph (e)(3)(ii) of this section.
10. This material may be transported in intermediate bulk containers under the provisions of paragraph (e) of this section.
11. Up to 2000 kg per container authorized.
12. Samples may only be offered for transportation under the provisions of paragraph (c)(4) of this section.
13. "Corrosive" subsidiary risk label is required.
14. This material may be transported in bulk packagings under the provisions of paragraph (e) of this section.
15. No "Corrosive" subsidiary risk label is required for concentrations below 80%.
16. With <6% di-tert-butyl peroxide.
17. With ≥8% 1-isopropylhydroperoxy-4-isopropylhydroxybenzene.
18. Addition of water to this organic peroxide will decrease its thermal stability.
19. [Reserved]
20. Mixtures with hydrogen peroxide, water and acid(s).
21. With diluent type A, with or without water.
22. With >36%, by mass, ethylbenzene.
23. With >19%, by mass, methyl isobutyl ketone.
24. Diluent type b with boiling point >100°C.
25. No "Corrosive" subsidiary risk label is required for concentrations below 56%.

(c) *New organic peroxides, formulations and samples.*

(1) Except as provided for samples in paragraph (c)(2) of this section, no person may offer for transportation an organic peroxide which is not identified by technical name in the Organic Peroxides Table of this section, or a formulation of one or more organic peroxides which are identified by technical name in that table, unless the organic peroxide is assigned a generic type and shipping description and is approved by the Associate Administrator for Hazardous Materials Safety under the provisions of §173.128(c) of this subchapter.

(2) *Samples.* Samples of new organic peroxides or new formulations of organic peroxides identified in the Organic Peroxides Table in paragraph (b) of this section, for which complete test data are not available, and which are to be transported for further testing or evaluation, may be assigned an appropriate shipping description for organic peroxide Type C, packaged and offered for transportation, under the following conditions:

(i) Data available to the person offering the material for transportation must indicate that the sample would pose of level of hazard no greater than that of an organic peroxide type B and that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation;

(ii) The sample must be packaged in accordance with packing method OP2;

(iii) Packages of the organic peroxide may be offered for transportation and transported in a quantity not to exceed 10 kg (22 pounds) per transport vehicle; and

(iv) One of the following shipping descriptions must be assigned:

(A) Organic peroxide Type C, liquid, 5.2, UN 3103;

(B) Organic peroxide Type C, solid, 5.2, UN 3104;

(C) Organic peroxide type C, liquid, temperature controlled, 5.2, UN 3113; or

(D) Organic peroxide Type C, solid, temperature controlled, 5.2, UN 3114.

(3) *Mixtures.* Mixtures of organic peroxides individually identified in the Organic Peroxides Table in paragraph (b) of this section may be classified as the same type of organic peroxide as that of the most dangerous component and be transported under the conditions for transportation given for this type. If the stable components form a thermally less stable mixture, the SADT of the mixture must be determined and the new control and emergency temperature derived under the provisions of §173.21(f).

(d) *Packing Method Table.* Packagings for organic peroxides and self-reactive substances are listed in the Maximum Quantity per Packing Method Table. The packing methods are designated OP1 to OP8. The quantities specified for each packing method represent the maximum that is authorized.

(1) The following types of packagings are authorized:

(i) Drums: 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2;

(ii) Jerricans: 3A1, 3A2, 3B1, 3B2, 3H1, 3H2;

(iii) Boxes: 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4A, 4B; or

(iv) Composite packagings with a plastic inner receptacle: 6HA1, 6HA2, 6HB1, 6HB2, 6HC, 6HD1, 6HD2, 6HG1, 6HG2, 6HH1, 6HH2.

(2) Metal packaging (including inner packagings of combination packagings and outer packagings of combination or composite packagings) are used only for packing methods OP7 and OP8.

(3) In combination packagings, glass receptacles are used only as inner packagings with a maximum content of 0.5 kg or 0.5 liter.

(4) The maximum quantity per packaging or package for Packing Methods OP1-OP8 must be as follows:

**Maximum Quantity Per Packaging/Package for Packing Methods OP1 to OP8**

Maximum quantity	Packing method							
	OP1	OP2 <sup>1</sup>	OP3	OP4 <sup>1</sup>	OP5	OP6	OP7	OP8
Solids and combination packagings (liquid and solid) (kg)	0.5	0.5/10	5	5/25	25	50	50	<sup>2</sup> 200
Liquids (L)	0.5	.....	5	.....	30	60	60	<sup>3</sup> 225

<sup>1</sup> If two values are given, the first applies to the maximum net mass per inner packaging and the second to the maximum net mass of the complete package.

<sup>2</sup> 60 kg for jerricans and 100 kg for boxes.

<sup>3</sup> 60 L for jerricans.

(e) *Bulk packagings for organic peroxides.* When bulk packagings are authorized under the provisions of the Organic Peroxides Table in paragraph (b) of this section, only the following packagings are authorized:

(1) *Railcars.* Class DOT 103, 104, 105, 109, 111, 112, 114, 115, or 120 fusion-weld tank car tanks are authorized. DOT 103W, 111A60F1 and 111A60W1 tank car tanks must have bottom outlets effectively sealed from inside. Gauging devices are required on DOT 103W tank car tanks. Riveted tank car tanks are not authorized.

(2) *Cargo tanks.* Specification MC 307, MC 310, MC311, MC 312, DOT 407, and DOT412 cargo tank motor vehicles with a tank design pressure of at least 172 kPa (25 psig) are authorized.

(3) *Portable tanks.*

(i) Specification IM 101 intermodal portable tanks are authorized as follows:

(A) Each tank must have a minimum design pressure of 267 kPa (39 psig), a minimum shell thickness of 6.35 mm (0.250 inch) mild steel.

(B) Each tank must be equipped with at least two self-reclosing pressure relief devices of at least 7.6 cm (3.0 inches) diameter. The pressure relief devices must be set at a pressure that is determined by the following formula:

$$\text{Pressure relief valve setting} = 1/2 \times [\text{Vapor pressure of lading at } 46^{\circ}\text{C (115}^{\circ}\text{F)} + \text{Static head of lading} + \text{Pressure of gas padding, if any}]$$

(ii) Specification 57 metal portable tanks are authorized only for tert-butyl cumyl peroxide, di-(2-tert-butylperoxyisopropyl-benzene(s), dicumyl peroxide and mixtures of two or more of these peroxides.

(4) For tertiary butyl hydroperoxide (TBHP), each tank car, cargo tank or portable tank must contain 7.6 cm (3.0 inches) low density polyethylene (PE) saddles having a melt index of at least 0.2 grams per 10 minutes (ASTM D1238, condition E) as part of the lading, with a ratio of PE to TBHP over a range of 0.008 to 0.012 by mass. Alternatively, plastic or metal containers equipped with fusible plugs having a melting point between 69°C (156°F) and 71°C (160°F) and filled with a sufficient quantity of water to dilute the TBHP to 65 percent or less by mass may be used. The PE saddles must be visually

inspected after each trip and, at a minimum, once every 12 months, and replaced when discoloration, fracture, severe deformation, or other indication of change is noted.

(v) Specification 57 metal portable tanks are authorized only for tert-butyl cumyl peroxide, di-(2-tert-butylperoxyisopropyl)-benzene(s), and dicumyl peroxide.

(5) Intermediate bulk containers. Intermediate bulk containers that are tested at the Packing Group II performance level in accordance with subpart O of part 178 of this subchapter are authorized as follows:

- (i) Composite: 31HA1;
- (ii) Rigid plastic: 31H1; and
- (iii) Metal: 31A.

#### **§173.226 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone A.**

Division 6.1. Packing Group I, materials that are poisonous by inhalation and that fall within the boundaries of Hazard Zone A in the graph found in §173.133 must be packed in non-bulk packagings in accordance with the following paragraphs:

(a) In specification cylinders, as authorized in §173.40.

(b) In 1A1, 1B1, 1H1, 1N1, or 6HA1 drums further packed in a 1A2 or 1H2 drum. Both inner and outer drums must conform to the performance test requirements of Subpart M of Part 178 of this subchapter at the Packing Group I performance level. The outer drum must have a minimum thickness of 1.35 mm (0.053 inches for a 1A2 outer drum or 6.30 mm (0.248 inch) for a 1H2 outer drum. Outer 1A2 and 1H2 drums must withstand a hydrostatic test pressure of 100 kPa (15 psi). Capacity of the inner drum may not exceed 220 L (58 gallons). In addition, the inner drum must —

(1) Be capable of satisfactorily withstanding the hydrostatic pressure test in §178.605 of this subchapter at a test pressure of 550 kPa (80 psig);

(2) Satisfactorily withstand the leakproofness test in §178.604 of this subchapter using an internal air pressure of at least twice the vapor pressure at 55°C (131°F) of the material to be packaged;

(3) Have screw-type closures that are —

(i) Closed and tightened to a torque prescribed by the closure manufacturer, using a device that is capable of measuring torque;

(ii) Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation; and

(iii) Provided with a cap seal that is properly applied in accordance with the cap seal manufacturer's recommendations and is capable of withstanding an internal pressure of at least 100 kPa (15 psig).

(4) Have a minimum thickness as follows:

(i) If the capacity of the inner drum is less than or equal to 120 L (32 gallons), the minimum thickness of the inner drum is —

(A) For a 1A1 or 1N1 drum, 1.3 mm (0.051 inches);

(B) For a 1B1 drum, 3.9 mm (0.154 inches);

(C) For a 1H1 drum, 3.16 mm (0.124 inches); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.0622 inches) and the outer steel drum shall be 0.96 mm (0.0378 inches).

(ii) If the capacity of the inner drum is greater than 120 L (32 gallons), the thickness of the inner drum is —

(A) For a 1A1 or 1N1 drum, 1.7 mm (0.067 inches);

(B) For a 1B1 drum, 4.7 mm (0.185 inches);

(C) For a 1H1 drum, 3.16 mm (0.124 inches); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.0622 inches) and the outer steel drum shall be 1.08 mm (0.043 inches).

(5) Be isolated from the outer drum by a shock-mitigating, non-reactive material.

(c) In combination packagings, consisting of an inner packaging system and an outer packaging, as follows:

(1) *Outer packagings:*

Steel drum: 1A2

Aluminum drum: 1B2

Metal drum, other than steel or aluminum: 1N2

Plywood drum: 1D

Fiber drum: 1C

Plastic drum: 1H2

Wooden barrel: 2C2

Steel jerrican: 3A2

Plastic jerrican: 3H2

Aluminum jerrican: 3B2

Steel box: 4A

Aluminum box: 4B

Natural wood box: 4C1 or 4C2

Plywood box: 4D

Reconstituted wood box: 4F

Fiberboard box: 4G

Expanded plastic box: 4H2

Solid plastic box: 4H2

(2) *Inner packaging system.* The inner packaging system consists of two packagings: an impact-resistant receptacle of glass, earthenware, plastic or metal securely cushioned with a nonreactive, absorbent material and packed within a leak-tight packaging of metal or plastic. This combination packaging in turn is packed within the outer packaging. Capacity of each inner receptacle may not exceed 4 L (1 gallon). An inner receptacle that has a closure must have a closure which is physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation. Both the inner packaging system and the outer packaging must conform to the performance test requirements of Subpart M of Part 178 of this subchapter, at the Packaging Group I performance level. The inner packaging system must meet these tests without the benefit of the outer packaging. The total amount of liquid contained in the outer packaging may not exceed 16 L (4 gallons).

#### **§173.227 Materials poisonous by inhalation, Division 6.1, Packing Group I, Hazard Zone B.**

Division 6.1. Packing Group I, materials that are poisonous by inhalation and that fall within the boundaries of Hazard Zone B in the graph found in §173.133 shall be packed in non-bulk packagings which conform to the performance test requirements of Subpart M of Part 178 of this subchapter, at the Packing Group I performance level. The following packagings are authorized:

(a) Packagings as authorized in §173.226.

(b) 1A1, 1B1, 1N1 or 1H1 drum or 6HA1 composite further packed in a 1A2 or 1H2 drum. Both the inner and outer drums must conform to the performance test requirements of Subpart M of Part 178 of this subchapter at the Packing Group I performance level. The outer drum must have a minimum thickness of 1.35 mm (0.053 inches) for a 1A2 outer drum or 6.30 mm (0.248 inches) for a 1H2 outer drum. Outer 1A2 and 1H2 drums must withstand a hydrostatic test pressure of 100 kPa (15 psi). In addition, the inner drum must —

(1) Satisfactorily withstand the leakproofness test in §178.604 of this subchapter using an internal air pressure of at least two times the vapor pressure at 55°C (131°F) of the material to be packaged;

(2) Have screw closures that are —

(i) Closed and tightened to a torque prescribed by the closure manufacturer, using a device that is capable of measuring torque;

(ii) Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation; and

(iii) Provided with a cap seal that is properly applied in accordance with the cap seal manufacturer's recommendations and is capable of withstanding an internal pressure of at least 100 kPa (15 psig).

(3) Have a minimum thickness as follows:

(i) If the capacity of the inner drum is less than or equal to 30 L (7.9 gallons), the minimum thickness of the inner drum is:

(A) For a 1A1 drum, 0.69 mm (0.027 inch);

(B) For a 1B1 drum, 2.79 mm (0.110 inch);

(C) For a 1H1 drum, 1.14 mm (0.045 inch); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.0625 inch), the outer steel drum shall be 0.70 mm (0.027 inch).

(ii) If the capacity of the inner drum is greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons), the minimum thickness of the inner drum is —

(A) For a 1A1 drum, 1.08 mm (0.043 inch);

(B) For a 1B1 drum, 3.9 mm (0.154 inch);

(C) For a 1H1 drum, 3.16 mm (0.124 inch); and

(D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.0625 inch) and the outer steel drum shall be 0.96 mm (0.0378 inches).

(iii) If the capacity of the inner drum is greater than 120 L (31.7 gallons), the thickness of the inner drum is —

- (A) For a 1A1 or 1N1 drum, 1.35 mm (0.053 inches);
  - (B) For a 1B1 drum, 4.7 mm (0.185 inches);
  - (C) For a 1H1 drum, 3.16 mm (0.124 inches); and
  - (D) For a 6HA1 drum, the plastic inner container shall be 1.58 mm (0.0625 inch) and the outer steel drum shall be 1.08 mm (0.043 inch).
- (4) Be isolated from the outer drum by a shock-mitigating, non-reactive material; and
- (5) Have a capacity not greater than 220 L (58 gallons).

(c) 1A1, 1B1, 1H1, 1N1 or 6HA1 drums described in paragraph (b) of this section may be used without being further packed in a 1A2 or 1H2 drum if the shipper loads the material, blocks and braces the drums within the transport vehicle and seals the transport vehicle used. Drums may not be stacked (double decked) within the transport vehicle. Shipments must be from one origin to one destination only without any intermediate pickup or delivery.

#### **§173.228 Bromine pentafluoride or bromine trifluoride.**

(a) When the §172.101 Table specifies that a hazardous material be packaged under this section, only non-bulk packagings prescribed in paragraph (b) of this section are authorized for its transportation. Each packaging must conform to the general packaging requirements of Subpart B of this part, to the specification requirements of Part 178 of this subchapter and to the requirements of the special provisions of Column 7 of the §172.101 Table.

(b) Specification 3A150, 3AA150, 3B240, 3BN150, 4B240, 4BA240, 4BW240 and 3E1800 cylinders are authorized. Each valve outlet must be sealed by a threaded cap or threaded plug. Cylinder valves must be protected as specified for corrosive gases in §173.301(g). No cylinder may be equipped with any pressure relief device. Specification 3E1800 cylinders must be packaged in accordance with the requirements of §173.301(k).

#### **§173.229 Chloric acid solution or chlorine dioxide hydrate, frozen.**

When the §172.101 Table specifies that a hazardous material be packaged in accordance with this section, only 4G fiberboard boxes, with inner packagings of polyethylene or other suitable material, are authorized. Fiberboard boxes must be reinforced and insulated and sufficient dry ice must be used to maintain the hydrate or acid in a frozen state during transportation. Each packaging must conform to the general packaging requirements of Subpart B of Part 173, and to the requirements of Part 178 of this subchapter at the Packing Group I performance level. Transportation is authorized only by private or contract carrier by motor vehicle.

### **Subpart F — Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7**

#### **§173.240 Bulk packaging for certain low hazard solid materials.**

When §172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of Subparts A and B of Part 173 of this subchapter and the special provisions specified in Column 7 of the §172.101 Table.

(a) *Rail cars*: Class DOT 103, 104, 105, 109, 111, 112, 114, 115, or 120 tank car tanks; Class 106 or 110 multi-unit tank car tanks; and metal non-DOT specification, sift-proof tank car tanks and sift-proof closed cars.

(b) *Motor vehicles*: Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, DOT 406, DOT 407, and DOT 412 cargo tank motor vehicles; non-DOT specification, sift-proof cargo tank motor vehicles; and sift-proof closed vehicles.

(c) *Portable tanks and closed bulk bins*: DOT 51, 52, 53, 56, 57 and 60 portable tanks; IMO type 1, 2 and 5, and IM 101 and IM 102 portable tanks; marine portable tanks conforming to 46 CFR Part 64; and sift-proof non-DOT specification portable tanks and closed bulk bins.

(d) *Intermediate bulk containers*. Intermediate bulk containers are authorized subject to the conditions and limitations of this paragraph and paragraph (d)(2) of this section provided they conform to the requirements in subpart O of part 178 of this subchapter at the Packing Group performance level specified in column 5 of the §172.101 Table of this subchapter for the material being transported.

(1) The following are authorized:

(i) Composite: 11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1, or 31HZ2. For composite intermediate bulk containers the letter “Z” must be replaced with a capital letter which indicates the material of construction of the outer packaging. For example 21HA1 is a composite intermediate bulk container with a metal outer packaging (see §178.702 of this subchapter);

(ii) Fiberboard: 11G;

(iii) Flexible: 13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, or 13M2;

(iv) Metal: 11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B, or 31N;

(v) Rigid plastic: 11H1, 11H2, 21H1, 21H2, 31H1, or 31H2; or

(vi) Wooden intermediate bulk containers: 11C, 11D, or 11F.

(2) The following conditions and limitations apply to the use of intermediate bulk containers:

(i) Flexible, fiberboard and wooden intermediate bulk containers are intended for the transport of solids only and may not be used for liquids or materials that may become liquid during transportation; or

(ii) Flexible, fiberboard, or wooden intermediate bulk containers containing materials in Packing Group II must be packed in a closed freight container or a closed transport vehicle.

#### **§173.241 Bulk packagings for certain low hazard liquid and solid materials.**

When §172.101 of this subchapter specifies that a hazardous material be packaged under this section, only the following bulk packagings are authorized, subject to the requirements of Subparts A and B of Part 173 of this subchapter and the special provisions specified in Column 7 of the §172.101 Table.

(a) *Rail cars*: Class DOT 103, 104, 105, 109, 111, 112, 114, 115, or 120 tank car tanks; Class 106 or 110 multi-unit tank car tanks and AAR Class 203W, 206W, and 211W tank car tanks.

(b) *Cargo tanks*: DOT specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, DOT 406, DOT 407, and DOT 412 cargo tank motor vehicles; and non-DOT specification cargo tank motor vehicles suitable for transport of liquids.

(c) *Portable tanks*: DOT 51, 52, 56, 57 and 60 portable tanks; IMO type 1, 2 and 5, and IM 101 and IM 102 portable tanks; marine portable tanks conforming to 46 CFR Part 64; and non-DOT specification portable tanks suitable for transport of liquids.

(d) *Intermediate bulk containers*

(1) intermediate bulk containers are authorized subject to the conditions and limitations of this paragraph and paragraph (d)(2) of this section provided they conform to the requirements in subpart O of part 178 of this subchapter at the Packing Group performance level specified in column 5 of the §172.101 Table of this subchapter for the material being transported.

(i) The following are authorized for liquids or solids:

(A) Composite: 31HZ1 or 31HZ2; For each composite intermediate bulk container, the letter “Z” must be replaced with a capital letter which indicates the material of construction of the outer packaging. For example, 31HA1 is a composite intermediate bulk container with a metal outer packaging (see §178.702 of this subchapter);

(B) Metal: 31A, 31B, or 31N; or

(C) Rigid plastic: 31H1 or 31H2.

(ii) The following are authorized for solids only:

(A) Composite: 11HZ1, 11HZ2, 21HZ1, or 21HZ2. For each composite intermediate bulk container, the letter “Z” must be replaced with a capital letter which indicates the material of construction of the outer packaging. For example, 21HA1 is a composite intermediate bulk container with a metal outer packaging (see §178.702 of this subchapter);

(B) Fiberboard: 11G

(C) Flexible: 13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, or 13M2;

(D) Metal: 11A, 11B, 11N, 21A, 21B, or 21N;

(E) Rigid plastic: 11H1, 11H2, 21H1, or 21H2, or

(F) Wooden: 11C, 11D, or 11F.

(2) The following conditions and limitations apply to the use of intermediate bulk containers:

(i) Flexible, fiberboard and wooden intermediate bulk containers are intended for the transport of solids only and may not be used for liquids or materials that may become liquid during transportation; or