

V=internal volume in cubic centimeter (1 cubic inch=16.387 cubic centimeters);

P=test pressure, pounds per square inch.

Formula derived from formula of Note 2 and the following:

$$EE=(PKVD^2)/(D^2-d^2)$$

NOTE 2: The maximum wall stress shall be computed from the formula:

$$S=(P(1.3D^2+0.4d^2))/(D^2-d^2)$$

where:

S=wall stress, pounds per square inch;

P=test pressure, pounds per square inch;

D=outside diameter, inches;

d=D-2t, where t=minimum wall thickness determined by a suitable method

(4) That an external and internal visual examination made at the time of test or retest shows the cylinder to be free from excessive corrosion, pitting, or dangerous defects.

(5) That a plus sign (+) be added following the test date marking on the cylinder to indicate compliance with paragraphs (c) (2), (3), and (4) of this section.

(d) *Fluorine.* Fluorine must be shipped in Specification 3A1000, 3AA1000, or 3BN400 (§ 178.36, § 178.37 or § 178.39 of this subchapter) cylinders without safety relief device and equipped with valve protection cap. Such containers must not be charged to over 400 p.s.i.g. at 70° F. and must not contain over 6 pounds of gas.

(e) *Verification of container pressure.* (1) Each day, the pressure in a container representative of that day's compression must be checked by the charging plant after the container has cooled to a settled temperature and a record of this test kept for at least 30 days.

(f) *Carbon monoxide.* Carbon monoxide must be shipped in a Specification 3A, 3AX, 3AA, 3AAX, 3AL, 3, 3E, or 3T, (§§ 178.36, 178.37, 178.46, 178.42, 178.45 of this subchapter) cylinder having a minimum service pressure of 1,800 psig. The pressure in the cylinder must not exceed 1000 psig at 70° F. except that if the gas is dry and sulfur free, the cylinder may be charged to five-sixths of the cylinder service pressure or 2000 psig, whichever is the lesser. Specification 3AL cylinders are authorized only when transported by highway, rail and cargo-only aircraft.

(g) *Diborane and diborane mixtures.* Diborane and diborane mixed with compatible compressed gas in Specification 3AA1800 (§ 178.37 of this subchapter), cylinders. The maximum filling density of the diborane shall not exceed 7 percent. Diborane mixed with compatible compressed gas must not have a pressure exceeding the service pressure of the cylinder if complete decomposition of the diborane occurs. Cylinder valves must be protected either by metal caps or by over packing cylinder in strong wooden boxes.

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

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.302, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.303 Charging of cylinders with compressed gas in solution (acetylene).

(a) *Cylinder, filler and solvent requirements.* (Refer to applicable parts of Specification 8 and 8AL). Acetylene gas must be shipped in Specification 8 or 8AL (§ 178.59 or § 178.60 of this subchapter) cylinders. The cylinders shall consist of metal shells filled with a porous material, and this material must be charged with a suitable solvent. The cylinders containing the porous material and solvent, shall be tested with satisfactory results in accordance with CGA Pamphlet C-12. Representative samples of cylinders charged with acetylene shall be tested with satisfactory results in accordance with CGA Pamphlet C-12.

(1) The specific gravity of acetone solvent in acetylene cylinders must be 0.796 or over at 15.5° C. (59.9° F.).

(2) The amount of solvent added in the refilling operation must not cause the tare weight of the cylinder to exceed its marked tare weight. The tare weight includes the weight of the cylinder shell, porous filling, valve, safety relief devices and solvent, but without removable cap.

(b) *Filling limits.* The pressure in cylinders containing acetylene gas must not exceed 250 psi at 70° F., and in case the cylinders are marked for a lower allowable charging pressure, at

70° F., then that pressure must not be exceeded.

(c) *Data requirements on filler and solvent.* Cylinders containing acetylene gas must not be shipped unless they were charged by or with the consent of the owner, and by a person, firm, or company having possession of complete information as to the nature of the porous filling, the kind and quantity of solvent in the cylinders, and the meaning of such markings on the cylinders as are prescribed by the Department's regulations and specifications applying to containers for the transportation of acetylene gas.

(d) *Verification of container pressure.* (1) Each day, the pressure in a container representative of that day's compression must be checked by the charging plant after the container has cooled to a settled temperature and a record of this test kept for at least 30 days.

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.303, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.304 Charging of cylinders with liquefied compressed gas.

(a) *Detailed charging requirements.* Liquefied gases shall be charged in ac-

cordance with the specific provisions of paragraph (a)(2) of this section or paragraph (e) of this section. Where charging requirements are not specifically prescribed, liquefied gases, except gas in solution or poisonous gas, must be shipped, subject to the applicable paragraphs under General Requirements for Shipment (see § 173.301), the charging requirements of this section for liquefied compressed gas, or the charging requirements for mixtures (see § 173.305), in containers manufactured under specifications, as follows:

(1) Specification 3,<sup>1</sup> 3A, 3AA, 3B, 3BN, 3D,<sup>1</sup> 3E, 4,<sup>1</sup> 4A,<sup>1</sup> 4B, 4BA, 4B240ET, 4BW, 4E, 9,<sup>1</sup> 25,<sup>1</sup> 26,<sup>1</sup> 38,<sup>1</sup> 39, 40,<sup>1</sup> or 41,<sup>1</sup> (§§ 178.36, 178.37, 178.38, 178.39, 178.42, 178.50, 178.51, 178.55, 178.61, 178.65, 178.68 of this subchapter), except that no Specification 4E, 9, 39, 40, 41 packaging may be charged and shipped with a mixture containing a pyroforic liquid, carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin, or poisonous material (class A, B, or irritating material), unless specifically authorized in this part.

(2) The following requirements must be complied with for the gases named (for cryogenic liquids, see § 173.316):

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Containers marked as shown in this column or of the same type with higher service pressure must be used except as provided in § 173.34 (a), (b), § 173.301(j) (see notes following table)
Anhydrous ammonia.....	54.....	DOT-4; DOT-3A480; DOT-3AA480; DOT-3A480X; DOT-4A480; DOT-3; DOT-4AA480; DOT-3E1800; DOT-3AL480.
Bromotrifluoromethane (R-13B1 or H-1301).	124.....	DOT-3A400; DOT-3AA400; DOT-3B400; DOT-4A400; DOT-4AA480; DOT-4B400; DOT-4BA400; DOT-4BW400; DOT-3E1800; DOT-39; DOT-3AL400.
Carbon dioxide (see notes 4, 7, and 8)...	68.....	DOT-3A1800; DOT-3AX1800; DOT-3AA1800; DOT-3AA1800X; DOT-3; DOT-3E1800; DOT-311800; DOT-3HT2000; DOT-39; DOT-3AL1800.
Chlorine (see Note 2).....	125.....	DOT-3A480; DOT-3AA480; DOT-25; DOT-3; DOT-3BN480; DOT-3E1800.
Chlorodifluoroethane (R-142b) or 1-chloro-1,1-difluoroethane (see Note 8).	100.....	DOT-3A150; DOT-3AA150; DOT-3B150; DOT-4B150; DOT-4BA225; DOT-4BW225; DOT-3E1800; DOT-39; DOT-3AL150.
Chlorodifluoromethane (R-22) (see Note 8).	105.....	DOT-3A240; DOT-3AA240; DOT-3B240; DOT-4B240; DOT-4BA240; DOT-4BW240; DOT-4B240ET; DOT-4E240; DOT-39; DOT-41; DOT-3E1800; and DOT-3AL240.

<sup>1</sup>Use of existing cylinders authorized, but new construction not authorized.

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Containers marked as shown in this column or of the same type with higher service pressure must be used except as provided in § 173.34 (a), (b), § 173.301(f) (see notes following table)
Chloropentafluorethane, (R-115).....	110.....	DOT-3A225; DOT-3AA225; DOT-3B225; DOT-4A225; DOT-4BA225; DOT-4B225; DOT-4BW225; DOT-3E1800; DOT-39; and DOT-3AL225.
Chlorotrifluoromethane (R-13) (see Note 8).	100.....	DOT-3A1800; DOT-3AA1800; DOT-3; DOT-3E1800; DOT-39; and DOT-3AL1800.
Cyclopropane (see Notes 8 and 9).....	55.....	DOT-3A225; DOT-3A480X; DOT-3AA225; DOT-3B225; DOT-4A225; DOT-4AA480; DOT-4BA225; DOT-4B225; DOT-4BA225; DOT-4BW225; DOT-4B240ET; DOT-3; DOT-3E1800; DOT-39; and DOT-3AL225.
Dichlorodifluoromethane (R-12) (see Note 8).	119.....	DOT-3A225; DOT-3AA225; DOT-3B225; DOT-4A225; DOT-4B225; DOT-4BA225; DOT-4BW225; DOT-4B240ET; DOT-4E225; DOT-9; DOT-39; DOT-41; DOT-3E1800; and DOT-3AL225.
Dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture) (R-500) (see Note 9).	Not liquid full at 130° F.....	DOT-3A240; DOT-3AA240; DOT-3B240; DOT-3E1800; DOT-4A240; DOT-4B240; DOT-4BA240; DOT-4B240; DOT-4E240; DOT-9, DOT-39.
Difluoroethane (R-152a) (see Note 8)....	79.....	DOT-3A150; DOT-3AA150; DOT-3B150; DOT-4B150; DOT-4BA225; DOT-4BW225; DOT-3E1800; DOT-3AL150.
Dimethylamine, anhydrous.....	59.....	DOT-3A150; DOT-3AA150; DOT-3B150; DOT-4B150 DOT-4BA225; DOT-4BW225; ICC-3E1800.
Ethane (see Notes 8 and 9).....	35.8.....	DOT-3A1800; DOT-3AX1800; DOT-3BA1800; DOT-3AA1800; DOT-3; DOT-3E1800; DOT-3T1800; DOT-39; DOT-3AL1800.
Ethane (see Notes 8 and 9).....	36.8.....	DOT-3A2000; DOT-3AX2000; DOT-3AA2000; DOT-3AAX2000; DOT-3T2000; DOT-39; DOT-3AL2000.
Ethylene (see Notes 8 and 9).....	31.0.....	DOT-3A1800; DOT-3AX1800 DOT-3BA1800; DOT-3AA1800; DOT-3AAX1800; DOT-3; DOT-3E1800; DOT-3T1800; DOT-39; and DOT-3AL1800.
Ethylene (see Notes 8 and 9).....	32.5.....	DOT-3A2000; DOT-3AX2000; DOT-3AA2000; DOT-3AAX2000; DOT-3T2000; DOT-39; and DOT-3AL2000.
Ethylene (see Notes 8 and 9).....	35.5.....	DOT-3A2400; DOT-3AX2400; DOT-3BA2400; DOT-3AA2400; DOT-3AAX2400; DOT-3T2400; DOT-39; DOT-3AL2400.
Hydrogen chloride.....	65.....	DOT-3A1800; DOT-3AA1800; DOT-3AX1800; DOT-3AAX1800; DOT-3; DOT-3T1800; DOT-3E1800.
Hydrogen sulfide (see Note 10).....	62.5.....	DOT-3A480; DOT-3AA480; DOT-3B480; DOT-4A480; DOT-4B480; DOT-4BA480; DOT-4BW480; DOT-26-480; DOT-3E1800; DOT-3AL480.
Insecticide, liquefied gas (see Note 8)....	Not liquid full at 130° F.....	DOT-3A300; DOT-3AA300; DOT-3B300; DOT-4B300; DOT-4BA300; DOT-4BW300; DOT-9; DOT-40; DOT-41 DOT-3E1800.
Liquefied nonflammable gases, liquid other than those classified as flammable, corrosive, or poisonous, and mixtures or solutions thereof, charged with nitrogen, carbon dioxide, or air (see Notes 7 and 8).	Not liquid full at 130° F.....	Specification packaging authorized in paragraph (a)(1) of this section and DOT-3HT; DOT 4D; DOT-4DA; DOT-4DS.
Methylacetylene-propadiene, stabilized (see Note 5).	Not liquid full at 130° F.....	DOT-4B240 without brazed seams; DOT-4BA240 without brazed seams; DOT-3A240; DOT-3AA240; DOT-3B240; DOT-3E1800; DOT-4BW240; DOT-4E240; DOT-4B240ET; DOT-4; DOT-41; DOT-3AL240.
Methyl chloride.....	84.....	DOT-3A225; DOT-3AA225; DOT-3B225; DOT-4A225; DOT-4B225; DOT-4BA225; DOT-4B225; DOT-3; DOT-4; DOT-25; DOT-28-300; DOT-38; DOT-3E1800; DOT-4B240ET. Cylinders complying with DOT-3A150; DOT-3B150; DOT-4A150, and DOT-4B150 manufactured prior to Dec. 7, 1938 are also authorized.
Methyl mercaptan.....	80.....	DOT-3A240; DOT-3AA240; DOT-3B240; DOT-4B240; DOT-4B240ET; DOT-3E1800; DOT-4BA240; DOT-4BW240.
Monomethylamine, anhydrous.....	60.....	DOT-3A150; DOT-3AA150; DOT-3B150; DOT-4B150; DOT-4BA225; DOT-4BW225; DOT-3E1800.
Nitrosyl chloride.....	110.....	DOT-3BN400 only.
Nitrous oxide (see Notes 7, 8, and 11)...	69.....	DOT-3A1800; DOT-3AX1800; DOT-3AA1800; DOT-3AAX1800; DOT-3; DOT-3E1800; DOT-3T1800; DOT-3HT2000; DOT-39; DOT-3AL1800.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.(see Note 6).	Not liquid full at 130° F.....	DOT-3A240; DOT-3AA240; DOT-3B240; DOT-3E1800; DOT-4A240; DOT-4B240; DOT-4BA240; DOT-4B240; DOT-4E240; DOT-9; DOT-39; and DOT-3AL240.

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Containers marked as shown in this column or of the same type with higher service pressure must be used except as provided in § 173.34 (a), (b), § 173.301(f) (see notes following table)
Sulfur dioxide (see note 8)	125	DOT-3A225; DOT-3AA225; DOT-3B225; DOT-4A225; DOT-4B225; DOT-4BA225; DOT-4BW225; DOT-4B240ET; DOT-3; DOT-4; DOT-25; DOT-28-150; DOT-38; DOT-39; DOT-3E1800; and DOT-3AL225.
Sulfur hexafluoride	120	DOT-3A1000; DOT-3AA1000; DOT-3AA2400; DOT-3; DOT-3AL1000; DOT-3E1800; DOT-3T1800.
Sulfuryl fluoride	106	DOT-3A480; DOT-3AA480; DOT-3E1800; DOT-4B480; DOT-4BA480; DOT-4BW480.
Tetrafluoroethylene, inhibited	90	DOT-3A1200; DOT-3AA1200; DOT-3E1800.
Trifluorochloroethylene	115	DOT-3A300; DOT-3AA300; DOT-3B300; DOT-4A300; DOT-4B300; DOT-4BA300; DOT-4BW300; DOT-3E1800.
Trimethylamine, anhydrous	57	DOT-3A150; DOT-3AA150; DOT-3B150; DOT-4B150; DOT-4BA225; DOT-4BW225; DOT-3E1800.
Vinyl chloride (see Note 5)	84	DOT-4B150 without brazed seams; DOT-4BA225 without brazed seams; DOT-4BW225; DOT-3A150; DOT-3AA150; DOT-25; DOT-3E1800; DOT-3AL150.
Vinyl fluoride, inhibited	62	DOT-3A1800; DOT-3AA1800; DOT-3E1800; DOT-3AL1800.
Vinyl methyl ether (see Note 5)	68	DOT-4B150, without brazed seams; DOT-4BA225 without brazed seams; DOT-4BW225; DOT-3A150; DOT-3AA150; DOT-3B150; DOT-25; DOT-3E1800.

NOTE 1: The "filling density" is hereby defined as the percent ratio of the weight of gas in a container to the weight of water that the container will hold at 60° F. (1 lb. of water=27.377 cubic inches at 60° F.).

NOTE 2: Cylinders purchased after Oct. 1, 1944, for the transportation of chlorine must contain no aperture other than that provided in the neck of the cylinder for attachment of a valve equipped with an approved safety relief device. Cylinders purchased after Nov. 1, 1935, and charged with chlorine must not contain over 150 pounds of gas.

NOTE 3: [Reserved]

NOTE 4: Special carbon dioxide mining devices containing a heating element and charged with not over 6 pounds of carbon dioxide may be filled to a density of not over 85 percent, provided the cylinder is made of steel with a calculated bursting pressure in excess of 39,000 psi, be fitted with a frangible disc that will operate at not over 57 percent of that pressure, and be able to withstand a drop of 10 feet when striking crosswise on a steel rail while under a pressure of at least 3,000 psi. Such devices must be shipped in strong boxes or must be wrapped in heavy burlap and bound by 12-gauge wire with the wire completely covered by friction tape. Wrapping must be applied so as not to interfere with the functioning of the frangible disc safety relief device. Shipments must be described as "liquefied carbon dioxide gas (mining device)" and marked, labeled, and certified as prescribed for liquefied carbon dioxide.

NOTE 5: All parts of valve and safety relief devices in contact with contents of cylinders must be of a metal or other material, suitably treated if necessary, which will not cause formation of any acetylides.

NOTE 6: [Reserved]

NOTE 7: Specification 3HT cylinders for aircraft use only, having a maximum service life of 24 years. Authorized only for nonflammable gases. Cylinders must be equipped with pressure relief devices only of the frangible disc type which meet the requirements of § 173.34(d). Each frangible disc must have a rated bursting pressure which does not exceed 90 percent of the minimum required test pressure of the cylinder. Discs with fusible metal backing are not permitted. Cylinders may be shipped only when packed in strong outside packaging.

NOTE 8: See § 173.301(k).

NOTE 9: When used for shipment of flammable gases, the internal volume of a specification 39 cylinder must not exceed 75 cubic inches.

NOTE 10: Each valve outlet must be sealed by a threaded cap or a threaded solid plug.

NOTE 11: See § 173.304(a)(4).

(3) Specification 3AL (§ 178.46 of this subchapter) cylinders are authorized for the following liquefied gases: cyclobutane, hydrogen selenide, propylene, silane, carbonyl sulfide, vinyl bromide, and dimethyl ether. Shipments of flammable gases are authorized only when transported by highway, rail and cargo aircraft only.

(4) Specification DOT 3AL (§ 178.46 of this subchapter) cylinders when used in nitrous oxide service must be in compliance with the following conditions:

(i) Cylinder must be equipped only with brass or stainless steel valve; and

(ii) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(b) *Filling limits.* Except for carbon dioxide, nitrous oxide and vinyl fluoride, inhibited, the liquid portion of a

liquefied gas must not completely fill the packaging at any temperature up to and including 130°F. The liquid portion of vinyl fluoride, inhibited, may completely fill the cylinder at 130°F, provided the pressure at the critical temperature does not exceed one and one-fourth times the service pressure.

(c) *Verification of content in cylinder.* (1) Liquefied gases must be charged by weight, by volume measurement of liquid, charging line, by the use of proper scales or when lower in pressure than required for liquefaction a pressure-temperature chart may be used in charging to insure that the service pressure at 70° F. times 5/4 will not be exceeded at 130° F.

(2) Except as noted in paragraph (d)(4) of this section, the amount of liquefied gas charged into a container must be determined by weight, or if charged at a pressure lower than the liquefaction point, by pressure shown on a chart for the specific gas. Weight must be checked, after disconnecting from the charging line, by the use of proper scales.

(d) *Requirements for liquefied petroleum gas.* (1) Filling density limited as follows:

Minimum specific gravity of the liquid material at 60° F.	Maximum filling density in percent of the water-weight capacity of the container
0.271 to 0.289.....	26
0.290 to 0.306.....	27
0.307 to 0.322.....	28
0.323 to 0.339.....	29
0.339 to 0.354.....	30
0.355 to 0.371.....	31
0.372 to 0.396.....	32
0.399 to 0.425.....	33
0.426 to 0.440.....	34
0.441 to 0.452.....	35
0.453 to 0.462.....	36
0.463 to 0.472.....	37
0.473 to 0.480.....	38
0.481 to 0.488.....	39
0.489 to 0.495.....	40
0.496 to 0.503.....	41
0.504 to 0.510.....	42
0.511 to 0.519.....	43

Minimum specific gravity of the liquid material at 60° F.	Maximum filling density in percent of the water-weight capacity of the container
0.520 to 0.527.....	44
0.528 to 0.536.....	45
0.537 to 0.544.....	46
0.545 to 0.552.....	47
0.553 to 0.560.....	48
0.561 to 0.568.....	49
0.569 to 0.576.....	50
0.577 to 0.584.....	51
0.585 to 0.592.....	52
0.593 to 0.600.....	53
0.601 to 0.608.....	54
0.609 to 0.617.....	55
0.618 to 0.626.....	56
0.627 to 0.634.....	57

(2) Subject to § 173.301(f), any filling density percentage prescribed in this section is authorized to be increased by 2 for liquefied petroleum gas in Spec. 26 or 3 cylinders or in Spec. 3A marked for 1,800 psig, or higher, service pressure.

(3) Liquefied petroleum gas must be shipped in specification containers as follows:

(i) Specification 3, <sup>1</sup> 3A, 3AA, 3B, 3E, 3AL, 4B, 4BA, 4B240FLW, 4B240ET, 4BW, 4B240X, <sup>1</sup> 4E, 4, <sup>1</sup> 4A, <sup>1</sup> 9, <sup>1</sup> 25, <sup>1</sup> 26, <sup>1</sup> 38, <sup>1</sup> 39, or 41<sup>1</sup> (§§ 178.36, 178.37, 178.38, 178.42, 178.46, 178.50, 178.51, 178.54, 178.55, 178.61, 178.65, 178.68 of this subchapter) cylinders. The internal volume of a Specification 39 cylinder must not exceed 75 cubic inches. Shipments of flammable gases in 3AL cylinders are authorized only when transported by highway, rail and cargo-only aircraft

NOTE 1: Cylinders marked as complying with DOT Spec. 4B240FLW bearing manufacturer's symbol WCO and serial numbers 47A-1 to 47A-59200, inclusive, varying from the specification requirements as to physical properties of steel, are authorized for the transportation of liquefied petroleum gases.

(ii) Additional containers may be used within the limits of quantity and pressure as follows:

<sup>1</sup> Use of existing cylinders authorized, but new construction not authorized.

Type of container	Maximum capacity		Maximum charging pressure—p.s.i.g.
	Cubic inches	Gallons	
DOT-2P or DOT-2Q (see Note 1) .....	31.83	.....	45 p.s.i.g. at 70° F. and 105 p.s.i.g. at 130° F. (see Note 2).
DOT-2P or DOT-2Q (see Note 1) .....	31.83	.....	35 p.s.i.g. at 70° F. and 100 p.s.i.g. at 130° F.
DOT-3C or DOT-4C.....	3,881	16+5% tolerance.....	145 p.s.i.g. at 130° F.

NOTE 1: Containers must be packed in strong wooden or fiber boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each completed container filled for shipment must have been heated until contents reached a minimum temperature of 130° F., without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

NOTE 2: Containers must be equipped with safety relief devices which will prevent rupture of the containers and dangerous projection of the closing devices when the containers are exposed to the action of fire.

(4) Verification of content. Containers with a water capacity of 200 pounds or more and for use with a liquefied petroleum gas with a specific gravity at 60° F. of 0.504 or greater may have their contents determined by using a fixed length dip tube gauging device. The length of the dip tube shall be such that when a liquefied petroleum gas with a specific volume of 0.03051 cu. ft./lb. at a temperature of 40° F. is charged into the container it just reaches the bottom of the tube. The weight of this liquid shall not exceed 42 percent of the water capacity of the container which must be stamped thereon. The length of the dip tube, expressed in inches carried out to one decimal place and prefixed with the letters "DT" shall be stamped on the container and on the exterior of removable type dip tube; for the purpose of this requirement the marked length shall be expressed as the distance measured along the axis of a straight tube from the top of the boss through which the tube is inserted to the proper level of the liquid in the container. The length of each dip tube shall be checked when installed by weighing each container after filling except when installed in groups of substantially identical con-

tainers in which case one of each 25 containers shall be weighed. The quantity of liquefied gas in each container must be checked by means of the dip tube after disconnecting from the charging line. The outlet from the dip tube shall be not larger than a No. 54 drill size orifice. A container representative of each day's filling at each charging plant shall have its contents checked by weighing after disconnecting from the charging line.

(e) *Refrigerant gases.* Refrigerant gases which are nonpoisonous and nonflammable under this part, must be shipped in cylinders as prescribed in paragraph (a) (1) or (2) of this section, or as follows:

(1) Specifications 2P and 2Q (§§ 178.33, 178.33a of this subchapter). Inside metal containers packed in a strong wooden or fiberboard box of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Pressure in the container must not exceed 85 pounds per square inch absolute at 70° F. Each completed metal container filled for shipment must be heated until content reaches a minimum temperature of 130° F. without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked "Inside Containers Comply With Prescribed Specification."

(f) *Engine starting fluid.* Engine starting fluid containing compressed gas or gases which are flammable under this part must be shipped in cylinders as prescribed in paragraph (a)(1) of this section, or as follows:

(1) Inside nonrefillable metal containers having a capacity not over 32 cubic inches. Containers must be packaged in Spec. 12B (§ 178.205 of this subchapter) fiberboard boxes equipped with top and bottom pads

which will provide three complete thicknesses of fiberboard on top and bottom of each box, or Spec. 15A, 15B, 15C, 19A, or 19B (§§ 178.168, 178.169, 178.170, 178.190, 178.191 of this subchapter) wooden boxes. Pressure in the container must not exceed 140 psi, absolute, at 130° F. However, if the pressure exceeds 140 psi, absolute at 130° F., a Spec. 2P (§ 178.33 of this subchapter) container must be used. In any event, the metal container must be capable of withstanding without bursting a pressure of one and one-half times the pressure of the content at 130° F. The liquid content of the material and gas must not completely fill the container at 130° F. Each completed container filled for shipment must have been heated until content reaches a minimum temperature of 130° F., without evidence of leakage, distortion, or other defect. Each outside shipping container must be plainly marked, "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

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

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.304, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.305 Charging of cylinders with a mixture of compressed gas and other material.

(a) *Detailed requirements.* A mixture of a compressed gas and any other material must be shipped as a compressed gas if the mixture is a compressed gas as designated in § 173.300(a) and when not in violation of § 173.301(a).

(b) *Filling limits.* (See § 173.301(e).) For mixtures, the liquid portion of the liquefied compressed gas at 130° F. plus any additional liquid or solid must not completely fill the container.

(c) *Nonpoisonous and nonflammable mixtures.* Mixtures containing compressed gas or gases including insecticides, which mixtures are nonpoisonous and nonflammable under this part must be shipped in cylinders as prescribed in § 173.304(a) or as follows:

(1) Specification 2P (§ 178.33 of this subchapter). Inside metal containers

equipped with safety relief devices of a type examined by the Bureau of Explosives and approved by the Director, OHMT, and packed in strong wooden or fiber boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Pressure in the container may not exceed 85 psia at 70° F. Each completed metal container filled for shipment must be heated until content reaches a minimum temperature of 130° F., without evidence of leakage, distortion or other defect. Each outside shipping container must be plainly marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

(d) *Poisonous mixtures.* A mixture containing any poisonous material, Class A, or irritating material in such proportions that the mixture would be classed as poisonous under § 173.326(a) or § 173.381(a) must be shipped in packagings as authorized for these poisonous materials.

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-70, 38 FR 5309, Feb. 27, 1973, Amdt. 173-94, 41 FR 16079, Apr. 15, 1976; 45 FR 32697, May 19, 1980]

§ 173.306 Limited quantities of compressed gases.

(a) Limited quantities of compressed gases for which exceptions are permitted as noted by reference to this section in § 172.101 of this subchapter are excepted from labeling (except when offered for transportation by air) and, unless required as a condition of the exception, specification packaging requirements of this subchapter when packed in accordance with the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(1) When in containers of not more than 4 fluid ounces capacity (7.22 cubic inches or less) except cigarette lighters. Special exceptions for shipment of certain compressed gases in the ORM-D class are provided in Subpart N of this part.

(2) When in metal containers filled with a material that is not classed as a hazardous material to not more than 90 percent of capacity at 70° F. then charged with nonflammable, nonliquefied gas. Each container must be tested to three times the pressure at 70° F. and, when refilled, be retested to three times the pressure of the gas at 70° F. Also, one of the following conditions must be met:

(i) Container is not over 1 quart capacity and charged to not more than 170 psig at 70° F. and must be packed in a strong outside packaging, or

(ii) Container is not over 30 gallons capacity and charged to not more than 75 psig at 70° F.

(3) When in a metal container charged with a solution of materials and compressed gas or gases which is nonpoisonous, provided all of the following conditions are met. Special exceptions for shipment of aerosols in the ORM-D class are provided in Subpart N of this part.

(i) Capacity must not exceed 50 cubic inches (27.7 fluid ounces).

(ii) Pressure in the container must not exceed 180 psig at 130° F. If the pressure exceeds 140 psig at 130° F., but does not exceed 160 psig at 130° F., a specification DOT 2P (§ 178.33 of this subchapter) inside metal container must be used; if the pressure exceeds 160 psig at 130° F., a specification DOT 2Q (§ 178.33a of this subchapter) inside metal container must be used. In any event, the metal container must be capable of withstanding without bursting a pressure of one and one-half times the equilibrium pressure of the content at 130° F.

(iii) Liquid content of the material and gas must not completely fill the container at 130° F.

(iv) The container must be packed in strong outside packaging.

(v) Each completed container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the content at 130° F. (55° C.) without evidence of leakage, distortion, or other defect.

(vi) Each outside packaging must be marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED REGULATIONS."

(b) *Exemptions for foodstuffs, soap, biologicals, electronic tubes, and audible fire alarm systems.* Limited quantities of compressed gases, (except poisonous gases as defined by § 173.326) for which exceptions are provided as indicated by reference to this section in § 172.101 of this subchapter, when in accordance with one of the following paragraphs are excepted from labeling (except when offered for transportation 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, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter, except § 177.817. Special exceptions for shipment of certain compressed gases in the ORM-D class are provided in Subpart N of this part.

(1) Foodstuffs or soaps in a nonrefillable metal container not exceeding 50 cubic inches capacity (27.7 fluid ounces), with soluble or emulsified compressed gas, provided the pressure in the container does not exceed 140 p.s.i.g. at 130° F. The metal container must be capable of withstanding without bursting a pressure of one and one-half times the equilibrium pressure of the content at 130° F.

(i) Containers must be packed in strong outside packaging.

(ii) Liquid content of the material and the gas must not completely fill the container at 130° F.

(iii) Each outside packaging must be marked "INSIDE CONTAINERS COMPLY WITH PRESCRIBED REGULATIONS."

(2) Cream in refillable metal receptacles with soluble or emulsified compressed gas. Containers must be of such design that they will hold pressure without permanent deformation up to 375 psig and must be equipped with a device designed so as to release pressure without bursting of the container or dangerous projection of its parts at higher pressures. This exception applies to shipments offered for transportation by refrigerated motor vehicles only.

(3) Nonrefillable metal containers charged with a solution containing biological products or a medical preparation which could be deteriorated by

heat, and compressed gas or gases, which is nonpoisonous and nonflammable. The capacity of each container may not exceed 35 cubic inches (19.3 fluid ounces). The pressure in the container may not exceed 140 psig at 130° F., and the liquid content of the product and gas must not completely fill the containers at 130° F. One completed container out of each lot of 500 or less, filled for shipment, must be heated, until the pressure in the container is equivalent to equilibrium pressure of the content at 130° F. There must be no evidence of leakage, distortion, or other defect. Container must be packed in strong outside packagings.

(4) Electronic tubes, each having a volume of not more than 30 cubic inches and charged with gas to a pressure of not more than 35 psig and packed in strong outside packagings.

(5) Audible fire alarm systems powered by a compressed gas contained in an inside metal container when shipped under the following conditions:

(i) Each inside container must have contents which are not flammable, poisonous, or corrosive as defined under this part,

(ii) Each inside container may not have a capacity exceeding 35 cubic inches (19.3 fluid ounces),

(iii) Each inside container may not have a pressure exceeding 70 psig at 70° F. and the liquid portion of the gas may not completely fill the inside container at 130° F., and

(iv) Each nonrefillable inside container must be designed and fabricated with a burst pressure of not less than four times its charged pressure at 130° F. Each refillable inside container must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 130° F.

(c) *Fire extinguishers.* Fire extinguishers charged with limited quantities of a compressed gas to not more than 240 psig at 70° F. are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part

174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(1) Each fire extinguisher must be shipped as an inside packaging;

(2) Each fire extinguisher must have contents which are not flammable, poisonous, or corrosive as defined under this part;

(3) Each fire extinguisher under stored pressure may not have an internal volume exceeding 1,100 cubic inches. For fire extinguishers not exceeding 35 cubic inches capacity, the liquid portion of the gas plus any additional liquid or solid must not completely fill the container at 130° F. Fire extinguishers exceeding 35 cubic inches capacity may not contain any liquefied compressed gas;

(4) Each fire extinguisher manufactured on and after January 1, 1976, must be designed and fabricated with a burst pressure of not less than six times its charged pressure at 70° F. when shipped.

(5) Each fire extinguisher must be tested, without evidence of failure or damage, to at least three times its charged pressure at 70° F. but not less than 120 psig before initial shipment. For any subsequent shipment, each fire extinguisher must be in compliance with the retest requirements of the Occupational Safety and Health Administration Regulations of the Department of Labor, 29 CFR 1910.157(e), and;

(6) Each fire extinguisher must be marked to indicate the year of the test (within 90 days of the actual date of the original test) and "MEETS DOT REQUIREMENTS." This marking will be considered a certification that the fire extinguisher was manufactured in accordance with the requirements of this section.

NOTE: The words "This extinguisher meets all requirements of 49 CFR 173.306" may be displayed in place of "MEETS DOT REQUIREMENTS" on extinguishers manufactured prior to January 1, 1976.

(7) When Specification 2P or 2Q (§§ 178.33, 178.33a of this subchapter) packagings are used, paragraphs (c)(4)-(6) of this section are not applicable provided each packaging meets

the requirements of paragraph (a) of this section.

(d) *Truck bodies or trailers on flat cars; automobiles, motorcycles, tractors, or other self-propelled vehicles.* (1) Except as specified in § 173.21, truck bodies or trailers with automatic heating or refrigerating equipment of the gas burning type may be shipped with tanks containing fuel and equipment operating or not operating, when used for the transportation of other freight and loaded on flat cars as part of a joint rail-highway movement. The heating or refrigerating equipment is considered to be a part of the truck body or trailer and is not subject to any other requirements of this subchapter.

(2) Automobiles, motorcycles, tractors, or other self-propelled vehicles equipped with liquified petroleum gas or other compressed gas fuel tanks, provided such tanks are securely closed, are not subject to any other requirements for transportation by rail or highway. For transportation by water, see §§ 176.905 and 176.78(k) of this subchapter. For transportation by air, the fuel tank must be removed or emptied and securely closed.

(3) A cylinder which is a component part of a passenger restraint system and is installed in a motor vehicle, charged with nonliquefied, nonflammable compressed gas and having no more than two actuating cartridges per valve, is excepted from the requirements of Parts 170-189 of this subchapter except:

(i) Unless otherwise authorized by the Department, each cylinder must be in compliance with one of the cylinder specifications in Part 178 of this subchapter and authorized for use in § 173.302 for the gas it contains;

(ii) Each cylinder must be in compliance with the filling requirements of § 173.301; and

(iii) Each actuating cartridge must be approved in accordance with § 173.86 and meet the definition set forth in § 173.100(w).

(4) A cylinder which is part of a tire inflator system in a motor vehicle, charged with a nonliquefied, nonflammable compressed gas is excepted from the requirements of Parts 170-189 of this subchapter except:

(i) Unless otherwise authorized by the Department, each cylinder must be in compliance with one of the cylinder specifications in Part 178 and authorized for use in § 173.302 for the gas it contains;

(ii) Each cylinder must be in compliance with the filling requirements of § 173.301.

(iii) Each cylinder must be securely installed in the trunk of the motor vehicle and the valve must be protected against accidental discharge.

NOTE: A cylinder containing a gas generator may be included within the provisions of this exception if the requirements of § 173.34(d) are satisfied.

(e) *Refrigerating machines.* (1) New (unused) refrigerating machines or components thereof are excepted from the specification packaging requirements of this part if they meet the following conditions. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(i) Each pressure vessel may not contain more than 5,000 pounds of Group I refrigerant as classified in American National Standard B9.1 or not more than 50 pounds of refrigerant other than Group I.

(ii) Machines or components having two or more charged vessels may not contain an aggregate of more than 2,000 pounds of Group I refrigerant or more than 100 pounds of refrigerant other than Group I.

(iii) Each pressure vessel must be equipped with a safety device meeting the requirements of American National Standard B9.1.

(iv) Each pressure vessel must be equipped with a shut-off valve at each opening except openings used for safety devices and with no other connection. These valves must be closed prior to and during transportation.

(v) Pressure vessels must be manufactured, inspected and tested in accordance with American National Standard B9.1, or when over 6 inches internal diameter, in accordance with the ASME Code.

(vi) All parts subject to refrigerant pressure during shipment must be

tested in accordance with American National Standard B9.1.

(vii) The liquid portion of the refrigerant, if any, may not completely fill any pressure vessel at 130° F.

(viii) The amount of refrigerant, if liquefied, may not exceed the filling density prescribed in § 173.304.

(f) *Accumulators.* The following applies to accumulators, which are hydraulic accumulators containing nonliquefied, nonflammable gas, and nonflammable liquids or pneumatic accumulators containing nonliquefied, nonflammable gas, fabricated from materials which will not fragment upon rupture.

(1) Accumulators installed in motor vehicles, construction equipment, and assembled machinery and designed and fabricated with a burst pressure of not less than five times their charged pressure at 70° F., when shipped, are not subject to the requirements of this subchapter.

(2) Accumulators charged with limited quantities of compressed gas to not more than 200 p.s.i.g. at 70° F. are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and to Part 177 of this subchapter except § 177.817.

(i) Each accumulator must be shipped as an inside packaging,

(ii) Each accumulator may not have a gas space exceeding 2,500 cubic inches under stored pressure, and

(iii) Each accumulator must be tested, without evidence of failure or damage, to at least three times its charged pressure of 70° F., but not less than 120 p.s.i. before initial shipment and before each refilling and reshipment.

(3) Accumulators with a charging pressure exceeding 200 p.s.i.g. at 70° F. are excepted from labeling (except when offered for transportation by air) and the specification packaging requirements of this subchapter when shipped under the following conditions:

(i) Each accumulator must be in compliance with the requirements stated in paragraph (f)(2), (i), (ii), and (iii) of this section, and

(ii) Each accumulator must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 70° F. when shipped.

(g) *Water pump system tank.* Water pump system tanks charged with compressed air or limited quantities of nitrogen to not over 40 psig for single-trip shipment to installation sites are excepted from labeling (transportation by air not authorized) and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments are not subject to Subpart F of this subchapter, to Part 174 of this subchapter except § 174.24 and Part 177 except § 177.817.

(1) The tank must be of steel, welded with heads concave to pressure, having a rated water capacity not exceeding 120 gallons and with outside diameter not exceeding 24 inches. Safety relief devices not required.

(2) The tank must be pneumatically tested to 100 psig. Test pressure must be permanently marked on the tank.

(3) The stress at prescribed pressure must not exceed 20,000 psi using formula:

$$S = Pd/2t$$

where:

S = wall stress in pounds per square inch;

P = prescribed pressure for the tank of at least 3 times charged pressure at 70° F or 100 psig, whichever is greater;

d = inside diameter in inches;

t = minimum wall thickness, in inches.

(4) The burst pressure must be at least 6 times the charge pressure at 70° F.

(5) Each tank must be overpacked in a strong outside container in accordance with § 173.301(k).

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

[Amdt. 173-94, 41 FR 16079, Apr. 15, 1976]

EDITORIAL NOTE: For Federal Register citations affecting § 173.306 see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.307 Exceptions for compressed gases.

(a) The following materials are not subject to the requirements of this subchapter:

(1) Carbonated beverages.

(2) Except as provided in § 175.10(a)(2) of this subchapter, tires when inflated to pressures not greater than their rated inflation pressures.

(3) Balls used for sports.

(4) Refrigerating machines including dehumidifiers and air conditioners, and components thereof such as pre-charged tubing containing 25 pounds or less of nonflammable liquefied gas.

[Amdt. 173-94, 41 FR 18081, Apr. 15, 1976, as amended by Amdt. 173-135, 45 FR 13090, Feb. 28, 1980]

§ 173.308 Cigarette lighter or other similar device charged with fuel.

(a) In addition to the requirements of § 173.21(e), a cigarette lighter or other similar device charged with a flammable gas must be shipped as follows:

(1) No more than 2.3 fluid ounces of liquefied gas may be loaded into each device;

(2) The liquid portion of the gas may not exceed 85 percent of the volumetric capacity of each fluid chamber at 60° F;

(3) Each device, including closures, must be capable of withstanding without leakage or rupture an internal pressure of at least two times the vapor pressure of the fuel at 130° F; and

(4) Devices must be overpacked in packaging that is designed or arranged to prevent movement of the device itself.

(b) When no more than 1,500 devices covered by this section are transported in one motor vehicle by highway, the requirements of Parts 172 and 177 of this subchapter do not apply.

(c) For transportation by water in a closed transport vehicle or a closed freight container, the following warning must be affixed to the access doors: "WARNING—MAY CONTAIN EXPLOSIVE MIXTURES WITH AIR—KEEP IGNITION SOURCES AWAY WHEN OPENING." The warning must be on a contrasting back-

ground and must be readily legible from a distance of 25 feet.

[Amdt. 173-94, 41 FR 18081, Apr. 15, 1976, as amended by Amdt. 173-94A, 41 FR 40683, Sept. 20, 1976; Amdt. 173-120, 43 FR 39792, Sept. 7, 1978; Amdt. 173-165, 48 FR 28101, June 20, 1983]

§ 173.314 Requirements for compressed gases in tank cars.

(a) *Definitions.* For definitions of compressed gases, see § 173.300.

(b) *General requirements.* (1) Tank cars containing compressed gases must not be shipped unless they were loaded by or with the consent of the owner thereof.

(2) Tank cars must not contain gases capable of combining chemically and must not be loaded with any gas which combines chemically with the gas previously loaded therein, until all residue has been removed and interior of tank thoroughly cleaned.

(3) For cars of the DOT-106A and 110A class, the tanks must be placed in position and attached to car structure by the shipper.

(4) Wherever the word "approved" is used in this part of the regulations, it means approval by the Association of American Railroads Committee on Tank Cars as prescribed in § 179.3 of this subchapter.

(5) Each tank car, except series 106A\*\*\* or 110A\*\*\*, containing a flammable compressed gas or flammable compressed gas mixture must be marked with the name of contents (§ 172.101 of this subchapter) in accordance with the requirements of § 172.330 of this subchapter or as otherwise approved by the Department.

(6) Each tank car containing anhydrous ammonia; hydrogen chloride, refrigerated liquid; or chlorine must be marked "Anhydrous Ammonia," "Hydrogen Chloride," or "Chlorine," as appropriate, in accordance with the requirements of § 172.330 of this subchapter.

(c) *Authorized gases, filling densities, tank cars.* A compressed gas offered for transportation in a tank car must be prepared in accordance with paragraphs (b) through (h) of this section, § 173.10, and the following table (for cryogenic liquids, see § 173.319):

Kind of gas	Maximum permitted filling density, Note 1	Required tank car, see § 173.31(a) (2) and (3)
Ammonia solution.....	Note 21.....	DOT-105A100-W, 105A100AL-W, 109A100AL-W, 109A300-W, 111A100-W-4, Note 20.
Anhydrous ammonia.....	50.....	DOT-106A500-X, Note 25.
	57.....	DOT-105A300W, Note 24.
	57.....	DOT-112S400F, 112S340-W, 114S340-W, Note 15.
	58.8.....	DOT-112S400F, 112S340W, 114S340-W, Note 15.
Argon.....	Note 20.....	DOT-107A.
Bromotrifluoromethane (R-13B1 or H-1301).....	124.....	DOT-110A800W, Notes 13 and 25.
Butadiene (pressure not exceeding 75 pounds per square inch at 105°F.) inhibited.	Notes 18 and 21.....	ICC-105A100 <sup>1</sup> , 105A100-W, 111A100-W-4, Notes 4 and 23.
Butadiene (pressure not exceeding 255 pounds per square inch at 115°F.), inhibited.	Notes 18 and 21.....	DOT-112T340W, 112J340W, 114T340W, 114J340W, Notes 4 and 20.
Butadiene (pressure not exceeding 300 pounds per square inch at 115°F.), inhibited.	Notes 18 and 21.....	DOT-112T400W, 112J400W, 114T400W, 114J400W, Notes 4 and 20.
Carbon dioxide, refrigerated liquid.....	Note 5.....	DOT-105A500W, Note 6.
Chlorine.....	125.....	DOT-106A500X, Note 25.
	125.....	DOT-105A500W, Note 12.
	100.....	DOT-108A500X, 110A500W, Note 25.
Chlorodifluoroethane (R-142b) (1-Chloro-1,1-difluoroethane); Notes 4, Note 13.		DOT-105A100W, Note 23.
		DOT-114T340W, 114J340W, Notes 28 and 29.
Chlorodifluoromethane (R-22); Note 13.....	105.....	DOT-106A500X, 110A500W, Note 25.
	110.....	DOT-105A300W.
	108.....	DOT-112A400W.
	Note 21.....	DOT-114A340W, Note 29.
	Note 21.....	DOT-106A500X, 110A500W, Note 25.
		DOT-105A300W.
		DOT-114A340W, Note 29.
Chloropentafluoroethane (R-115); Note 13.....	Note 21.....	DOT-106A500X, 110A500W, Note 25.
		DOT-105A300W.
		DOT-114A340W, Note 29.
Chlorotetrafluoroethane (R-124); Note 13.....	125.....	DOT-106A500X, 110A500W, Note 25.
	128.....	DOT-112A400W.
Chlorotrifluoromethane (R-13); Note 13.....	Note 21.....	DOT-105A300W, DOT-114A340W, Note 29.
Crude nitrogen fertilizer solution.....	Note 21.....	DOT-106A500X.
		DOT-105A300-W, 109A300-W, Note 20.
Crude nitrogen fertilizer solution (pressure not exceeding 75 pounds per square inch at 105°F.).	Note 21.....	DOT-106A500X.
		DOT-105A100-AL-W, 109A100-AL-W, Note 20.
Dichlorodifluoromethane (R-12); Note 13.....	119.....	DOT-106A500X, 110A500W, Note 25.
	123.....	DOT-112A340W, 114A340W, Note 29.
	125.....	DOT-105A300W.
Difluoroethane (R-152a); Note 4, Note 13.....	79.....	DOT-108A500X, 110A500W, Note 25.
	79.....	DOT-112T400W, 112J400W, 114T340W, 114J340W, Notes 28 and 29.
	84.....	DOT-105A300W, Note 23.
Dimethylamine, anhydrous.....	59.....	DOT-106A500X.
	62.....	DOT-105A300W, Notes 4, 23 and 28.
	61.....	DOT-112T340W, 112J340W, Note 28.
Dimethyl ether.....	59.....	DOT-106A500X, 110A500-W.
	62.....	DOT-105A300W, Notes 4 and 23.
Fertilizer ammoniating solution containing free ammonia.	Note 21.....	DOT-106A500X.
Fertilizer ammoniating solution containing free ammonia (pressure not exceeding 75 pounds per square inch at 105°F.).	Note 21.....	DOT-105A300-W, 109A300-W, Note 20.
Fertilizer ammoniating solution containing free ammonia (pressure not exceeding 150 pounds per square inch at 105°F.).	Note 21.....	DOT-106A500X.
		DOT-105A100-AL-W, 109A100-AL-W, Note 20.
Helium.....	Note 20.....	DOT-107A.
Hexafluoropropylene.....	110.....	DOT-106A500-X, 110A500-W, Note 25.
Hexafluoropropylene oxide.....	110.....	DOT-110A500W, Note 7.
Hydrogen.....	Note 20.....	DOT-107A, Note 2.
Hydrogen chloride, refrigerated liquid.....	89.0 maximum to 80.1 minimum at maximum 80 psig, when offered for transportation.	DOT-105A600W, Note 17.
Hydrogen sulfide.....	88.....	DOT-106A800X, Notes 7 and 8.
Liquid hydrocarbon gas (pressure not exceeding 75 pounds per square inch at 105°F.).	Note 21.....	ICC-105A100 <sup>1</sup> , 105A100-W, 111A100-W-4, Notes 4 and 23.
Liquid hydrocarbon gas (pressure not exceeding 225 pounds per square inch at 105°F.).	Note 21.....	DOT-105A300-W, Notes 4 and 23.

Kind of gas	Maximum permitted filling density, Note 1	Required tank car, see § 173.31(a) (2) and (3)
Liquid hydrocarbon gas (pressure not exceeding 300 pounds per square inch at 105°F).	Note 21	DOT-105A400-W, Notes 4 and 23.
Liquid hydrocarbon gas (pressure not exceeding 375 pounds per square inch at 105°F).	Note 21	DOT-105A500-W, Notes 4 and 23.
Liquid hydrocarbon gas (pressure not exceeding 375 pounds per square inch at 130°F).	Note 21	DOT-108A500X.
Liquid hydrocarbon gas (pressure not exceeding 450 pounds per square inch at 105°F).	Note 21	DOT-105A600-W, Notes 4 and 23.
Liquefied petroleum gas (pressures not exceeding 75 pounds per square inch at 105°F).	Note 18	ICC-105A100 <sup>1</sup> , 105A100-W, 111A100-W-4, Notes 4 and 23.
Liquefied petroleum gas (pressure not exceeding 150 pounds per square inch at 105°F).	Note 18	DOT-105A200-W, 105A200AL-W, Notes 4 and 23.
Liquefied petroleum gas (pressure not exceeding 225 pounds per square inch at 105°F).	Note 18	DOT-105A300-W, Notes 4, 20 and 23.
Liquefied petroleum gas (pressure not exceeding 255 pounds per square inch at 115°F).	Note 18	DOT-112T340-W, 112J340-W, 114T340W, 114J340-W, Notes 4 and 20.
Liquefied petroleum gas (pressure not exceeding 300 pounds per square inch at 105°F).	Note 18	DOT-105A400-W, Notes 4, 20, and 23.
Liquefied petroleum gas (pressure not exceeding 300 pounds per square inch at 115°F).	Note 18	DOT-112T400-F, 112J400-F, 112T400-W, 112J400-W, 114T400-W, 114J400-W, Notes 4 and 20.
Liquefied petroleum gas (pressure not exceeding 375 pounds per square inch at 105°F).	Note 18	DOT-105A500-W, Notes 4, 20 and 23.
Liquefied petroleum gas (pressure not exceeding 375 pounds per square inch at 130°F).	Note 18	DOT-108A500X.
Liquefied petroleum gas (pressure not exceeding 450 pounds per square inch at 105°F).	Note 18	DOT-105A600-W, Notes 4, 20 and 23.
Methylacetylene-propadiene, stabilized	Note 22	DOT-105A300W, 112T340W, 112J340W, 114T340W, 114J340W, 108A500X, Notes 4, 9 and 23.
Methyl chloride	84	DOT-108A500X, Note 25.
	85	DOT-112T340W, 112J340W, Note 4.
	88	DOT-105A300W, Notes 4 and 23.
Methyl chloride-methylene chloride mixture	Note 22	DOT-108A500X, Notes 7 and 14. DOT-105A300-W, Notes 4 and 23.
Methyl mercaptan	80	DOT-106A500X, Notes 7 and 14.
	82	DOT-105A300-W, Notes 4 and 23.
Methylamine, anhydrous	60	DOT-106A600X.
	62	DOT-105A300W, Notes 4, 23 and 28.
	61	DOT-112T340W, 112J340W, Notes 4 and 26.
Nitrogen	Note 20	DOT-107A.
Nitrogen fertilizer solution	Note 21	DOT-106A500X. DOT-105A300-W, 109A300-W, 109A300AL-W, Note 20.
Nitrogen fertilizer solution (pressure not exceeding 75 pounds per square inch at 105° F.).	Note 21	DOT-108A500X. DOT-105A100-AL-W, 109A100-AL-W, Note 20.
Nitrosyl chloride	110	DOT-108A800-X, Notes 7 and 11.
	124	DOT-105A300-W, Note 10.
Nitrous oxide	Note 5	DOT-105A500W, 105A600W, Note 6.
Oxygen	Note 20	DOT-107A.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (classed as a flammable gas) Note 13.	Note 21	DOT-108A500X, 110A500W, Note 25. DOT-105A300W, Note 23. DOT-112T340W, 112J340W, 114T340W, 114J340W, Notes 28 and 29.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (classed as a nonflammable gas) Note 13.	Note 21	DOT-108A500X, 110A500W, Note 25. DOT-105A300W, DOT-112A340W, 114A340W, Note 29.
Sulfur dioxide	125	DOT-108A600X, 110A500W, Note 25. DOT-105A200-W.
Sulfuryl fluoride	120	DOT-105A500-W.
Trifluorochloroethylene	115	DOT-106A500X, 110A500W, Note 25.
	120	DOT-105A300-W, Notes 4 and 23.
Trimethylamine, anhydrous	57	DOT-106A500X.
	59	DOT-105A300W, Notes 4, 23 and 26.
	58	DOT-112T340W, 112J340W, Note 26.
Vinyl chloride, Note 9	84	DOT-108A500X, Note 7.
	87	DOT-105A200W, Notes 4, 16 and 23.
	86	DOT-112T340W, 112J340W, 114T340W, 114J340W, Note 4.

Kind of gas	Maximum permitted filling density, Note 1	Required tank car, see § 173.31(a) (2) and (3)
Vinyl fluoride, inhibited.....	59.6 maximum to 53.6 minimum at maximum 105 psig, when offered for transportation.	DOT-105A600W, Notes 17 and 23.
Vinyl methyl ether, Note 9.....	68..... 68.....	ICC-105A100 <sup>1</sup> , 105A100W, Notes 4 and 23. DOT-106A500X, Note 7.

<sup>1</sup> Use of existing tank cars authorized, but new construction not authorized.

NOTE 1: The filling density for liquefied gases is hereby defined as the percent ratio of the weight of gas in the tank to the weight of water that the tank will hold. For determining the water capacity of the tank in pounds, the weight of a gallon (231 cubic inches) of water at 60° F. in air shall be 8.32828 pounds.

NOTE 2: Each tank must be equipped with one or more safety relief devices of approved type and discharge area; the discharge outlet of each safety relief device must be connected to a manifold having an unobstructed discharge area of at least 1½ times the total discharge area of the safety relief devices connected to the manifold; all manifolds must be connected to a single common header having an unobstructed discharge outlet pointing upward and extending above top of the car; the header and the header outlet must each have an unobstructed discharge area at least equal to the total discharge area of the manifolds connected to the header; the header outlet must be equipped with an approved ignition device which will instantly ignite any hydrogen discharged through the safety relief device.

NOTE 3: [Reserved]

NOTE 4: For tank cars other than DOT-106A and DOT-110A used for the transportation of liquefied flammable gases, interior pipes of loading and unloading valves must be equipped with excess-flow valves of approved design.

NOTE 5: The liquid portion of the gas at 0° F. must not completely fill the tank.

NOTE 6: Tank must be insulated with an approved material of a thickness so that the thermal conductance is not more than 0.03 B.T.U. per square foot, per degree F. differential in temperature per hour; except that the insulation thickness directly over the center sills may be reduced to give thermal conductance not exceeding 0.04 B.T.U. per square foot, per degree F. differential in temperature per hour; this reduction is to permit an anchorage which must not exceed 7 inches from top of center sills to bottom of tank. Tank must be equipped with one safety relief valve of approved design set to open at a pressure not exceeding ¾ of the test pressure of the tank and one frangible disc of approved design set to function at a pressure less than the test pressure of the tank. The discharge capacity of each of these safety relief devices must be sufficient to prevent building up of pressure in the tank in excess of 82.5 percent of the tank test pressure. Tanks must be equipped with two pressure-regulating valves of approved design set to open at a pressure not to exceed 350 psi on 105A500-W tanks and at a pressure not to exceed 400 psi on 105A600-W tanks. Each regulating valve and safety relief device must have its final discharge piped to the outside of the protective housing.

NOTE 7: Specification 108A or 110A tanks authorized only for transportation by rail freight and by highway. (See §§ 174.204 and 177.834(m) of this subchapter for special requirements.)

NOTE 8: Each tank must be equipped with adequate safety relief devices of the fusible plug type having a yield temperature not over 170° F., nor less than 157° F. Each device must be resistant to extrusion of the fusible alloy and leak tight at 130° F. Each valve outlet must be sealed by a threaded cap or a threaded solid plug. In addition, all valves must be protected by a metal cover.

NOTE 9: All parts of valves and safety relief devices in contact with content of tank must be of a metal or other material suitably treated if necessary, which will not cause formation of any acetylides.

NOTE 10: Tanks must be made of or clad with a metal not subject to rapid deterioration by the lading; all appurtenances such as manhole covers, venting, loading and discharge valves, safety relief valves, check valves, and education pipes, must be made of metal not subject to rapid deterioration by the lading; cork must be used as an insulating material.

NOTE 11: Tanks for nitrosyl chloride shall be nickel-clad and safety relief devices shall be of the fusible plug type and shall function at a temperature of not exceeding 175° F. and be vapor tight at 130° F.

NOTE 12: For special tank requirements applying to chlorine, see § 179.102-2 of this subchapter. The quantity of chlorine loaded into a single-unit tank car must not exceed 90 tons. Nominal 16-, 30-, 55-, 85- or 90-ton tank car tanks must not be loaded in excess of the normal lading weights. Tank cars built to ICC-105A500 may be stenciled either ICC-105A300 or ICC-105A500; tank cars built to ICC or DOT 105A500W may be stenciled either 105A300W or 105A500W; each tank must be equipped with safety relief valve required by the stenciled specification. Cars not larger than 55-ton chlorine capacity built to ICC-105A300, or ICC-105A300W, may be continued in service if equipped with excess flow valves in accordance with § 179.102-2. DOT-105A cars having forged welded anchors must not be used for transportation of chlorine.

NOTE 13: This gas may be transported in authorized tank car tanks stenciled "DISPERSANT GAS" or "REFRIGERANT GAS."

NOTE 14: Container shall not be equipped with safety relief devices of any description.

NOTE 15: A filling density of 58.8 percent may be used during the months of November through March, inclusive. When this filling density is used, tank cars must be loaded and shipped directly to consumers for unloading. Storage in transit is not permitted.

NOTE 16: Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

NOTE 17: See paragraph (g) of this section.

NOTE 18: See paragraph (f) of this section.

NOTE 19: See paragraph (f)(2) of this section.

NOTE 20: See paragraph (d)(1) of this section.

NOTE 21: See paragraph (d)(2) of this section.

NOTE 22: See paragraph (d) of this section.

NOTE 23: Each Specification 105 tank car built after August 31, 1981, shall conform to class DOT-105J. After December 31, 1988, each Specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-105J. After December 31, 1988, each Specification 111 tank car with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-111J. Specification 111 tank cars built after March 1, 1984 are not authorized for the transportation of flammable gases.

NOTE 24: Each Specification 105 tank car built after August 31, 1981, shall conform to class DOT-105S. After December 31, 1988, each Specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume including manways) exceeding 18,500 U.S. gallons, shall conform to class DOT-105S.

NOTE 25: Specification 108 and 110A tanks for these commodities are authorized for transportation by rail freight, highway, and cargo vessel. (See §§ 174.204, 178.200, 178.230, and 177.834(m) of this subchapter for additional requirements.)

NOTE 26: For these materials only, Specifications 105A300W, and 112J340W or 112J340W tank cars may be equipped with safety relief devices with a start-to-discharge pressure setting of 247.5 psi and 280.5 psi respectively.

NOTE 27: [Reserved].

NOTE 28: DOT-114T340W and 114J340W tank cars may be equipped with bottom outlets, except that the bottom outlets must be rendered inoperative and effectively sealed to preclude bottom unloading when transporting flammable gases.

NOTE 29: A maximum safety relief valve setting of 280.5 psig is authorized on DOT Specification 114A340W, 114T340W, and 114J340W tank car tanks.

(d) *Filling limits*—(1) *Non-liquefied and liquefied gas.* The gas pressure at 105° F. in any insulated tank car tank of the DOT-105A and 109A-W class or Spec. DOT-111A100-W-4; at 115° F. in any uninsulated tank car tank of the DOT-112A-W and 114A-W class; or at 130° F. in any uninsulated tank car tank of the DOT-106A and 110A-W class must not exceed three-fourths times the prescribed retest pressure of the tank. The gas pressure at 130° F. in any uninsulated tank car tank of the DOT-107A series must not exceed seven-tenths of the marked test pressure of the tank.

NOTE 1: DOT-107A tanks may be charged with helium to a pressure 10 percent in excess of the marked maximum gas pressure at 130° F. of each tank.

(2) *Liquefied gas.* In addition to the requirements of paragraph (d)(1) of this section, the liquid portion of the gas at 105° F. must not completely fill an insulated tank, nor at 130° F. must not completely fill an uninsulated tank with the exception that the liquid portion of the gas at 115° F. must not completely fill an uninsulated tank car tank of the DOT-112A-W and 114A-W classes.

(e) *Verification of content.* The amount of liquefied gas loaded into each tank may be determined either by measurement or calculation of the weight. If by measurement, the weight must be checked after disconnecting the loading line by the use of proper scales. If by calculation, the weight of liquefied petroleum gas, methylacetylene-propadiene, stabilized, dimethylamine, monomethylamine, or trimethylamine may be calculated using the outage tables supplied by the tank car owners and the specific gravities as determined at the plant, and this computation must be checked by determination of specific gravity of product after loading. Carriers may verify calculated weights by use of proper scales. The use of a fixed tube gauge device is authorized for determining the weight of methyl mercaptan in Specification 105A300W tanks instead of weighing.

(f) *Special requirements for liquefied petroleum gas and butadiene tank cars*—(1) *Single unit tank cars.* Maximum filling density in single unit tank cars shall be as shown in the following table:

MAXIMUM PERMITTED FILLING DENSITY

Specific gravity at 60° F.	Insulated cars		Uninsulated cars	
	April through October	November through March (see Note 1)	April through October	November through March (see Note 1)
0.500	45.500	47.40	44.88	46.88
0.501	45.600	47.51	45.00	47.00
0.502	45.700	47.62	45.13	47.10
0.503	45.800	47.73	45.25	47.20
0.504	45.900	47.84	45.38	47.30
0.505	46.000	47.95	45.50	47.40
0.506	46.125	48.06	45.60	47.50
0.507	46.250	48.17	45.70	47.63
0.508	46.375	48.28	45.80	47.75
0.509	46.500	48.39	45.90	47.88
0.510	46.750	48.51	46.00	48.00
0.511	47.000	48.61	46.13	48.10
0.512	47.125	48.72	46.25	48.20
0.513	47.250	48.83	46.38	48.30
0.514	47.375	48.94	46.50	48.40
0.515	47.500	49.05	46.63	48.50
0.516	47.625	49.16	46.75	48.63
0.517	47.750	49.27	46.88	48.75
0.518	47.875	49.38	47.00	48.88
0.519	48.000	49.49	47.13	49.00
0.520	48.125	49.60	47.25	49.10
0.521	48.250	49.70	47.38	49.20
0.522	48.375	49.81	47.50	49.30
0.523	48.500	49.92	47.63	49.40
0.524	48.600	50.03	47.75	49.50
0.525	48.700	50.14	47.88	49.63
0.526	48.800	50.25	48.00	49.75
0.527	48.900	50.36	48.13	49.88
0.528	49.000	50.47	48.25	50.00
0.529	49.125	50.58	48.38	50.10
0.530	49.250	50.69	48.50	50.20
0.531	49.375	50.79	48.63	50.30
0.532	49.500	50.90	48.75	50.40
0.533	49.625	51.01	48.88	50.50
0.534	49.750	51.12	49.00	50.63
0.535	49.875	51.23	49.13	50.75
0.536	50.000	51.34	49.25	50.88
0.537	50.100	51.45	49.38	51.00
0.538	50.200	51.56	49.50	51.10
0.539	50.300	51.67	49.60	51.20
0.540	50.400	51.78	49.70	51.30
0.541	50.500	51.88	49.80	51.40
0.542	50.625	51.99	49.90	51.50
0.543	50.750	52.09	50.00	51.63
0.544	50.875	52.20	50.13	51.75
0.545	51.000	52.31	50.25	51.88
0.546	51.100	52.41	50.38	52.00
0.547	51.200	52.52	50.50	52.10
0.548	51.300	52.62	50.63	52.20
0.549	51.400	52.73	50.75	52.30

MAXIMUM PERMITTED FILLING DENSITY—  
Continued

Specific gravity at 60° F.	Insulated cars		Uninsulated cars	
	April through October	November through March (see Note 1)	April through October	November through March (see Note 1)
0.550	51.500	52.84	50.88	52.40
0.551	51.625	52.94	51.00	52.50
0.552	51.750	53.05	51.13	52.63
0.553	51.875	53.16	51.25	52.75
0.554	52.000	53.26	51.38	52.88
0.555	52.125	53.37	51.50	53.00
0.556	52.250	53.48	51.60	53.10
0.557	52.375	53.58	51.70	53.20
0.558	52.500	53.69	51.80	53.30
0.559	52.625	53.80	51.90	53.40
0.560	52.750	53.91	52.00	53.50
0.561	52.875	54.01	52.13	53.63
0.562	53.000	54.12	52.25	53.75
0.563	53.100	54.22	52.38	53.88
0.564	53.200	54.33	52.50	54.00
0.565	53.300	54.43	52.63	54.10
0.566	53.400	54.54	52.75	54.20
0.567	53.500	54.64	52.88	54.30
0.568	53.600	54.75	53.00	54.40
0.569	53.700	54.85	53.10	54.50
0.570	53.800	54.96	53.20	54.60
0.571	53.900	55.06	53.30	54.70
0.572	54.000	55.17	53.40	54.80
0.573	54.125	55.27	53.50	54.90
0.574	54.250	55.38	53.63	55.00
0.575	54.375	55.48	53.75	55.13
0.576	54.500	55.59	53.88	55.25
0.577	54.600	55.69	54.00	55.38
0.578	54.700	55.80	54.10	55.50
0.579	54.800	55.90	54.20	55.60
0.580	54.900	56.01	54.30	55.70
0.581	55.000	56.11	54.40	55.80
0.582	55.100	56.22	54.50	55.90
0.583	55.200	56.32	54.63	56.00
0.584	55.300	56.43	54.75	56.13
0.585	55.400	56.53	54.88	56.25
0.586	55.500	56.64	55.00	56.38
0.587	55.625	56.74	55.13	56.50
0.588	55.750	56.85	55.25	56.60
0.589	55.875	56.95	55.38	56.70
0.590	56.000	57.06	55.50	56.80
0.591	56.090	57.15	55.60	56.90
0.592	56.180	57.25	55.70	57.00
0.593	56.270	57.34	55.80	57.10
0.594	56.360	57.44	55.90	57.20
0.595	56.450	57.53	56.00	57.30
0.596	56.540	57.63	56.13	57.40
0.597	56.630	57.72	56.25	57.50
0.598	56.720	57.82	56.38	57.60
0.599	56.810	57.91	56.50	57.70
0.600	56.900	58.01	56.62	57.80
0.601	56.990	58.10	56.73	57.90
0.602	57.080	58.20	56.84	58.00
0.603	57.170	58.29	56.95	58.13
0.604	57.260	58.39	57.07	58.25
0.605	57.350	58.49	57.18	58.38
0.606	57.440	58.58	57.30	58.50
0.607	57.530	58.68	57.41	58.63
0.608	57.620	58.77	57.52	58.75
0.609	57.710	58.87	57.64	58.88
0.610	57.800	58.97	57.76	59.00
0.611	57.890	59.06	57.87	59.10
0.612	57.980	59.16	57.98	59.20

MAXIMUM PERMITTED FILLING DENSITY—  
Continued

Specific gravity at 60° F.	Insulated cars		Uninsulated cars	
	April through October	November through March (see Note 1)	April through October	November through March (see Note 1)
0.613	58.070	59.26	58.09	59.30
0.614	58.160	59.35	58.21	59.40
0.615	58.250	59.45	58.32	59.50
0.616	58.340	59.55	58.43	59.63
0.617	58.430	59.64	58.55	59.75
0.618	58.520	59.74	58.66	59.88
0.619	58.610	59.84	58.77	59.97
0.620	58.700	59.94	58.89	60.07
0.621	58.790	60.03	59.00	60.16
0.622	58.880	60.13	59.12	60.28
0.623	58.970	60.23	59.23	60.38
0.624	59.060	60.32	59.34	60.49
0.625	59.150	60.42	59.46	60.59
0.626	59.240	60.52	59.57	60.70
0.627	59.330	60.61	59.68	60.80
0.628	59.420	60.71	59.80	60.90
0.629	59.510	60.81	59.91	61.01
0.630	59.600	60.91	60.02	61.11
0.631	59.690	61.00	60.13	61.18
0.632	59.780	61.10	60.28	61.28
0.633	59.870	61.19	60.34	61.38
0.634	59.960	61.29	60.44	61.47
0.635	60.050	61.39	60.55	61.57

NOTE 1: When these filling densities are used, tank cars must be shipped directly to consumers for unloading. Storage in transit is not permitted.

(2) DOT-106A class tank cars. Maximum filling density in DOT-106A class tank cars shall be as shown in § 173.304(d)(1).

(g) Special requirements for hydrogen chloride, refrigerated liquid, and vinyl fluoride, inhibited. (1) The shipper shall notify the Bureau of Explosives whenever a car is not received by the consignee within 20 days from the date of shipment.

(2) A tank car containing hydrogen chloride, refrigerated liquid must have the auxiliary valve on the pressure relief device closed during transportation.

(h) Foreign tank cars in domestic use. Except as authorized by § 171.12a tank cars made in foreign countries, except Canada, must not be used in domestic traffic until they have been tested in this country and proper reports rendered as required by the specifications that apply.

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

§ 173.315

49 CFR Ch. I (10-1-87 Edition)

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

**EDITORIAL NOTE** For Federal Register citations to § 173.314, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.315 Compressed gases in cargo tanks and portable tanks.

(a) A compressed gas offered for transportation in a cargo tank or a portable tank must be prepared in ac-

cordance with this section (for cryogenic liquids, see § 173.318) and may only be shipped in a tank as provided in §§ 173.32, 173.33 and this section, as follows:

(1) Compressed gases must not be shipped in cargo tanks or portable tank containers except as provided in this section and §§ 173.32 and 173.33, and in the following table (for marking requirements see §§ 172.326 and 172.328 of this subchapter):

Kind of gas	Maximum permitted filling density		Specification container required	
	Percent by weight (see Note 1)	Percent by volume (see par. (f) of this section)	Type (see Note 2)	Minimum design pressure (psig)
Anhydrous ammonia (see Notes 14 and 17 and paragraph (1) of this section).	56	82; see Note 6	DOT-51, MC-330, MC-331; see Notes 12 and 17.	265; see Note 17.
Anhydrous dimethylamine	59	See Note 7	DOT-51, MC-330, MC-331.	150.
Anhydrous monomethylamine	57	do	do	Do.
Anhydrous trimethylamine	60	do	do	Do.
Ammonia solution	See par. (c) of this section.	do	MC-330, MC-331; see Note 12.	100; see par. (c)(1) of this section.
Bromotrifluoromethane (R-13B1 or H-1301); (See Note 9).	133	See Note 7	DOT-51, MC-330, MC-331.	365.
Butadiene, inhibited	See par. (b) of this section.	See par. (b) of this section.	DOT-51, MC-330, MC-331.	100.
Carbon dioxide, refrigerated liquid	See par. (c) of this section.	95	do	200; see Note 3.
Chlorine	125	See Note 7	MC-330 MC-331	225; see Notes 4 and 8.
Chlorodifluoroethane (R-142b) (1-Chloro 1,1-difluoroethane); (See Note 9).	100	See Note 7	DOT-51, MC-330, MC-331.	100.
Chlorodifluoromethane (R-22); (See Note 9).	105	See Note 7	DOT-51, MC-330, MC-331.	250.
Chloropentafluoroethane (R-115); (See Note 9).	See par. (c) of this section.	See Note 7	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Chlorotrifluoromethane (R-13); (See Note 9).	See par. (c) of this section.	See Note 7	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Dichlorodifluoromethane (R-12); (See Note 9).	119	See Note 7	DOT-51, MC-330, MC-331.	150.
Difluoroethane (R-152a); (See Note 9).	79	See Note 7	DOT-51, MC-330, MC-331.	150.
Dimethyl ether (see Note 16)	59	do	do	200.
Ethane, refrigerated liquid	See par. (c) of this section.	See par. (c) of this section.	MC-331, MC-338	100; see Note 11.
Ethane-propane mixture, refrigerated liquid.	See par. (c) of this section.	See par. (c) of this section.	MC-331, MC-338	275; see Note 11.
Hexafluoropropylene	110	See Note 7	DOT-51, MC-330, MC-331.	250.
Hydrogen chloride, refrigerated liquid.	103.0	See Note 7	MC-331, MC-338	100; see Note 11.
	91.6	do	do	300; see Note 11.
	86.7	do	do	450; see Note 11.
Liquefied petroleum gas (see Note 15).	See par. (b) of this section.	See par. (b) of this section.	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Methylacetylene-propadiene, stabilized (see Note 13).	53	90	DOT 51, MC 330, MC 331.	200.
Methyl chloride	84	88.6	do	150.
Methyl chloride (optional portable tank 2,000 pounds water capacity, fusible plug).	do	See Note 6	DOT-51	225.
Methyl mercaptan	80	90	DOT-51, MC-330, MC-331.	100.
Nitrous oxide, refrigerated liquid	See par. (c) of this section.	85	do	200; See Note 3.

Kind of gas	Maximum permitted filling density		Specification container required	
	Percent by weight (see Note 1)	Percent by volume (see par. (f) of this section)	Type (see Note 2)	Minimum design pressure (psig)
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (See Note 9).	See par. (c) of this section.	See Note 7.....	DOT-51, MC-330, MC-331.	See par. (c)(1) of this section.
Sulfur dioxide (tanks not over 1,200 gallons water capacity).	125.....	87.5.....	.....do.....	150; see Note 4.
Sulfur dioxide (tanks over 1,200 gallons water capacity).	.....do.....	.....do.....	.....do.....	125; see Note 4.
Sulfur dioxide (optional portable tank 1,000-2,000 pounds water capacity, fusible plug).	.....do.....	See Note 6.....	DOT-51.....	225.
Vinyl chloride.....	84 (see Note 13).....	See Note 7.....	MC-330, MC-331.....	150.
Vinyl fluoride, inhibited.....	66.....	.....do.....	.....do.....	250; see Note 11.
Vinyl methyl ether.....	68.....	See Notes 7 and 13.	.....do.....	100.

NOTE 1: Maximum filling density for liquefied gases is hereby defined as the percent ratio of the weight of gas in the tank to the weight of water that the tank will hold. For determining the water capacity of the tank in pounds, the weight of a gallon (231 cubic inches) of water at 60° F. in air shall be 8.32828 pounds.

NOTE 2: See § 173.32 for authority to use other portable tanks and for manifolding cargo tanks, see § 173.301(d). Specifications MC 330 cargo tanks may be painted as specified for MC 331 cargo tanks.

NOTE 3: If cargo tanks and portable tank containers for carbon dioxide, refrigerated liquid and nitrous oxide, refrigerated liquid are designed to comply with the requirements of the ASME Code for Low Temperature Operation, the design pressure may be reduced to 100 p.s.i.g. or the controlled pressure, whichever is greater.

NOTE 4: In the design of tanks for sulfur dioxide and chlorine a corrosion allowance of 20 percent or 0.10 inch, whichever is less, must be added to the metal thickness. In chlorine tanks the wall thickness must be at least five-eighths inch, including corrosion allowance.

NOTE 5: Unlagged cargo tanks and portable tank containers for liquid anhydrous ammonia may be filled to 87.5 percent by volume provided the temperature of the anhydrous ammonia being loaded into such tanks is determined to be not lower than 30° F. or provided the filling of such tanks is stopped at the first indication of frost or ice formation on the outside surface of the tank and is not resumed until such frost or ice has disappeared.

NOTE 6: Tanks equipped with fusible plugs must be filled by weight.

NOTE 7: Tanks must be filled by weight.

NOTE 8: Chlorine cargo tank motor vehicles may be shipped only if the contents are to be unloaded at one unloading point.

NOTE 9: This gas may be transported in authorized cargo tanks and portable tanks marked "DISPERSANT GAS," or "REFRIGERANT GAS."

NOTE 10: [Reserved]

NOTE 11: MC-330, MC-331 and MC-338 cargo tanks must be insulated. Cargo tanks must meet all the following requirements. Each tank must have a design service temperature of minus 100° F., or no warmer than the boiling point at one atmosphere of the hazardous material to be shipped therein, whichever is colder, and must comply with the low-temperature requirements of the ASME Code. When the normal travel time is 24 hours or less, the tank's holding time as loaded must be at least twice the normal travel time. When the normal travel time exceeds 24 hours, the tank's holding time as loaded must be at least 24 hours greater than the normal travel time. The holding time is the elapsed time from loading until venting occurs under equilibrium conditions. The cargo tank must have an outer jacket made of steel when the cargo tank is used to transport a flammable gas.

NOTE 12: No aluminum, copper, silver, zinc, or alloy of any of these metals shall be used in the cargo tank construction where it can come into contact with the lading.

NOTE 13: All parts of valves and safety devices in contact with contents of tank must be of a metal or other material suitably treated if necessary, which will not cause formation of any acetylides.

NOTE 14: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel ("NQT") are authorized for all grades of anhydrous ammonia. Specifications MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel ("QT") (see marking requirements of § 172.328(c) of this subchapter) are authorized for anhydrous ammonia having a minimum water content of 0.2 percent by weight. Any tank being placed in anhydrous ammonia service or a tank which has been in other service or has been opened for inspection, test, or repair, must be cleaned of the previous product and must be purged of air before loading. See § 172.203(h) of this subchapter for special shipping paper requirements.

NOTE 15: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel (NQT) are authorized for all grades of liquefied petroleum gases. Only grades of liquefied petroleum gases determined to be "noncorrosive" are authorized in Specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel (QT). "Noncorrosive" means the corrosiveness of the gas does not exceed the limitations for classification 1 of the ASTM Copper Strip Classifications when tested in accordance with ASTM D1838-64, "Copper Strip Corrosion by Liquefied Petroleum (LP) Gases." (For QT and NQT) marking requirements see § 172.328(c) of this subchapter. For special shipping paper requirements, see § 172.203(h) of this subchapter.)

NOTE 16: Specifications MC 330 and MC 331 cargo tanks must be equipped with emergency discharge controls that comply with § 178.337-11(c) of this subchapter.

NOTE 17: A Specification MC-330 or MC-331 cargo tank or a nonspecification cargo tank meeting, and marked in conformance with, the edition of the ASME Code in effect when it was fabricated, may be used for the transportation of anhydrous ammonia if it:

- (1) Has a minimum design pressure not lower than 250 psig;
- (2) Was manufactured in conformance with the ASME Code prior to January 1, 1981, according to its ASME name plate and manufacturer's data report;
- (3) Is painted white or aluminum;
- (4) Complies with Note 12 of this paragraph;
- (5) Has been inspected and tested in accordance with § 173.33 as specified for Specification MC-330 or MC-331;
- (6) Was used to transport anhydrous ammonia prior to January 1, 1981;
- (7) Is operated exclusively in intrastate commerce (including its operation by a motor carrier otherwise engaged in interstate commerce) in a state where its operation was permitted by the laws of that State (not including the incorporation of this subchapter) prior to January 1, 1981; and
- (8) Is operated in conformance with all other requirements of this subchapter.

(b) Maximum permitted filling densities for cargo and portable tank containers for transportation of butadiene, inhibited, and liquefied petroleum gas are as follows:

Maximum specific gravity of the liquid material at 60° F.	Maximum permitted filling density in percent of the water-weight capacity of the tanks (percent) See Note 1	
	1200 gallons or less	Over 1200 gallons
0.473 to 0.480.....	38	41
0.481 to 0.488.....	39	42
0.489 to 0.495.....	40	43
0.496 to 0.503.....	41	44
0.504 to 0.510.....	42	45
0.511 to 0.519.....	43	46
0.520 to 0.527.....	44	47
0.528 to 0.536.....	45	48
0.537 to 0.544.....	46	49
0.545 to 0.552.....	47	50
0.553 to 0.560.....	48	51
0.561 to 0.568.....	49	52
0.569 to 0.576.....	50	53
0.577 to 0.584.....	51	54
0.585 to 0.592.....	52	55
0.593 to 0.600.....	53	56
0.601 to 0.608.....	54	57
0.609 to 0.617.....	55	58
0.618 to 0.626.....	56	59
0.627 and over.....	57	60

NOTE 1: Filling is permitted by volume provided the same filling density is used as permitted by weight, except when using fixed length dip tube or other fixed maximum liquid level indicators (paragraph (f) of this section), in which case the maximum permitted filling density shall not exceed 97 percent of the maximum permitted filling density by weight contained in the table.

(1) *Odorization.* All liquefied petroleum gas shall be effectively odorized as required in Note 2 of this paragraph to indicate positively, by a distinctive odor, the presence of gas down to a concentration in air of not over one-fifth the lower limit of combustibility; *Provided, however,* That odorization is not required if harmful in the use or further processing of the liquefied petroleum gas, or if odorization will serve no useful purpose as a warning agent in such use or further processing.

NOTE 1: The lower limits of combustibility of the more commonly used liquefied petroleum gases are: Propane, 2.15 percent; butane, 1.55 percent. These figures represent volumetric percentages of gas-air mixtures in each case.

NOTE 2: The use of 1.0 pound of ethyl mercaptan, 1.0 pound of thiophane, or 1.4 pounds of amyl mercaptan per 10,000 gallons of liquefied petroleum gas shall be considered sufficient to meet the requirements

of § 173.315(b)(1). This note does not exclude the use of any other odorant in sufficient quantity to meet the requirements of § 173.315(b)(1).

(c) Except as otherwise provided, the loading of a liquefied gas into a cargo tank or portable tank shall be determined by weight or by a suitable liquid level gauging device. The vapor pressure (psig) at 115°F. must not exceed the design pressure of the cargo tank or portable tank container. The liquid portion of the gas shall not fill the tank at 105°F. if the tank is insulated, or at 115°F. if the tank is uninsulated, except that this requirement shall not apply to:

(1) A tank containing carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid. Such tank is required to be equipped with suitable pressure control valves and may not be filled to a level exceeding 95 percent of the volumetric capacity of the tank.

(2) A tank containing ethane, refrigerated liquid; ethane-propane mixture, refrigerated liquid; or hydrogen chloride, refrigerated liquid. Such tank must be filled to allow at least two percent outage below the inlet of the pressure relief valve or pressure control valve under conditions of incipient opening, with the tank in a level attitude.

(d) If the loading of cargo tanks and portable tank containers with liquefied gases is to be determined by weight, the gross weight shall be checked after the filling line is disconnected in each instance. The gross weight shall be calculated from the tank capacity and tare weight set forth on the metal plate required by the specification, and the maximum filling density permitted for the material being loaded into the tank as set forth in the table, paragraph (a)(1) of this section.

(e) If the loading of cargo tanks and portable tank containers with liquefied gases is to be determined by adjustable liquid level device, each tank and each compartment thereof shall have a thermometer well, so that the internal liquid temperature can easily be determined, and the amount of liquid in the tank shall be corrected to a 60° F. basis. Liquid levels shall not exceed a level corresponding to the

maximum filling density permitted for the material being loaded into the tank as set forth in the table in paragraph (a)(1) of this section.

(f) When the loading of cargo tanks and portable tank containers with liquefied gases is determined only by fixed length dip tube or other fixed maximum liquid level indicator, the device shall be arranged to function at a level not to exceed the maximum permitted volume prescribed by the table, paragraph (a)(1) of this section. Loading shall be stopped when the device functions.

(g) Containers; the liquid level of which has been determined by means of a fixed length dip tube gauging device, shall not be acceptable for stowage as cargo on vessels in commerce subject to the jurisdiction of the United States Coast Guard. Nothing contained in this section shall be so construed as to prohibit the transportation on car floats or car ferries of motor vehicles laden with containers nor cargo tanks the liquid level of either of which has been determined by means of fixed length dip tube devices.

(h) Each cargo tank and portable tank, except a tank filled by weight, must be equipped with one or more of the gauging devices described in the following table which indicate accurately the maximum permitted liquid level. Additional gauging devices may be installed but may not be used as primary controls for filling of cargo tanks and portable tanks. Gauge glasses are not permitted on any cargo tank or portable tank. Primary gauging devices used on cargo tanks of less than 3500 gallons water capacity are exempt from the longitudinal location requirements specified in paragraphs (h)(2) and (3) of this section provided: The tank length does not exceed three times the tank diameter; and the cargo tank is unloaded within 24 hours after each filling of the tank.

Kind of gas	Gauging device permitted for filling purposes
Anhydrous trimethylamine.....	Do.
Aqua ammonia solution containing anhydrous ammonia.	Rotary tube; adjustable slip tube; fixed length dip tube.
Butadiene, inhibited .....	Do.
Carbon dioxide, refrigerated liquid.	Do.
Chlorine .....	None.
Dichlorodifluoromethane .....	Do.
Difluoroethane .....	Do.
Difluoromono-chloroethane.....	Do.
Dimethyl ether.....	Do.
Ethane, refrigerated liquid.....	Rotary tube; adjustable slip tube; fixed length dip tube.
Ethane-propane mixture, refrigerated liquid.	Do.
Hexafluoropropylene.....	None.
Hydrogen chloride, refrigerated liquid.	Do.
Liquefied petroleum gases.....	Rotary tube; adjustable slip tube; fixed length dip tube.
Methyl chloride .....	Fixed length dip tube.
Methyl mercaptan .....	Rotary tube; adjustable slip tube; fixed length dip tube.
Mono-chlorodifluoromethane .....	None.
Nitrous oxide, refrigerated liquid....	Rotary tube; adjustable slip tube; fixed length dip tube.
Methylacetylene-propadiene, stabilized.	Do.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s.	None.
Sulfur dioxide .....	Fixed length dip tube.
Vinyl chloride .....	None.
Vinyl fluoride, inhibited .....	Do.

(1) The design pressure of the liquid level gauging devices shall be at least equal to the design pressure of the tank.

(2) If the primary gauging device is adjustable, it must be capable of adjustment so that the end of the tube will be in the location specified in paragraph (h)(3) of this section for at least one of the ladings to be transported, at the filling level corresponding to an average loading temperature. Exterior means must be provided to indicate this adjustment. The gauging device must be legibly and permanently marked in increments not exceeding 20 Fahrenheit degrees (or not exceeding 25 p.s.i.g. on tanks for carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid), to indicate the maximum levels to which the tank may be filled with liquid at temperatures above 20° F. However, if it is not practicable to so mark the gauging device, this information must be leg-

Kind of gas	Gauging device permitted for filling purposes
Anhydrous ammonia.....	Rotary tube; adjustable slip tube; fixed length dip tube.
Anhydrous dimethylamine.....	None.
Anhydrous monomethylamine.....	Do.

ibly and permanently marked on a plate affixed to the tank adjacent to the gauging device.

(3) A dip tube gauging device consists of a pipe or tube with a valve at its outer end with its intake limited by an orifice not larger than 0.060 inch in diameter. If a fixed length dip tube is used, the intake must be located midway of the tank both longitudinally and laterally and at maximum permitted filling level. In tanks for liquefied petroleum gases, the intake must be located at the level reached by the lading when the tank is loaded to maximum filling density at 40° F.

(4) Each opening for a pressure gauge, except on a tank used exclusively for the transportation of carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid must be restricted at or inside the tank by an orifice no larger than 0.060 inch in diameter.

(1) Each tank must be provided with one or more safety relief devices which, unless otherwise specified in this part, must be safety relief valves of the spring-loaded type. Each valve must be arranged to discharge upward and unobstructed to the outside of the protective housing to prevent any impingement of escaping gas upon the tank. For each chlorine tank the protective housing must be in compliance with the requirements set forth in the applicable specification.

(1) Safety relief valves on each tank must have a total relieving capacity as determined by the flow formulas contained in CGA Pamphlet S-1.2. Safety relief valves must have a total relieving capacity sufficient to prevent a maximum pressure in the tank of more than 120 percent of the design pressure. For an insulated tank the required relieving capacity of the relief valves must be the same as for an un-insulated tank, unless the insulation will remain in place and will be effective under fire conditions. In this case, each insulated tank must be covered by a sheet metal jacket of not less than 16 gauge thickness. An MC 330 cargo tank that has safety relief valves sized by Fetterly's formula dated November 27, 1928, may be continued in service. Copies of this formula may be

obtained from the Bureau of Explosives.

(2) Each safety relief valve must be arranged to minimize the possibility of tampering. If the pressure setting or adjustment is external to the valve, the safety relief valve must be provided with means for sealing the adjustment and it must be sealed.

(3) Each safety relief valve on a tank must be set to start-to-discharge at pressure no higher than 110 percent of the tank design pressure and no lower than the design pressure specified in paragraph (a)(1) of this section for the gas transported.

(4) Each safety relief valve must be plainly and permanently marked with the pressure in p.s.i.g. at which it is set to discharge, with the actual rate of discharge of the device in cubic feet per minute of the gas or of air at 60° F. and 14.7 p.s.i.a., and with the manufacturer's name or trade name and catalog number. The start-to-discharge valve must be visible after the valve is installed. The rated discharge capacity of the device must be determined at a pressure of 120 percent of the design pressure of the tank.

(5) Each safety relief valve must have direct communication with the vapor space in the tank.

(6) Each connection to a safety relief valve must be of sufficient size to provide the required rate of discharge through the safety relief valve.

(7) No shut-off valve may be installed between a safety relief valve and the tank except in cases where two or more safety relief valves are installed on the same tank, and one or more safety shut-off valves are arranged to always provide the required relief capacity through at least one of the safety relief valves.

(8) Each safety relief valve outlet must be provided with a protective device to prevent the entrance and accumulation of dirt and water. This device must not impede flow through the valve.

(9) On tanks for carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid each safety relief device must be installed and located so that the cooling effect of the contents will not prevent the effective operation of the device. In addition to the

required safety relief valves, these tanks may be equipped with one or more pressure controlling devices.

(10) Each tank for carbon dioxide, refrigerated liquid also may be equipped with one or more frangible disc devices set to function at a pressure not over two times nor less than 1.5 times the design pressure of the tank.

(11) Each portion of connected liquid piping or hose that can be closed at both ends must be provided with a safety relief valve without an intervening shut-off valve to prevent excessive hydrostatic pressure that could burst the piping or hose.

(12) Subject to conditions of paragraph (a)(1) of this section for the methyl chloride and sulfur dioxide optional portable tanks, one or more fusible plugs examined by the Bureau of Explosives and approved by the Director, OHMT may be used on these tanks in place of safety relief valves of the spring-loaded type. The fusible plug or plugs must be in accordance with CGA Pamphlet S-1.2, to prevent a pressure rise in the tank of more than 120 percent of the design pressure. If the tank is over 30 inches long, each end must have the total specified safety discharge area.

(13) A safety relief valve on a chlorine cargo tanks must conform to one of the following standards of The Chlorine Institute, Inc.: Type 1½ JQ225, Dwg. H51970, dated October 7, 1968; or Type 1½ JQ225, Dwg. H50155, Revision A, dated April 28, 1969.

(j) Storage containers for liquefied petroleum gas for permanent installation on consumer premises may be shipped by private motor carrier only under the following conditions:

(1) Each container must be constructed in compliance with the requirements of the ASME Code (containers built in compliance with earlier editions starting with 1943 are authorized) and must be marked to indicate compliance in the manner specified by the respective Code.

(2) Each container must be equipped with safety devices in compliance with the requirements for safety devices on containers as specified in NFPA Pamphlet No. 58.

(3) The containers shall be so braced or otherwise secured on the vehicle as to prevent relative motion while in transit. Valves or other fittings shall be adequately protected against injury during transportation. (See § 177.834(g) of this subchapter.)

(4) Except as provided in paragraph (j)(5) of this section, containers shall not be shipped when charged with liquefied petroleum gas to more than 5 percent of their water capacity.

(5) Storage containers of less than 1,042 pounds water capacity (125 gallons) may be shipped when charged with liquefied petroleum gas in compliance with DOT filling density.

(k) A nonspecification cargo tank meeting, and marked in conformance with, the edition of the ASME Code in effect when it was fabricated, may be used for the transportation of liquefied petroleum gas if it:

(1) Has a minimum design pressure no lower than 250 psig;

(2) Has a capacity of 3,500 gallons or less;

(3) Was manufactured in conformance with the ASME Code prior to January 1, 1981, according to its ASME name plate and manufacturer's data report;

(4) Conforms to NFPA Pamphlet 58;

(5) Has been inspected and tested in accordance with § 173.33 as specified for Specification MC-330 or MC-331;

(6) Is operated exclusively in intrastate commerce (including its operation by a motor carrier otherwise engaged in interstate commerce) in a state where its operation was permitted by the laws of that State (not including the incorporation of this subchapter) prior to January 1, 1981;

(7) Was used to transport liquefied petroleum gas prior to January 1, 1981; and

(8) Is operated in conformance with all other requirements of this subchapter.

(1) Anhydrous ammonia must not be offered for transportation or transported in specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered ("QT") steel except as provided in this paragraph.

(1) The ammonia must have a minimum water content of 0.2 percent by weight. Any addition of water must be

made using steam condensate, deionized, or distilled water.

(2) Except as otherwise provided in this paragraph, each person offering for transportation or transporting anhydrous ammonia shall perform a periodic analysis for prescribed water content in the ammonia. The analysis must be performed:

(i) From a sample of the ammonia in storage taken at least once every 7 days, or each time ammonia is added to the storage tanks, whichever is less frequent; or

(ii) At the time the cargo tanks are loaded, then a sample of the ammonia taken from at least one loaded cargo tank out of each 10 loads, or from one cargo tank every 24 hours, whichever is less frequent; or

(iii) At the same frequency as described in paragraph (1)(2)(ii) of this section, from a sample taken from the loading line to the cargo tank.

(3) If water is added at the time of loading:

(i) The sample for analysis must be taken from a point in the loading line between the water injection equipment and the cargo tank; and

(ii) Positive provisions must be made to assure water injection equipment is operating.

(4) If water injection equipment becomes inoperative, suitable corrective maintenance must be performed after which a sample from the first loaded cargo tank must be analyzed for prescribed water content.

(5) The analysis method for water content must be as prescribed in CGA Pamphlet G-2.2, titled "Tentative Standard Method for Determining Minimum of 0.2 per cent water in Anhydrous Ammonia," 1975 edition.

(6) Records indicating the results of the analysis taken, as required by this paragraph, must be retained for 2 years and must be open to inspection by representative of the Department.

(7) Each person receiving anhydrous ammonia containing 0.2 per cent water by weight may offer for transportation or transport that ammonia without performing the prescribed analysis for water content provided:

(i) The ammonia received was certified as containing 0.2 percent water as

prescribed in §§ 172.203(h)(1)(i) and 177.817(a) of this subchapter; and

(ii) The amount of water in the ammonia has not been reduced by any means.

(m) A cargo tank (commonly known as a nurse tank and considered an implement of husbandry) transporting anhydrous ammonia, and operated by a private carrier exclusively for agricultural purposes does not have to meet the specification requirements of Part 178 of this subchapter if it:

(1) Has a minimum design pressure of 250 psig and meets the requirements of the edition of the ASME code in effect at the time it was manufactured and is marked accordingly;

(2) Is equipped with safety relief valves meeting the requirements of CGA pamphlet S1.2;

(3) Is painted white or aluminum;

(4) Has capacity of 3,000 gallons or less;

(5) Is loaded to a filling density no greater than 56 percent;

(6) Is securely mounted on a farm wagon; and

(7) Is in conformance with the requirements of Part 172 of this subchapter except that shipping papers are not required; and it need not be marked or placarded on one end if that end contains valves, fittings, regulators or gauges when those appurtenances prevent the markings and placard from being properly placed and visible.

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

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.316, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.316 Cryogenic liquids in cylinders.

(a) *General requirements.* (1) A cylinder may not be loaded with a cryogenic liquid colder than the design service temperature of the packaging.

(2) A cylinder may not be loaded with any material which may combine chemically with any residue in the packaging to produce an unsafe condition.

(3) The jacket covering the insulation on a cylinder used to transport any flammable cryogenic liquid must be made of steel.

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form may not be installed on any cylinder used to transport oxygen, cryogenic liquid unless the parts are anodized in accordance with ASTM Standard B 580.

(5) An aluminum valve, pipe or fitting may not be installed on any cylinder used to transport any flammable cryogenic liquid.

(6) Each cylinder must be provided with one or more pressure relief devices, which must be installed and maintained in compliance with the requirements of this subchapter.

(7) Each pressure relief device must be installed and located so that the cooling effect of the contents during venting will not prevent effective operation of the device.

(8) The maximum weight of the contents in a cylinder with a design serv-

ice temperature colder than -320° F. may not exceed the design weight marked on the cylinder (see § 178.57-20(a)(4) of this subchapter).

(b) *Pressure control systems.* Each cylinder containing a cryogenic liquid must have a pressure control system that conforms to § 173.34(d) and is designed and installed so that it will prevent the cylinder from becoming liquid full.

(c) *Specification cylinder requirements and filling limits.* Specification DOT-4L cylinders (§178.57 of this subchapter) are authorized for the transportation of cryogenic liquids when carried in the vertical position as follows:

(1) For purposes of this section, "filling density," except for hydrogen, is defined as the percent ratio of the weight of lading in the packaging to the weight of water that the packaging will hold at 60° F. (1 lb. of water=27.737 cubic inches at 60° F.).

(2) The cryogenic liquids of argon, nitrogen, oxygen, helium and neon must be loaded and shipped in accordance with the following table:

Pressure control valve setting (maximum start-to-discharge pressure psig)	Maximum permitted filling density (percent by weight)					
	Air	Argon	Nitrogen	Oxygen	Helium	Neon
45.....	82.5	133	78	108	12.5	109
75.....	80.3	130	74	105	12.5	104
105.....	78.4	127	72	103	12.5	100
170.....	76.2	122	70	100	12.5	92
230.....	75.1	119	69	98	12.5	85
295.....	73.3	116	68	96	12.5	77
360.....	70.7	113	65	93	12.5	.....
450.....	65.9	111	61	91	12.5	.....
540.....	62.9	107	58	88	12.5	.....
625.....	60.1	104	55	86	12.5	.....
Design service temperature (*F.).....	-320	-320	-320	-320	-452	-411

(3) *Hydrogen (minimum 95 percent parahydrogen)* must be loaded and shipped as follows:

Column 1	Column 2
Design service temperature.....	Minus 423° F. or colder.
Maximum permitted filling density, based on cylinder capacity at minus 423° F (see Note 1).	6.7 percent.
The pressure control valve must be designed and set to limit the pressure in the cylinder to not more than.	17 psig.

NOTE 1: The filling density for hydrogen, cryogenic liquid is defined as the percent ratio of the weight of lading in a packaging to the weight of water that the packaging will hold at minus 423° F. The volume of the packaging at minus 423° F is determined in cubic inches. The volume is converted to pounds of water (1 lb. of water=27.737 cubic inches).

(1) Each cylinder must be constructed, insulated and maintained so that during transportation the total rate of venting shall not exceed 30 SCF of hydrogen per hour.

(ii) In addition to the marking requirements in § 178.57-20 of this subchapter, the total rate of venting in SCF per hour (SCFH) shall be marked on the top head or valve protection band in letters at least one-half inch high as follows: "VENT RATE\*\*SCFH" (with the asterisks replaced by the number representing the total rate of venting, in SCF per hour).

(iii) Carriage by highway is subject to the conditions specified in § 177.840(a) of this subchapter.

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

[Amdt. 173-166, 48 FR 27695, June 16, 1983, as amended by Amdt. 173-166, 49 FR 24314, June 12, 1984; Amdt. 173-180, 49 FR 42735, Oct. 24, 1984; Amdt. 173-201, 52 FR 13041, Apr. 20, 1987]

#### § 173.318 Cryogenic liquids in cargo tanks.

(a) *General requirements.* (1) A cargo tank may not be loaded with a cryogenic liquid colder than the design service temperature of the packaging.

(2) A cargo tank may not be loaded with any material that may combine chemically with any residue in the packaging to produce an unsafe condition (see § 178.338-15).

(3) The jacket covering the insulation on a tank used to transport a cryogenic liquid must be made of steel if the cryogenic liquid:

(i) Is to be transported by vessel (see § 176.76(h)(1) of this subchapter); or

(ii) Is oxygen or a flammable material.

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form may not be installed on any cargo tank used to transport oxygen, cryogenic liquid unless the parts are anodized in accordance with ASTM Standard B 580.

(5) An aluminum valve, pipe or fitting, external to the jacket that retains lading during transportation may not be installed on any cargo tank used to transport oxygen, cryogenic liquid or any flammable cryogenic liquid.

(6) A cargo tank used to transport oxygen, cryogenic liquid must be pro-

vided with a manhole (see § 178.338-6 of this subchapter).

(b) *Pressure relief systems and pressure control valves*—(1) *Types of pressure relief systems*—(i) *Tanks in oxygen and flammable cryogenic liquid service.* Except as otherwise provided in this paragraph, each tank in oxygen and flammable cryogenic liquid service must be protected by two independent pressure relief systems which are not connected in series, namely:

(A) A primary system of one or more pressure relief valves; and

(B) A secondary system of one of more frangible discs or pressure relief valves. For a tank in carbon monoxide service, the secondary system must be pressure relief valves only.

(ii) *Tanks in helium and atmospheric gas (except oxygen) cryogenic liquid service.* For a tank used in helium and atmospheric gas (except oxygen) cryogenic liquid service, the tank must be protected by at least one pressure relief system consisting of:

(A) One of more pressure relief valves; or

(B) A combination of one or more pressure relief valves and one or more frangible discs.

(2) *Capacities of pressure relief systems*—(i) *Tanks in oxygen or flammable cryogenic liquid service.* For tanks in oxygen or flammable cryogenic liquid service, the primary system and the secondary system of pressure relief devices must each have a flow capacity equal to or greater than that calculated by the applicable formula in paragraph 5.3.2 or paragraph 5.3.3 of CGA Pamphlet S-1.2. In addition:

(A) The primary pressure relief system must have his total flow capacity at a pressure not exceeding 120 percent of the tank's design pressure.

(B) The secondary pressure relief system must have this total flow capacity at a pressure not exceeding 150 percent of the tank's design pressure.

(ii) *Tanks in helium and atmospheric gas (except oxygen) cryogenic liquid service.* For tanks in helium and atmospheric gas (except oxygen) cryogenic liquid service, the pressure relief system must have a flow capacity equal to or greater than that calculated by the applicable formula in para-

graphs 5.3.2 or 5.3.3 of CGA Pamphlet S-1.2. If the pressure relief system consists of a combination of pressure relief valves and frangible discs, the pressure relief valves must have a total venting capacity equal to or greater than that calculated by the applicable formula in paragraph 4.1.10.1.1 of CGA Pamphlet S-1.2. The pressure relief system must have this total flow capacity at a pressure not exceeding 150 percent of the tank's design pressure.

(3) *Type and construction of pressure relief devices.* (i) Each pressure relief device must be designed and constructed for a pressure equal to or exceeding the tank's design pressure at the coldest temperature reasonably expected to be encountered.

(ii) Pressure relief devices must be either spring-loaded pressure relief valves or frangible discs. Pressure relief valves must be of a type that automatically open and close at predetermined pressures.

(4) *Setting of pressure relief devices.* (i) On a tank used in oxygen or flammable cryogenic liquid service, the pressure relief devices must perform as follows.

(A) Each pressure relief valve in the primary relief system must be set-to-discharge at a pressure no higher than 110 percent of the tank's design pressure.

(B) Each pressure relief device in the secondary pressure relief system must be designed to commence functioning at a pressure no lower than 130 percent and no higher than 150 percent of the tank's design pressure.

(ii) On a tank used in helium and atmospheric gas (except oxygen) cryogenic liquid service, the pressure relief devices in the pressure relief system must be designed to commence functioning at no higher than 150 percent of the tank's design pressure.

(5) *Optional pressure relief devices and pressure control valves.* In addition to the required pressure relief devices, a cargo tank in cryogenic liquid (except carbon monoxide) service may be equipped with one or both of the following:

(i) One or more pressure control valves set at a pressure below the tank's design pressure.

(ii) One or more frangible discs set to function at a pressure not less than one and one-half times or more than two times the tank's design pressure.

(6) *Maximum filling rate.* (i) For a tank used in oxygen and flammable cryogenic liquid service, the maximum rate at which the tank is filled must not exceed the liquid flow capacity of the primary pressure relief system rated at a pressure not exceeding 120 percent of the tank's design pressure.

(ii) On tanks used in helium and atmospheric gas (except oxygen) cryogenic liquid service, the maximum rate at which the tank is filled must not exceed the liquid flow capacity of the pressure relief valves rated at 150 percent of the tank's design pressure.

(7) *Arrangement and location of pressure relief devices.* (i) The discharge from any pressure relief system must be directed upward and be unobstructed to the outside of the protective housing in such a manner as to prevent impingement of gas upon the jacket or any structural part of the vehicle.

(ii) Each pressure relief valve must be arranged or protected to prevent the accumulation of foreign material between the relief valve and the atmospheric discharge opening in any relief piping. The arrangement must not impede flow through the device.

(iii) Each pressure relief valve must be designed and located to minimize the possibility of tampering. If the pressure setting or adjustment is external to the valve, the valve adjustment must be sealed.

(iv) Each pressure relief device must have direct communication with the vapor space of the tank at the mid-length of the top centerline.

(v) Each pressure relief device must be installed and located so that the cooling effect of the contents during venting will not prevent the effective operation of the device.

(8) *Connections.* (i) Each connection to a pressure relief device must be of sufficient size to allow the required rate of discharge through the pressure relief device. The inlet connection must be not less than one-half inch nominal pipe size.

(ii) A shut-off valve may be installed in a pressure relief system only when

the required relief capacity is provided at all times.

(9) *Pressure relief devices for piping hose and vacuum-insulated jackets.* (i) Each portion of connected liquid piping or hose that can be closed at both ends must be provided with either a hydrostatic pressure relief valve without an intervening shut-off valve, or a check valve permitting flow from the pipe or hose into the tank. If used, the relief valve must be located so as to prevent its discharge from impinging on the tank, piping, or operating personnel.

(ii) On a vacuum-insulated cargo tank the jacket must be protected by a suitable relief device to release internal pressure. The discharge area of this device must be at least 0.00024 square inch per pound of water capacity of the tank. This relief device must function at a pressure not exceeding the internal design pressure of the jacket, calculated in accordance with the ASME Code, or 25 psig, whichever is less.

(10) *Tank inlet, outlet, pressure relief device and pressure control valve markings.* (i) Each tank inlet and outlet, except pressure relief devices and pressure control valves, must be permanently marked to indicate whether it communicates with "vapor" or "liquid" when the tank is filled to the maximum permitted filling density.

(ii) Each pressure relief valve must be plainly and permanently marked with the pressure, in psig, at which it is set-to-discharge, the discharge rate of the device in SCF per minute (SCFM) of free air, and the manufacturer's name or trade name and catalog number. The marked set-to-discharge pressure valve must be visible with the valve in its installed position. The rated discharge capacity of the device must be determined at a pressure of 120 percent of the design pressure of the tank.

(iii) Each pressure control valve must be plainly and permanently marked with the pressure, in psig, at which it is set-to-discharge.

(c) *Weight of lading requirements.* The weight of a cryogenic liquid in the tank must be determined by weighing or by the use of a liquid level gauging device authorized in § 178.338-14(a) of this subchapter, and may not exceed the lesser of:

(1) The weight of lading in the tank, based on the water capacity stamped on the nameplate (§ 178.338-18(a)(4) of this subchapter) and the appropriate maximum permitted filling density specified in paragraph (f) of this section; or

(2) The maximum weight of lading for which the cargo tank was designed, as marked on the specification plate (see § 178.338-18(b) of this subchapter).

(d) *Outage.* Except for a cargo tank containing helium, cryogenic liquid, a cargo tank offered for transportation must have an outage of at least two percent below the inlet of the pressure relief device or pressure control valve, under conditions of incipient opening, with the tank in a level attitude.

(e) *Temperature.* A flammable cryogenic liquid in a cargo tank at the start of travel must be at a temperature sufficiently cold that the pressure setting of the pressure control valve or the required pressure relief valve, whichever is lower, will not be reached in less time than the marked rated holding time for the cryogenic liquid (see §§ 173.33(d)(1)(ii) and 178.338-9(b) of this subchapter).

(f) *Specification MC-338 (§ 178.338 of this subchapter) cargo tanks* are authorized for the shipment of the following cryogenic liquids subject to the following additional requirements:

(1) For purposes of this section, "filling density" is defined as the percent ratio of the weight of lading in the tank to the weight of water that the tank will hold at the design service temperature (one pound of water=27.737 cubic inches at 60° F., or one gallon of water=231 cubic inches at 60° F. and weighs 8.32828 pounds).

(2) *Air, argon, helium, nitrogen, and oxygen, cryogenic liquids* must be loaded and shipped in accordance with the following table:

PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum set-to-discharge pressure (psig)	Maximum permitted filling density (percent by weight)				
	Air	Argon	Helium	Nitrogen	Oxygen
26			12.5		
30	80.3	129	12.5	74	105
40	79.2		12.5		
50	78.0		12.5		
55	77.3	125	12.5	71	102
60	76.9		12.5		
80	75.3		12.5		
85	75.1	121	12.5		89
100	73.0		12.5		
105	73.7		12.5	67	
120	72.2		12.5		
140	71.4		12.5		
145	70.9	115	12.5	64	94
180	68.3		12.5		
200	67.3	110	12.5	61	91
250	63.3	106	12.5	57	87
275	62.3	105	12.5	56	86
325	59.4	101		53	83
Design service temperature.	-320°F	-320°F	-452°F	-320°F	-320°F

(3) Carbon monoxide, hydrogen, ethylene, and methane or natural gas, cryogenic liquids must be loaded and shipped in accordance with the following table:

PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum set-to-discharge pressure (psig)	Maximum permitted filling density (percent by weight)			
	Carbon monoxide	Ethylene	Hydrogen	Methane or natural gas
13			6.6	
15	75.0		6.6	40.5
17	74.0		6.6	
20		53.5		40.0
25	73.0			
30	72.0	52.7	6.3	39.1
35				
40		52.0		38.6
45	71.5			
50		51.4	6.0	38.2
55				
60		50.8		
70		50.2	5.7	37.5
80		49.2		
85				
100		48.4	5.4	36.6
115		48.2		
125			5.0	
150			4.5	
175	62.5	45.8		
285	58.0			
Design service temperature.	-320°F	-155°F	-423°F	-260°F

(g) One-way travel time; marking. The jacket of a cargo tank to be used to transport a flammable cryogenic liquid must be marked on its right side near the front, in letters and numbers

at least two inches high, "One-Way-Travel-Time — hrs.", with the blank filled in with a number indicating the one-way travel time (OWTT), in hours, of the cargo tank for the flam-

mable cryogenic liquid to be transported. A cargo tank that is partially unloaded at one or more locations must have additional marking "One-Way-Travel-Time — hrs. — psig to — psig at — percent filling density," with the second blank filled in with the pressure existing after partial unloading and the third blank filled in with the set-to-discharge pressure of the control valve or pressure relief valve, and the fourth blank with the filling density following partial unloading. Multiple OWTT markings for different pressure levels are permitted.

(1) OWTT is based on the marked rated holding time (MRHT) of the cargo tank for the cryogenic liquid to be transported in the cargo tank. If the MRHT for the flammable cryogenic liquid is not displayed on or adjacent to the specification plate, this MRHT may be derived.

(2) The MRHT is converted to OWTT, in hours, as follows:

(i) For a tank with an (MRHT) of 72 hours or less,

$$\text{OWTT} = (\text{MRHT} - 24) / 2$$

(ii) For a tank with an MRHT greater than 72 hours,

$$\text{OWTT} = \text{MRHT} - 48$$

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

[Amdt. 173-166, 48 FR 27696, June 16, 1983; 48 FR 50440, 50442, Nov. 1, 1983, as amended by Amdt. 173-166, 49 FR 24315, June 12, 1984; Amdt. 173-180, 49 FR 42735, Oct. 24, 1984; Amdt. 173-201, 52 FR 13041, Apr. 20, 1987]

### § 173.319 Cryogenic liquids in tank cars.

(a) *General requirements.* (1) A tank car containing a flammable cryogenic liquid may not be shipped unless it was loaded by, or with the consent of, the owner of the tank car.

(2) The amount of flammable cryogenic liquid loaded into a tank car must be determined, either by direct measurement or by calculation based on weight, to verify that the tank has not been filled to a level in excess of the limits specified in paragraph (d)(2) of this section. The weight of any flammable cryogenic liquid loaded, except hydrogen, must be checked by

use of scales after disconnecting the loading line.

(3) Whenever a tank car containing any flammable cryogenic lading is not received by the consignee within 20 days from the date of shipment, the shipper of the lading shall notify the Bureau of Explosives.

(4) A tank car may not be loaded with any flammable cryogenic liquid:

(i) That may combine chemically with any residue in the tank to produce an unsafe condition,

(ii) That is colder than the design service temperature of the tank,

(iii) If the average daily pressure rise in the tank exceeded 3 psi during the prior shipment (see § 173.31(c)(13)),

(iv) Unless it is marked with the name of contents, in accordance with § 172.330 of this subchapter.

(b) When a tank car containing a flammable cryogenic liquid is offered for transportation:

(1) At least 0.5 percent outage must be provided below the inlet of the pressure relief or pressure control valve at the start-to-discharge pressure setting of the valve, with the tank car in a level attitude, and

(2) The absolute pressure in the annular space must be less than 75 microns of mercury.

(c) *Temperature.* A flammable cryogenic liquid must be loaded into a tank car at such a temperature that the average daily pressure rise during transportation will not exceed 3 psi (see paragraph (a)(4)(iii) of this section and § 173.31(c)(13)).

(d) A Class DOT-113 tank car is authorized for the shipment of the following cryogenic liquids subject to the following additional requirements:

(1) For purposes of this section, "filling density" is defined as the percent ratio of the weight of lading in the tank to the weight of water that the tank will hold at the design service temperature (one pound of water = 27.737 cubic inches at 60° F., or one gallon of water = 231 cubic inches at 60° F. and weighs 8.32828 pounds).

(2) *Ethylene, and hydrogen (minimum 95 percent parahydrogen), cryogenic liquids* must be loaded and shipped in accordance with the following table:

PRESSURE CONTROL VALVE SETTING OR RELIEF VALVE SETTING

Maximum start-to-discharge pressure (psig)	Maximum permitted filling density (percent by weight)			
	Ethylene	Ethylene	Ethylene	Hydrogen
17.....				6.60.
45.....	52.8.....			
75.....		51.1.....	51.1.....	
Maximum pressure when offered for transportation.	10 psig.....	10 psig.....	20 psig.....	
Design service temperature.....	Minus 260° F.....	Minus 260° F.....	Minus 155° F.....	Minus 423° F.
Specification (see § 173.31(a)(9)).....	113D60W.....	113C120W.....	113D120W.....	113A175W.
	113C60W.....			113A60W.

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, App. A to Part 1)  
[Amdt. 173-166, 48 FR 27698, June 16, 1983]

§ 173.320 Cryogenic liquids; exceptions.

(a) Atmospheric gases and helium, cryogenic liquids, in Dewar flasks, insulated cylinders, insulated portable tanks, insulated cargo tanks, and insulated tank cars, designed and constructed so that the pressure in such packagings will not exceed 25.3 psig under ambient temperature conditions during transportation are not subject to the requirements of this subchapter when transported by motor vehicle or railcar except as specified in paragraphs (a)(1), (a)(2), and (a)(3) of this section.

(1) Sections 171.15 and 171.16 of this subchapter pertaining to the reporting of incidents, not including a release that is the result of venting through a pressure control valve, or the neck of the Dewar flask.

(2) Subparts A, B, C, and D of Part 172, (§§ 174.24 for rail and 177.817 for highway) and in addition, Part 172 in its entirety for oxygen.

(3) Subparts A and B of Part 173, and §§ 174.1 and 177.800, 177.804, 177.807, and 177.823 of this subchapter.

(b) The requirements of this subchapter do not apply to atmospheric gases and helium:

(1) During loading and unloading operations (pressure rises may exceed 25.3 psig); or

(2) When used in operation of a process system; such as a refrigeration system (pressure may exceed 25.3 psig).

(c) For transportation aboard aircraft, see § 171.11 of this subchapter.

[Amdt. 173-201, 52 FR 13043, Apr. 20, 1987]

**Subpart H—Poisonous Materials, Etiologic Agents, and Radioactive Materials; Definitions and Preparation**

§ 173.325 Classes of poisonous materials.

(a) Poisonous materials for the purpose of this subchapter are divided into three groups according to the degree of hazard in transportation.

- (1) Poison A.
- (2) Poison B.
- (3) Irritating material.

[Amdt. 173-94, 41 FR 16081, Apr. 15, 1976]

§ 173.326 Poison A.

(a) For the purpose of Parts 170-189 of this subchapter extremely dangerous poisons, Class A, are poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life. This class includes the following:

- (1) Bromacetone.
- (2) Cyanogen.
- (3) Cyanogen chloride containing less than 0.9 percent water.
- (4) Diphosgene.
- (5) Ethyldichlorarsine.
- (6) Hydrocyanic acid (see Note 1 of this paragraph).
- (7) [Reserved]
- (8) Methyldichlorarsine.
- (9) [Reserved]
- (10) Nitrogen peroxide (tetroxide).
- (11) [Reserved]
- (12) Phosgene (diphosgene).
- (13) Nitrogen tetroxide-nitric oxide mixtures containing up to 33.2 percent weight nitric oxide.

NOTE 1: Diluted solutions of hydrocyanic acid of not exceeding 5 percent strength are classed as poisonous articles, Class B (see § 173.343).

(b) Poisonous gases or liquids, Class A, as defined in paragraph (a) of this section, except as provided in § 173.331, must not be offered for transportation by rail express.

[29 FR 18763, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16081, Apr. 15, 1976; Amdt. 173-94A, 41 FR 40683, Sept. 20, 1976]

§ 173.327 General packaging requirements for Poison A materials.

(a) Cylinders must be maintained in compliance with the requirements of § 173.34. Valves must be capable of withstanding the test pressure of the cylinders and must have taper-threaded connections directly to the cylinders (no bushings or straight-threaded connections of valves to cylinders permitted). For corrosive commodities, valves may be of the packed type provided the assembly is made gas-tight by means of a seal cap with compatible gasketed joint to the valve body or to the cylinder to prevent loss of commodity through or past the packing; otherwise the valves must be of the packless type with nonperforated diaphragms and handwheels. Each valve outlet must be sealed by a threaded cap or a threaded solid plug. The outlet caps and plugs, luting, and gaskets must be compatible with each other, the valve assembly, and the lading.

(1) The pressure of the poison gas at 130° F. must not exceed the service pressure of the cylinder. Cylinders must not be liquid full at 130° F.

(2) Cylinders packed in boxes must have adequate protection for valves. Box and valve protection must be of strength sufficient to protect all parts of cylinders and valves from deformation or breakage resulting from a drop of at least 6 feet onto a concrete floor, impacting at the weakest point. A cylinder not overpacked in a box must be equipped with a protective cap or other means of valve protection which must be capable of preventing damage to or distortion of the valve if it were subjected to an impact test as follows: The cylinder, prepared as for ship-

ment, is allowed to fall from an upright position with the side of the cap or other valve protection striking a solid steel object projecting not more than 6 inches above the floor level.

(b) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

(c) No Class A poisons in cargo tanks. No "extremely dangerous poison, class A," may be loaded into or transported in any cargo tank.

(d) It shall not be permissible to transport class A poison if there be any interconnecting means of any character between the containers.

(e) Unless otherwise specified in this subchapter, packaging used for the transportation of any Poison A material may not be completely filled. Sufficient outage must be provided so that the packaging will not be liquid full at 130° F. (55° C.).

(f) Each tank car, except series 106A\*\*\* and 110A\*\*\*, containing Poison A materials must be marked with the name of contents (§ 172.101 of this subchapter) in accordance with the requirements of § 172.330 of this subchapter.

[29 FR 18763, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.327, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.328 Poison A materials not specifically provided for.

(a) Poison A materials, as defined in § 173.326, other than those for which special packaging requirements are prescribed in this part, must be packaged as follows:

(1) Specification 33<sup>1</sup> or 3D<sup>1</sup> metal cylinders of not over 125 pounds water capacity (nominal). Gaskets if used between the protection cap and neck of cylinder must be renewed for each shipment. Cylinders not fitted with valve protection extension ring must be packed in wooden boxes complying

<sup>1</sup>Use of existing cylinders authorized, but new construction not authorized.

with the construction, marking, and labeling requirements of § 173.25.

(2) Specification 3A1800, 3AA1800, 3AL1800, or 3E1800 (§§ 178.36, 178.37, 178.42, 178.46 of this subchapter) cylinders.

(i) Specifications 3A, 3AA and 3AL cylinders must not exceed 125 pounds water capacity (nominal). Cylinders must have valve protection or be packed in strong wooden or metal boxes as described in § 173.327(a)(2). Specification 3AL cylinders containing arsine or phosphine may only be transported by highway and rail.

(ii) Specification 3E1800 cylinders must be packed in strong wooden or metal boxes.

(3) Cyanogen chloride containing less than 0.9 percent water may also be packaged as prescribed by § 173.332(a)(2) of this subchapter.

[29 FR 18743, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.328, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.329 Bromacetone; chlorpicrin and methyl chloride mixtures; chlorpicrin and nonflammable, nonliquefied compressed gas mixtures.

(a) Bromacetone, when offered for transportation by carriers by rail freight, highway, or water, must be packed in specification containers as follows:

(1) As prescribed in § 173.328.

(2) Specification 15A, 15B, 15C, 16A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in hermetically sealed metal cans in corrugated fiberboard cartons, Spec. 2C (§ 178.22 of this subchapter). Bottles must not contain over 1-pound of liquid each, may not be filled to over 95 percent capacity, must be tightly and securely closed, and be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 24 pounds.

(b) *Chlorpicrin and methyl chloride mixtures.* Chlorpicrin and methyl chloride mixtures, in addition to con-

tainers prescribed in § 173.328, when offered for transportation by carriers by rail freight, highway, or water, may be shipped in specification containers as follows:

(1) Specification 3A, 3AA, 3B, 3C,<sup>1</sup> 3E, 4A,<sup>1</sup> 4B, 4BA, 4BW, or 4C<sup>1</sup> (§§ 178.36, 178.37, 178.38, 178.42, 178.50, 178.51, 178.61, of this subchapter). Cylinders having not over 250 pounds water capacity (nominal). Valves or other closing devices must be protected to prevent damage in transit, by screw-on metal caps or by packing the cylinders in strong boxes or crates. Cylinders having a wall thickness of less than 0.10 inch must be packed in boxes or crates complying with the construction, marking, and labeling requirements of § 173.25.

(c) *Chlorpicrin and nonflammable, nonliquefied compressed gas mixtures.* Chlorpicrin and nonflammable, nonliquefied compressed gas mixtures, in addition to containers prescribed in § 173.328, when offered for transportation by carriers by rail freight, highway, or water, must be shipped in specification containers as follows:

(1) Specification 3A, 3AA, 3B, 3C,<sup>1</sup> 3E, 4A,<sup>1</sup> 4B, 4BA, 4BW, or 4C<sup>1</sup> (§§ 178.36, 178.37, 178.38, 178.42, 178.50, 178.51, 178.61, of this subchapter). Cylinders having not over 250 pounds water capacity (nominal). Valves or other closing devices must be protected to prevent damage in transit, by screw-on metal caps or by packing the cylinders in strong boxes or crates. Cylinders having a wall thickness of less than 0.10 inch must be packed in boxes or crates complying with the construction, marking, and labeling requirements of § 173.25.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967, and amended at 45 FR 59892, Sept. 11, 1980; Amdt. 173-149, 46 FR 49903, Oct. 8, 1981]

§ 173.330 Chemical ammunition.

(a) Projectiles, shells, bombs, and grenades containing Poison A materials but not equipped or packaged with ignition elements, bursting charges, detonating fuzes, or explosive compo-

<sup>1</sup> Use of existing cylinders authorized, but new construction not authorized.

nents, may be shipped only by, for, or to the Department of Defense. Each shipment must be packaged, marked, and labeled as required by their regulations. Each package must be labeled with POISON GAS label marked "NONEXPLOSIVE" and also marked with the proper shipping name. (See §§ 173.53(r) and 173.59 for explosive chemical ammunition.)

(b) Chemical ammunition containing poisonous liquids or gases, Class A, must not be offered for transportation by rail express.

129 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16082, Apr. 15, 19761

#### § 173.331 Gas identification sets.

(a) Gas identification sets containing Poison A materials, irritating materials, and chlorine must be packaged in Specification 15A, 15B, 19A, or 19B (§§ 178.168, 178.169, 178.190, or 178.191 of this subchapter) wooden boxes under the following conditions:

(1) Gas identification sets containing Poison A materials and irritating materials may be shipped in amounts not exceeding 5 cubic centimeters, if a liquid, or 5 grams, if a solid, when mixed with or absorbed in activated charcoal or silica gel, or other absorbent medium, and packed in strong glass bottles of not less than 4 fluid ounces capacity. The Poison A materials and chlorine may be shipped if the gas itself is absorbed in activated charcoal or silica gel, or other absorbent medium, and packed in the same type 4-ounce bottles as described above. Each bottle as herein specified must be surrounded with appropriate absorbent cushioning material, and enclosed in a hermetically sealed metal can. Each can must be surrounded on all sides by at least 1 inch of dry, fine sawdust or wood pulp. The cans must be packed in Specification 15A, 15B, 19A, or 19B (§§ 178.168, 178.169, 178.190, 178.191 of this subchapter) wooden boxes. The bottles must be closed with ground-in glass stoppers securely fastened. The cushioning material around the bottle must be at least 1 inch thick. The cans must be made from metal of thickness not less than 30 gauge, United States standard. There must be not more than a total

of 100 grams or cubic centimeters or a combination of both, in each outside wooden box.

(b) Gas identification sets containing Poison A materials and irritating materials must be packaged as follows:

(1) The liquids or liquefied gases in hermetically sealed glass tubes containing not to exceed 40 cubic centimeters each. Each tube must be securely cushioned and packed in an individual mailing tube with screw-thread metal cover. Not more than 12 such mailing tubes, cushioned with corrugated fiberboard, may be packed in a closed fiberboard container, not to exceed 4 such fiberboard containers, containing an aggregate of not to exceed 48 glass tubes cushioned and packed in an outside steel cylinder of not less than 0.145-inch wall thickness, which is closed by a plate, bolted to a flange welded to cylinder wall. Suitable gasket must be placed between flange and head plate, and closure must prevent leakage of any gas.

(c) Gas identification training sets containing Poison A materials and irritating materials must be packaged as follows:

(1) The Poison A materials and irritating material, in amounts not exceeding 5 cubic centimeters, if a liquid, or 20 grams, if a solid, when mixed with or absorbed in activated charcoal, silica gel, crepe rubber, or other absorbent medium, must be packed in strong glass bottles of not less than 2 fluid ounces capacity, equipped with a polyethylene liner; each bottle as herein specified must have a metal screw-cap closure, equipped with a built-in compression type spring and an insert in the opening of the bottle to match so that when tightened an airtight seal is obtained. Twelve bottles, containing articles as described in this paragraph and not exceeding 100 cubic centimeters or grams, or a combination of both, must be placed in a modified styrene plastic carrying case, in three rows of four bottles each and fitted with a fiberboard cell or separator. The void space around the individual bottles, and around all interior sides of the carrying case, must be filled with dry, fine sawdust or vermiculite. A sheet of sponge rubber must be fitted to the inside of the top and

bottom of the carrying case to provide additional cushioning and insure a snug fit of the bottles when the top is secured. The carrying case must be fitted into a snug fitting fiberboard box, domestic type. The case must then be packed in a nailed wooden box, Specification 15A or 15B (§§ 178.168, 178.169 of this subchapter), which must be fitted with a waterproof case liner.

[Amdt. 173-94, 41 FR 16082, Apr. 15, 1976, as amended by Amdt. 173-149, 46 FR 49903, Oct. 6, 1981; Amdt. 173-158, 47 FR 43066, Sept. 30, 1982]

**§ 173.332 Hydrocyanic acid, liquid (prussic acid) and hydrocyanic acid liquefied.**

(a) Hydrocyanic acid, liquid (prussic acid) and hydrocyanic acid liquefied, must be packed in specification containers as follows:

(1) As prescribed in § 173.328.

(2) Specification 3A480, 3AA480, 3A480X<sup>1</sup> or 3AL1800 (§ 178.36, 178.37, 178.46 of this subchapter) metal cylinders of not over 278 pounds water capacity (nominal); valve protection cap must be used and be at least  $\frac{1}{16}$ -inch thick, gas-tight, with  $\frac{1}{16}$ -inch faced seat for gasket and with United States standard form thread; the cap must be capable of preventing injury or distortion of the valve when it is subjected to an impact caused by allowing the cylinder, prepared as for shipment, to fall from an upright position with side of cap striking a solid steel object projecting not more than 6 inches above floor level. Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(b) Cylinders must be charged with not more than 0.6 pound of liquid for 1-pound water capacity of cylinder. Each filled cylinder must be tested for leakage before shipment and must show absolutely no leakage; this test must consist in passing over the closure of the cylinder, without the protection cap attached, a piece of Guignard's sodium picrate paper to detect any escape of hydrocyanic acid from the cylinder. Other equally efficient test methods may also be used in lieu of the picrate paper.

(c) Liquid hydrocyanic acid completely absorbed in inert material may also be shipped in specification containers as follows:

(1) Specification 15A, or 19B (§§ 178.168, 178.191 of this subchapter). Wooden boxes with inside containers consisting of metal cans, spec. 2N (§ 178.32 of this subchapter), not over 14 pounds water capacity each. The liquid contents of each can must not exceed 0.33 pound of liquid for 1-pound water capacity of the can. Each can containing 4 ounces or more of liquid must be fitted with fiber caps not less than 0.08 inch thick flanged about 1 inch and fitting snugly over each end of the can. Each can must be tested for leakage after being filled and again after being maintained at ordinary room temperature for a period of at least three weeks. Each can must have its outer surface protected against rust by the use of enamel or lacquer, or each can must be completely wrapped in waterproof paper.

(2) The box lining must consist of not more than two pieces of waterproof paper, one piece completely surrounding the contents and running lengthwise of the box, and the other piece completely surrounding the contents and running crosswise of the box. In each instance, the wrapping must overlap at least 4 inches.

(3) Spec. 12B (§ 178.205) of this subchapter). Fiberboard boxes, constructed in accordance with requirements for a gross weight of 65 pounds but having a gross weight of not over 70 pounds, with inside containers consisting of metal cans, Spec. 2N (§ 178.32 of this subchapter). The liquid contents of each can must not exceed 0.33 pound of liquid for 1-pound water capacity of the can and the total weight of liquid in each can must not exceed 41 ounces. Each can must be tested for leakage after being filled and again after being maintained at ordinary room temperature for a period of at least three weeks. Each can must have its outer surface protected against rust by the use of enamel or lacquer. Not more than twelve cans shall be packed in the outside fiberboard box and each can shall be separated from the other by 200-pound minimum test fiber-

<sup>1</sup> Use of cylinders authorized, but new construction not authorized.

board partitions. Each box shall be provided with 200-pound minimum test fiberboard liner and top and bottom pads of the same material. In addition to the required closure of the boxes, two metal straps measuring ½ inch by .015 inch must be applied around the girth of each box.

(d) Specification 105A500W or 105A600W (§§ 179.100 and 179.101 of this subchapter). Tank cars. Tank must be restenciled 105A300W and be equipped with safety valves of the type and size used on Spec. 105A300W (§§ 179.100 and 179.101 of this subchapter). Tank car tank must be equipped with approved dome fittings and safety devices, and with cork insulation at least 4 inches in thickness. Each tank car must be marked "HYDROCYANIC ACID" in accordance with the requirements of § 172.330 of this subchapter. Written procedures covering details of tank car appurtenances, dome fittings and safety devices, and marking, loading, handling, inspection, and testing practices shall be examined by the Bureau of Explosives and approved by the Director, OHMT before any tank car is offered for transportation of hydrocyanic acid. The maximum permitted filling density is 63 percent of the water capacity of the tank.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16082, Apr. 15, 1976; Amdt. 173-138, 45 FR 32697, May 19, 1980; Amdt. 173-149, 46 FR 49903, Oct. 8, 1981; Amdt. 173-52, 46 FR 62457, Dec. 24, 1981; 47 FR 13818, Apr. 1, 1982]

#### § 173.333 Phosgene or diphosgene.

(a) Phosgene or diphosgene must be packed in specification containers as follows:

(1) As prescribed in § 173.328, the filling density (see § 173.304(a)(2) Table Note 1) must not exceed 125 percent and a cylinder must not contain more than 150 pounds of phosgene.

(2) Spec. 106A500X (§§ 179.300, 179.301 of this subchapter) tanks. Authorized only for phosgene. Tanks must not be equipped with safety devices of any type. Outage must be sufficient to prevent tanks from becoming liquid full at 130°F. (55°C.) Addi-

tional requirements are prescribed for rail shipments under § 174.200 of this subchapter, and for highway shipments under § 177.834(m) of this subchapter.

(b) Each filled cylinder must be tested for leakage before shipment and must show absolutely no leakage; this test must consist in immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 150° F. for at least thirty 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 shipment.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-34, 35 FR 13836, Sept. 1, 1970; Amdt. 173-138, 45 FR 32697, May 19, 1980]

#### § 173.334 Organic phosphates mixed with compressed gas.

(a) Hexaethyl tetraphosphate, parathion, tetraethyl dithio pyrophosphate, tetraethyl pyrophosphate, or other Poison B organic phosphate, n.o.s. (including a compound or mixture), may be mixed with a compressed gas which must be nonflammable. This mixture must not contain more than 20 percent by weight of organic phosphate and must be packaged as follows:

(1) Specification 3A240, 3AA240, 3B240, 4A240, 4B240, 4BA240, or 4BW240 (§§ 178.36, 178.37, 178.38, 178.49, 178.50, 178.51, 178.61, of this subchapter) cylinders meeting the following requirements;

(i) Each cylinder may be charged with not more than 10 pounds of the mixture, to a maximum filling density of not more than 80 percent of the water capacity;

(ii) Each cylinder must be charged in compliance with § 173.301 (e) and (f);

(iii) No cylinder may be equipped with an eduction tube or a fusible plug;

(iv) No cylinder may be equipped with any valve unless the valve is a type approved by the Department for this installation;

(v) Cylinders must be overpacked in a box so arranged to protect each

valve or other closing device from damage. No more than four cylinders may be packed in a box except that in a wooden box, up to 12 cylinders may be so packed. Each box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package were dropped six feet onto solid concrete, impacting at the weakest point.

(b) Cylinders must be packed in strong wooden boxes with valves or other closing devices protected from injury, with not more than twelve cylinders in one outside wooden box. A single-trip outside fiberboard box may be used when not more than four such cylinders are to be shipped in one outside container. Valves must be adequately protected. Box and valve protection must be of strength sufficient to protect all parts of inside containers and valves from deformation or breakage resulting from a drop of at least six feet onto a concrete floor, impacting at the weakest point.

[29 FR 18753, Dec. 29, 1964, as amended by Order 71, 31 FR 9072, July 1, 1966. Redesignated at 32 FR 5606, Apr. 5, 1967]

**EDITORIAL NOTE:** For Federal Register citations affecting § 173.334, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

**§ 173.336 Nitrogen dioxide, liquid; nitrogen peroxide, liquid; and nitrogen tetroxide, liquid.**

(a) Nitrogen dioxide, liquid, nitrogen peroxide, liquid, and nitrogen tetroxide, liquid must be packed in specification containers as follows:

(1) As prescribed in § 173.328.

(2) Specification 3A480, 3AA480, 3AL1800, or 25<sup>1</sup> (§§ 178.36, 178.37, or 178.46 of this subchapter) metal cylinders with valve removed are authorized. Valve opening must be closed by means of a solid metal plug with tapered thread properly luted to prevent leakages; valve protection cap must be used and be at least  $\frac{1}{8}$ -inch thick, gas-tight, with  $\frac{1}{8}$ -inch faced seat for gasket and with United States standard form thread. Shipments in 3AL

cylinders are authorized only when transported by highway, and rail.

(i) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in accordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(3) Specification 106A500X or 110A500W (§§ 179.300, 179.301 of this subchapter) tanks. Each tank must be equipped with gas tight valve protection caps. Tanks must not be equipped with safety devices of any type. Outage must be sufficient to prevent tanks from becoming liquid full at 130°F. (55°C.). (See § 174.600 and 177.834(m) of this subchapter for special requirements for rail and highway shipments). Specification 110A500W tanks must be stainless steel.

(4) Specification 105A500W (§§ 179.100, 179.101 of this subchapter) tanks cars. Authorized for nitrogen tetroxide only. Tanks must be lagged with not less than a four-inch thickness of cork. All valves and fittings must be protected by a securely attached cover made of metal not subject to deterioration by the lading, and all valve openings, except the safety valve, must be fitted with screw plugs or caps to prevent leakage in the event of valve failure. Safety valve must be equipped with an approved stainless steel or platinum frangible disc. Each tank car must be marked "NITROGEN TETROXIDE" in accordance with the requirements of § 172.330 of this subchapter. Written procedures covering details of tank car appurtenances, dome fittings and safety devices, and marking, loading, handling, inspection and testing practices, must be examined by the Bureau of Explosives and approved by the Director, OEHMT before any tank car is offered for transportation of nitrogen tetroxide.

<sup>1</sup> Use of existing cylinders authorized, but new construction not authorized.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.336, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.337 Nitric oxide.

(a) Nitric oxide must be packed in specification containers as follows:

(1) Specification 3A1800, 3AA1800, 3E1800, or 3AL1800 (§§ 173.36, 178.37, 178.42, or 178.46 of this subchapter) cylinders charged to a pressure of not more than 750 psi at 70° F. Cylinders must be equipped with a valve of stainless steel and valve seat of material which will not be deteriorated by contact with nitric oxide or nitrogen dioxide. Cylinders or valves may not be equipped with safety devices of any type. Valve outlets must be sealed by a solid threaded cap or plug and an inert gasketing material.

(i) Specification 3E1800 cylinders must be packed in strong wooden boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each outside package must be plainly marked "Inside containers comply with prescribed specifications."

(ii) Specification 3A, 3AA, and 3AL cylinders must have their valves protected by metal caps or other equally protective guards securely attached to the cylinders and be of sufficient strength to protect the valves from injury during transit, or by packing in strong wooden boxes of such design as to protect valves from injury or accidental functioning under conditions incident to transportation. Each outside package must be plainly marked "Inside containers comply with prescribed specifications." Shipments in 3AL cylinders are authorized only when transported by highway and rail.

(iii) Each cylinder must be cleaned in compliance with the requirements of Federal Specification RR-C-901b paragraphs 3.7.2 and 3.8.2. Cleaning agents equivalent to those specified in RR-C-901b may be used; however, any cleaning agent must not be capable of reacting with oxygen. One cylinder selected at random from a group of 200 or less cleaned at the same time must be tested for oil contamination in ac-

cordance with Specification RR-C-901b paragraph 4.4.2.3 and meet the standard of cleanliness specified.

(2) Specification 106A500X (§§ 179.300, 179.301 of this subchapter) tank car tanks, Nitric oxide charge in each tank may not exceed 200 psig at 70° F. Each tank must be equipped with gas-tight valve protection cap (see § 179.302 of this subchapter). Each valve outlet must be sealed by a threaded solid plug or a threaded cap with inert luting or gasket material. Valves must be of stainless steel and the caps, plugs, and valve seats must be of material that will not be deteriorated by contact with nitric oxide or nitrogen dioxide. The tank may not be equipped with any safety relief device.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-73, 38 FR 20085, July 27, 1973; Amdt. 173-94, 41 FR 16082, Apr. 15, 1976; Amdt. 173-52, 46 FR 62458, Dec. 24, 1981; 47 FR 13818, Apr. 1, 1982]

§ 173.343 Poison B.

(a) For the purposes of Parts 170-189 of this subchapter and except as otherwise provided in this part, Class B poisons are those substances, liquid or solid (including pastes and semisolids), other than Class A poisons or Irritating materials, which are known to be so toxic to man as to afford a hazard to health during transportation; or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man because they fall within any one of the following categories when tested on laboratory animals:

(1) *Oral toxicity.* Those which produce death within 48 hours in half or more than half of a group of 10 or more white laboratory rats weighing 200 to 300 grams at a single dose of 50 milligrams or less per kilogram of body weight, when administered orally.

(2) *Toxicity on inhalation.* Those which produce death within 48 hours in half or more than half of a group of 10 or more white laboratory rats weighing 200 to 300 grams, when inhaled continuously for a period of one hour or less at a concentration of 2 milligrams or less per liter of vapor, mist, or dust, provided such concentra-

tion is likely to be encountered by man when the chemical product is used in any reasonable foreseeable manner.

(3) *Toxicity by skin absorption.* Those which produce death within 48 hours in half or more than half of a group of 10 or more rabbits tested at a dosage of 200 milligrams or less per kilogram body weight, when administered by continuous contact with the bare skin for 24 hours or less.

(b) The foregoing categories shall not apply if the physical characteristics or the probable hazards to humans as shown by experience indicate that the substances will not cause serious sickness or death. Neither the display of danger or warning labels pertaining to use nor the toxicity tests set forth above shall prejudice or prohibit the exemption of any substances from the provisions of Parts 170-189 of this chapter.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16083, Apr. 15, 1976; Amdt. 173-94B, 41 FR 57070, Dec. 30, 1976]

#### § 173.344 General packaging requirements for Poison B liquids.

(a) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

(b) Packagings containing liquid material may not be completely filled. Outage must be as follows:

(1) For packagings of 110 gallons or less, sufficient outage must be provided so that the packaging will not be liquid full at 130° F. (55° C.).

(2) The proper vacant space (outage) in a tank car or other shipping container depends on the coefficient of expansion of the liquid and the maximum increase of temperature to which it will be subjected in transit. Outage must be calculated to the total capacity of the container.

(3) Liquid poison must not be loaded into domes of tank cars.

(4) In tank cars, outage must be calculated to percentage of the total capacity of the tank, i. e., shell and dome capacity combined. If the dome of the tank car does not provide sufficient outage, then vacant space must be left

in the shell to make up the required outage.

(5) The outage for tank cars must not be less than 1 percent.

(6) No cargo tank or compartment thereof used for the transportation of any liquid poison shall be completely filled; sufficient space shall be left vacant in every case to prevent leakage from or distortion of any such cargo tank by expansion of the contents due to rise in temperature in transit, and such free space (outage) shall be sufficient in every case so that such cargo tank shall not become entirely filled with the liquid at 130° F.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16083, Apr. 15, 1976; Amdt. 173-94A, 41 FR 40683, Sept. 20, 1976]

#### § 173.345 Limited quantities of Poison B liquids.

(a) Limited quantities of Poison B liquids for which exceptions are permitted as noted by reference to this section in § 172.101 of this subchapter or as provided in § 173.359(c), in tightly closed inside packagings, securely cushioned when necessary to prevent breakage, are excepted from the specification packaging requirements when packed according to the following paragraphs. In addition, shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except §§ 174.24 and 174.680 and to Part 177 of this subchapter except §§ 177.817 and 177.841(e).

(1) In glass packagings not over 1-quart capacity each, or in metal containers or polyethylene bottles not over 1-gallon capacity each, packed in outside steel, or wooden boxes, barrels, or drums.

(2) In glass packagings not over 1 pint capacity each, or in metal or polyethylene packagings (other than bags) not over 1 quart capacity each, packed in a strong outside fiberboard box or molded expanded polystyrene case.

(b) Special exceptions for shipment of certain drugs and medicines in the ORM-D class are prescribed in Subpart N of this part.

[Amdt. 173-94, 41 FR 16083, Apr. 15, 1976, as amended by Amdt. 173-94B, 41 FR 57070,

Dec. 30, 1976; Amdt. 173-118, 43 FR 31142, July 20, 1978; Amdt. 173-149, 46 FR 49903, Oct. 8, 1981

**§ 173.346 Poison B liquids not specifically provided for.**

(a) Poison B liquid, as defined in § 173.343, other than those for which special requirements are prescribed, must be packaged as follows:

(1) Spec 5, 5A, 5B, or 5C (§§ 178.80, 178.81, 178.82, or 178.83 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C or 17E (§ 178.115 or § 178.116 of this subchapter). Metal drums (single-trip containers), with openings not exceeding 2.3 inches in diameter.

(3) Specification 37B (§ 178.132 of this subchapter). Metal drums (single-trip containers), welded side seams, openings not over 2.3 inches in diameter, capacity not over 10 gallons. Not authorized for transportation by air.

(4) Spec. 37A or 37B (§ 178.131 or § 178.132 of this subchapter). Metal drums (single-trip containers), with welded side seams, not over 5 gallons; authorized for pastes only.

(5) [Reserved]

(6) Specification 34 (§ 178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of § 173.24(d) of this part prior to first shipment.

(7) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with glass or earthenware inside containers not over 1 quart capacity each, or with metal inside containers not over 1 gallon capacity each. Packages containing glass or earthenware containers must not weigh over 65 pounds gross.

(8) Spec. 12D (§ 178.207 of this subchapter). Fiberboard boxes with inside container which must be glass or earthenware not over one gallon each; authorized for not more than 75 pounds gross weight; not to contain more than 4 such inside containers if their capacity is greater than 5 pints each. Use of this container will be permitted until further order of the Department.

(9) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§ 178.168, 178.169,

178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, except that inside containers not over 3 gallons are authorized when only one is packed in each outside container; or with inside metal containers not over 10 gallons capacity each.

(10) Specification 103,<sup>1</sup> 103W, 103A,<sup>1</sup> 103ALW, 103AW, 103BW, 104,<sup>1</sup> 104W, 105A100,<sup>1</sup> 105A 100W, 105A200ALW, 109A300ALW, 111A60ALW1, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 111A100W4, 112A400W, 114A400W, or 115A60W6 (§§ 179.100, 179.101, 179.200, 179.201, 179.220, 178.221 of this subchapter). Tank cars. Specification 103BW tank cars must be rubberlined and are authorized only for arsenic acid as prescribed in § 173.348 of this subchapter.

(11) Cylinders as prescribed for any compressed gas, except acetylene, are also authorized.

(12) Specifications MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, or MC 312 (§§ 178.341, 178.342, 178.343 of this subchapter). Cargo tanks. Tank motor vehicles designed and constructed to Specification MC 304 or MC 307 except for bottom outlets equipped with external ball valves may be used only for toluene diisocyanate.

(13) Specification 1A, 1D, or 1M (§§ 178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(14) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity, securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides, and top without breakage.

(15) Spec. 21C (§ 178.224 of this subchapter). Fiber drums, with inside glass containers not over one gallon capacity each.

<sup>1</sup>The use of existing tanks authorized but new construction not authorized.

(16) Spec. 42B or 42D (§§ 178.107, 178.109 of this subchapter). Aluminum drums.

(17) [Reserved]

(18) Spec. 15P or 22C (§ 178.182 or § 178.198 of this subchapter). Glued plywood or wooden box, or plywood drum as prescribed by § 178.198-2(a) of this subchapter, with inside Spec. 2T (§ 178.21 of this subchapter) polyethylene container.

(19) Specification 37P (§ 178.133 of this subchapter). Steel drums, not over 5 gallons capacity, with polyethylene liner (non-reusable container). Drums exceeding 1 gallon capacity must be constructed of at least 24-gauge metal. Hole in steel drum body must be suitably plugged. Authorized only for materials that will not react with polyethylene and result in container failure. Not authorized for transportation by air.

(20) Specification 6D or 37M (§§ 178.102, 178.134 of this subchapter). Cylindrical steel overpacks with inside Specifications 2S or 2SL (§§ 178.35, 178.35a of this subchapter) polyethylene containers. Authorized for materials that will not react with polyethylene and result in container failure.

(21) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with not more than one inside glass bottle not over 1-gallon capacity. Shipper must have established that the completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(22) Spec. 29 (§ 178.226 of this subchapter). Mailing tubes, with polyethylene bottles not over 2 quarts capacity each.

(23) [Reserved]

(24) Specification 12P (§ 178.211 of this subchapter). Fiberboard boxes with one inside Specification 2U (§ 178.24 of this subchapter) polyethylene container of not over 5-gallon capacity or two inside Specification 2U polyethylene containers of not over 2½ gallon capacity each. Wire staples are not authorized for assembly or closure of boxes, except when polyethylene container is completely enclosed in inside boxes free of wire staples or other projections that could cause fail-

ures. Not authorized for transportation by air.

(25) Specification 16A (§ 178.185 of this subchapter). Wirebound wooden box (see § 178.185-22 of this subchapter) with inside Specification 2U (§ 178.24 of this subchapter) polyethylene container. The polyethylene container must be separated from the wooden box by a complete corrugated fiberboard liner and top and bottom pads. Not authorized for transportation by air.

(26) Spec. 12B or 12A (§ 178.205 or 178.210 of this subchapter). Fiberboard boxes with inside polyethylene bottles having a minimum wall thickness of 0.015 inch and provided with screw-cap closures, not over 1-gallon capacity each. Except for polyethylene bottles having a minimum wall thickness exceeding 0.015 inch, each bottle shall be enclosed in a box constructed of at least 200-pound test (Mullen or Cady) corrugated fiberboard and not more than four such boxes shall be packed in one outside specification shipping container. When Spec. 12A boxes are used, shipper must have established that completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(27) Specification 51 (§ 178.245 of this subchapter). Portable tank. For rail transportation see § 174.63 of this subchapter.

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

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

[29 FR 18753 Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.346, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.347 Aniline oil

(a) Aniline oil must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of

this subchapter). Wooden boxes with inside metal containers not over 10 gallons capacity each, or glass bottles not over 1-pound capacity each. Not more than 25 glass bottles shall be packed in one outside box.

(2) Specification 103,<sup>1</sup> 103W, 103A,<sup>1</sup> 103AW, 104W, 105A100W, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 112A200W, 112A400F, or 114A340W, (§§ 179.100, 179.101, 179.200, 179.201, of this subchapter). Tank cars.

(3) Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, or MC 307 (§§ 178.340, 178.341, 178.342 of this subchapter) cargo tanks. Bottom outlets on Specification MC 304 cargo tanks must be equipped with valves conforming with § 178.342-5(a) of this subchapter.

(4) Spec. 5, 5A, or 5B (§§ 178.80, 178.81 or 178.82 of this subchapter). Metal barrels or drums. Net weight in 110 gallon drums must not exceed 915 pounds.

(5) Spec. 17C (§ 178.115 of this subchapter). Metal drums (single-trip).

(6) Spec. 17E (§ 178.116 of this subchapter). Metal drums (single-trip) not over 5 gallons capacity each.

(7) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with metal inside containers not over 1 gallon capacity each; not to contain more than 4 such inside containers if their capacity is greater than 5 pints each.

(8) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside glass bottles or metal containers not over 1 gallon capacity each. Not more than four inside containers having capacity of 1 gallon each, shall be packed in one outside container. Shipper must have established that completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

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

(b) Openings in metal barrels or drums must not exceed 2.3 inches in diameter.

(1) Gaskets not less than one-eighth inch thick must be used at bung and

filling holes. Gaskets must be made of hard fiber impregnated with glycerin, metal-covered cork, impregnated asbestos sheets, or metal-covered asbestos.

(c) Filled drums must be so placed that bungs will be subjected to hydrostatic head of oil contained therein for a period of not less than 12 hours.

(1) The exterior of filled drums must be carefully examined for evidence of aniline oil, any traces of which must be removed by washing off with water or, preferably, weak acetic acid. The space between rolling hoops immediately around the bung should be painted to aid in the detection of leaks at this point.

(d) All returnable drums must bear the following notice, "PREVENT DAMAGE TO FOODSTUFFS OR OTHER FREIGHT. DRAIN THIS DRUM THOROUGHLY TIGHTEN BUNGS, WITH GASKET SECURELY IN PLACE BEFORE RETURNING. USE NEW GASKETS WHEN NECESSARY. ANILINE OIL STAINS ON THE OUTSIDE OF DRUMS SHOULD BE WASHED OFF WITH WATER OR, PREFERABLY WEAK ACETIC ACID", shellacked to head of drum near the consignee's name and address.

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

[29 FR 18753, Dec. 29, 1964, as amended by Order 73, 32 FR 3457, Mar. 2, 1967. Redesignated at 32 FR 5806, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.347, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.348 Arsenic acid.

(a) Arsenic acid must be packed in specification containers as follows:

(1) As prescribed in § 173.346. When shipped in metal barrels or drums, or cargo tanks or tank cars, without lead lining, the arsenic acid must contain not over 0.05 percent nitric acid.

(2) Specification 1A, 1D, or 1M (§§ 178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) Specification 12A or 12B (§§ 178.210, 178.205 of this subchap-

<sup>1</sup>The use of existing tanks authorized but new construction not authorized.

ter). Fiberboard boxes with Specification 2E (§ 178.24a of this subchapter) inside polyethylene bottles made of high-density (Type III) polyethylene having minimum wall thickness of 0.015 inch with screw-cap closures, not over 1-gallon capacity each. Specification 12A fiberboard boxes may have not more than four inside polyethylene bottles which must be packed to provide a snug fit. Specification 12B fiberboard boxes may not contain more than one inside polyethylene bottle and not more than four such boxes may be overpacked in a strong outside fiberboard box under provisions of § 173.25.

(4) Specification 21P (§ 178.225 of this subchapter). Fiber drum overpack with inside Specification 2S, 2SL, or 2U (§§ 173.35, 173.35a, 178.24 of this subchapter) polyethylene packaging of not over 30-gallon capacity.

(5) Specification 34 (§ 178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of § 173.24(d) of this part prior to first shipment.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.348, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.349 Carbohic acid (phenol) liquid.

(a) Carbohic acid (phenol) liquid (liquid tar acid containing over 50 percent benzo-phenol), must be packed in specification containers as follows:

(1) As prescribed in § 173.346.

(2) Specification 1A, 1D, or 1M (§§ 178.1, 178.4, 178.17 of this subchapter). Glass carboys in boxes or expanded polystyrene packagings. Not authorized for transportation by aircraft.

(3) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5-pints capacity each. Not more than 6 inside glass bottles of 5-pints capacity each shall be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(4) Specification 34 (§ 178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of § 173.24(d) of this part prior to first shipment.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.349, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.350 Chemical ammunition.

(a) Chemical ammunition consisting of projectiles, shells, bombs, grenades and other containers filled with Poison B materials, without ignition elements, bursting charges, detonating fuzes, or other explosive components, must be packed for shipment in strong outside wooden or metal boxes. Boxes must be marked with proper shipping name and labeled as prescribed by this part for gases, liquids, or chemicals contained therein.

(b) Chemical ammunition, when shipped as such, must not be equipped or packed with explosive or ignition elements. (See §§ 173.53(r) and 173.59 for explosive chemical ammunition.)

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16083, Apr. 15, 1976]

#### § 173.351 Hydrocyanic acid solutions.

Hydrocyanic acid solutions not over 5 percent hydrocyanic acid must be packaged in specification containers as follows:

(a) As prescribed in § 173.332.

(b) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190 or 178.191 of this subchapter) wooden boxes with inside glass bottles not over 1 pound capacity each for solutions of not over 5 percent hydrocyanic acid and not over 5 pints capacity each for solutions of not over 2 percent strength. Completed package, with glass packaging filled with water, must be capable of withstanding six four-foot drops onto solid concrete in the following order: bottom, four sides, and top, without breakage.

[Amdt. 173-52, 46 FR 62458, Dec. 24, 1981]

§ 173.352 Sodium and potassium cyanide solutions, and cyanide solution, n.o.s.

(a) Sodium and potassium cyanide solutions, and cyanide solutions, n.o.s. must be packed in specification packagings as follows:

(1) Spec. 5, 5A, or 5B (§§ 178.80, 178.81, or 178.82 of this subchapter). Metal barrels or drums without galvanizing inside, with openings not exceeding 2.3 inches in diameter.

(2) Specification 17E or 37B (§ 178.116, 178.132 of this subchapter). Metal drums (single-trip), with welded side seams, with openings not exceeding 2.3 inches in diameter. Specification 37B not authorized for transportation by air.

(3) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191, of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon capacity each, or inside metal containers not over 10 gallons capacity each, and without galvanizing.

(4) Specification 103,<sup>1</sup> 103W, 103A<sup>1</sup> 103AW, 105A400W, 111A60F1, 111A60W1, 111A60W2, 111A100F2, 112A400W, or 114A400W (§§ 179.100, 179.101, 179.200, 179.201, of this subchapter). Tank cars.

(5) Specification MC-300, MC-301, MC-302, MC-303, MC-304, MC-305, MC-306, MC-307, or MC-312 (§§ 178.341, 178.342, 178.343 of this subchapter). Cargo tanks.

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

(7) Specification 6D (§ 178.102 of this subchapter). Cylindrical steel overpack with inside Specification 2S or 2SL (§§ 178.35, 178.35a of this subchapter) polyethylene packaging. Not authorized for transportation by air.

(8) Specification 34 (§ 178.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of § 173.24(d) of this part prior to first shipment.

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

[29 FR 18753, Dec. 29, 1964, as amended by Order 73, 32 FR 3457, Mar. 2, 1967. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.352, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.353 Methyl bromide and methyl bromide mixtures.

(a) Methyl bromide, liquid (bromomethane); methyl bromide and ethylene dibromide mixture liquid; or methyl bromide and more than 2% chloropicrin mixture, liquid; must be packed in specification containers as follows:

(1) Specification 5A (§ 178.81 of this subchapter). Metal drums not exceeding 30 gallons capacity or metal drums of bilge type not exceeding 33 gallons capacity and with openings not exceeding 2.3 inches in diameter. Not authorized for mixtures containing any compressed gas.

(2) Specification 15A, 15B, 15C, 16A, 19A, 19B or 12B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191, 178.205 of this subchapter). Wooden, wire-bound wooden, or fiberboard boxes, with inside metal cans containing not over 1-pound each, or inside metal cans with a minimum wall thickness of 0.007-inch containing not over 1¼-pound each. The 1-pound can must be able to withstand an interior pressure of 130 psig without leakage or permanent distortion and pressure of contents must not exceed 130 psig at 130°F. (55°C.). The 1¼-pound can must be able to withstand an interior pressure of 140 psig without leakage or permanent distortion and pressure of contents must not exceed 140 psig at 130°F. (55°C.). Outage shall be such that the cans will not become liquid full at 130°F. Cans must be of tinsplate or lined with suitable material and must have concave or pressure ends.

(3) Specification 3A225, 3AA225, 3B225, 3E1800, 4A225<sup>1</sup>, 4B225, 4BA225, or 4BW225, (§§ 178.36, 178.37, 178.38, 178.42, 178.49, 178.50, 178.51, 178.61 of this subchapter). Metal cylinders. Valves and other closing devices must be protected to prevent damage in

<sup>1</sup>The use of existing tanks authorized but new construction not authorized.

<sup>1</sup> Use of existing cylinders authorized, but new construction not authorized.

transit by equipping the cylinder with valve protection required by §173.301(g). Cylinders having a wall thickness of less than 0.08-inch must be packed in boxes or crates (See § 173.25).

(4) Spec. 4D300 or 4DA500 (§ 178.53 or § 178.58 of this subchapter). Metal spheres, must be packed in strong boxes or crates (see § 173.25).

(5) Specification 105A100,<sup>1</sup> 105A100W, or 111A100-W-4 (§§ 179.100, 179.101, 179.200, 179.201 of this subchapter) tank cars. Outage must be sufficient to prevent tank cars from becoming liquid full at 105° F.

(6) Specification 106A500X (§§ 179.300, 179.301 of this subchapter) tanks. Outage must be sufficient to prevent tanks from becoming liquid full at 130° F. (55°C.). (See §§ 174.200 and 177.834(m) of this subchapter for special requirements for rail and highway shipments.)

(7) Specification 12B (§ 178.205 of this subchapter). Fiberboard box with inside tinplated metal cans containing not more than 6 ounces net weight of product per can. Cans must be capable of withstanding a pressure of 75 pounds per square inch at 130° F without leakage or permanent distortion. Not more than 12 cans may be packed snugly in the outside fiberboard box and gross weight of completed package shall not exceed 30 pounds. Authorized only for methyl bromide and ethylene dibromide mixtures.

(8) Specification 51 (§ 178.245 of this subchapter). Steel portable tanks having a design pressure of not less than 250 pounds per square inch and equipped with a spring-load safety relief device.

(b) [Reserved]

(c) Outage must be sufficient to prevent cylinders or spheres from becoming entirely filled with liquid at 130° F. (55° C.) and when the vacant space (outage) is charged with a nonflammable nonliquefied compressed gas, the pressure in the cylinder or sphere at 130° F. (55° C.) must not exceed 5/4 the marked service pressure of the cylinder or sphere.

(d) Spec. 17C (§ 178.115 of this subchapter). Metal drums (single-trip) not over 5½ gallons marked capacity each and having no opening exceeding 2.3

inches in diameter. Authorized only for mixtures of methyl bromide and ethylene dibromide, liquid containing not over 40 percent by weight of methyl bromide.

(e) Specifications MC 330 and MC 331 (§ 178.337 of this subchapter). Cargo tanks having a design pressure not less than 250 pounds per square inch equipped with an approved spring-relief safety valve. Outage must be sufficient to prevent tank from becoming entirely filled with liquid at 130° F.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.353, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.353a Methyl bromide, liquid, and nonflammable, nonliquefied compressed gas mixtures.

(a) Methyl bromide, liquid, and nonflammable, nonliquefied compressed gas mixtures must be packed in specification containers as noted in §173.353a (a)(2), (3), (4), (5), (6), (8) and (c).

(b) Liquid may contain 2 percent or less by weight chloropicrin.

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

[Amdt. 173-94A, 41 FR 40683, Sept. 20, 1976, as amended by Amdt. 173-171, 49 FR 2252, Jan. 19, 1984]

§ 173.354 Motor fuel antiknock compound or tetraethyl lead.

(a) Motor fuel antiknock compound (a mixture of one or more organic lead compounds such as tetraethyl lead, triethylmethyl lead, diethyldimethyl lead, ethyltrimethyl lead, and tetramethyl lead, with one or more halogen compounds such as ethylene dibromide and ethylene dichloride, hydrocarbon solvents or other equally efficient stabilizers) or tetraethyl lead must be packed in specification containers as follows:

(1) Specification 15A, or 19B (§§ 178.166, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers of not over

1-pint capacity each, or metal cans, enclosed in hermetically sealed (soldered) strong metal cans.

(2) Spec. 5 or 5A (§ 178.80 or § 178.81 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(3) Specification steel or nickel cylinders as prescribed for any compressed gas except acetylene.

(4) Specification 105A300-W (§§ 179.100 and 179.101 of this subchapter). *Tank car*. Each tank car must be marked "MOTOR FUEL ANTIKNOCK COMPOUND" in accordance with the requirements of § 172.330 of this subchapter. Tank car not authorized for tetraethyl lead. Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

(5) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tanks. (See Note 1). These cargo tanks are authorized for motor fuel antiknock compound only. A frangible disc may be used in series with and inboard of the pressure relief valve. The relief valve and the frangible disc must be set to function in a range of no less than 100 percent and no greater than 110 percent of the maximum allowable working pressure.

NOTE 1: Spec. MC 300, MC 301, MC 302 or MC 303 (§§ 178.321, 178.323, or § 178.324 of this chapter) cargo tanks in motor fuel antiknock compound service prior to October 1, 1955 may be continued in service.

(6) Spec. 51 (§ 178.245 of this subchapter). Portable tanks having a minimum design pressure of 100 pounds per square inch. Authorized for motor fuel antiknock compound only. A frangible disc may be used in series with and inboard of the pressure relief valve. The relief valve and the frangible disc must be set to function in a range of no less than 100 percent and no greater than 110 percent of the maximum allowable working pressure.

(7) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes construct-

ed on at least 375-pound test (Mullen or Cady) solid fiberboard with inside metal cans enclosed in hermetically sealed (soldered) metal cans, not over 5 pounds capacity each. Each inside metal container must be enclosed in a taped, double-faced corrugated liner constructed of at least 200-pound test (Mullen or Cady) fiberboard and fitted with die-cut end caps constructed of at least 200-pound test (Mullen or Cady) double-walled corrugated fiberboard. Authorized gross weight not over 90 pounds.

(b) Outage must be sufficient to prevent any container from becoming entirely filled with liquid at 130° F.

(c) Steel tank conforming or equivalent to ASME specifications which contain solid or semisolid residual motor fuel antiknock compound (including rust, scale, or other contaminants) may be shipped by rail freight or highway. The tank must have been designed and constructed to be capable of withstanding full vacuum. All openings must be closed with gasketed blank flanges or vapor tight threaded closures. Each tank must be secured and braced to prevent movement under conditions normally incident to transportation.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.354, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.355 Phenyldichlorarsine.

(a) Phenyldichlorarsine must be packed in specification containers as follows:

(1) Spec. 5A (§ 178.81 of this subchapter) Metal barrels or drums, made of not less than 12 gauge steel, and limited to 30 gallons capacity, with openings not exceeding 2.3 inches in diameter. Each metal barrel or drum must be tested before each filling to 20 pounds hydrostatic test.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16084, Apr. 15, 1976]

§ 173.356 Thiophosgene.

(a) Thiophosgene must be packed in specification containers as follows:

<sup>1</sup>Use of existing cargo tanks authorized, but new construction not authorized.

(1) Spec. 12B (§ 173.205 of this subchapter). Fiberboard boxes, with inside containers which must be tightly closed glass bottles not exceeding 1 pint capacity each, securely packed in absorbent incombustible cushioning material. Cushioning material must be capable of absorbing entire contents of the container.

(2) Specification 15A, 15B, or 19B (§§ 173.168, 173.169, 173.191 of this subchapter). Wooden boxes with inside glass bottles not over 1-quart capacity each, securely packed in absorbent incombustible cushioning material in sufficient quantity to absorb any leakage.

(3) Specification 5C (§ 173.83 of this subchapter). Steel barrels or drums made of Type 304 stainless steel.

(4) Specification IM 101 portable tanks (§§ 173.270, 173.271 of this subchapter) are authorized under conditions specified in the IM Tank Table.

129 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967

EDITORIAL NOTE: For Federal Register citations affecting § 173.356, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.357 Chloropicrin and chloropicrin mixtures containing no compressed gas or Poison A liquid.

(a) *Chloropicrin*. Chloropicrin, when offered for transportation by carriers by rail freight, highway, or water, must be packed in specification containers as follows:

(1) Specification 15A, 15B, 15C, 16A, or 19B (§§ 173.168, 173.169, 173.170, 173.185, 173.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in hermetically sealed metal cans in corrugated fiberboard cartons, Spec. 2C (§ 173.22 of this subchapter). Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 24 pounds.

(2) Spec. 12B (§ 173.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test

with inside glass bottles or tubes in hermetically sealed metal cans in individual unsealed one-piece corrugated fiberboard boxes, Spec. 12B at least 200-pound test. Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 12 pounds.

(3) Spec. 12B (§ 173.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with not more than one inside glass bottle or tube in a hermetically sealed metal can. Bottles must contain not over 1 pound of liquid, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard.

(4) Specification 34 (§ 173.19 of this subchapter). Polyethylene drum. The shipper shall assure conformance with the requirements of § 173.24(d) of this part prior to first shipment.

(b) *Chloropicrin and mixtures of chloropicrin containing no compressed gas or Poison A liquid*. Chloropicrin and mixtures of chloropicrin containing no compressed gas or Poison A liquid, in addition to containers prescribed in paragraph (a) of this section, when offered for transportation by carriers by rail freight, highway, or water, may be shipped in specification containers as follows:

(1) Specification 3A, 3AA, 3B, 3C<sup>1</sup>, 3D<sup>1</sup>, 3E, 4A<sup>1</sup>, 4B, 4BA, 4BW, or 4C<sup>1</sup> (§§ 173.36, 173.37, 173.38, 173.40, 173.41, 173.42, 173.49, 173.50, 173.51, 173.52, 173.61 of this subchapter). Metal cylinders. Valves and other closing devices must be protected to prevent damage in transit by equipping the cylinders with valve protection required by § 173.301(g) of this subchapter. A cylinder closed by means of a solid plug may have the closure pro-

<sup>1</sup> Use of existing cylinders authorized, but new construction not authorized.

tected by a metal collar. Cylinders having a wall thickness of less than 0.08 inch must be packaged in boxes or crates. Each cylinder having a water capacity over 275 pounds must have a minimum design pressure of 225 p.s.i.g., unless the specification requires a higher minimum design pressure.

(2) Specification 5A or 5B (§ 178.81, 178.82 of this subchapter). Metal drums not exceeding 33-gallon capacity with welded seams. Specification 5B authorized only for chloropicrin mixtures containing not over 45 percent chloropicrin by weight. Removable head containers not authorized.

(3) Specification 17C or 17E (§§ 178.115, 178.116 of this subchapter). Metal drums (single-trip) with openings not over 2.3 inches in diameter. Capacity not to exceed 30 gallons for Specification 17E. Authorized only for mixtures of chloropicrin and technical grade dichloropropene containing not more than 15 percent chloropicrin by weight.

(4) Specification 106A500X (§§ 179.300, 179.301 of this subchapter) tanks. Valves must be protected by metal caps. Tanks must not be equipped with safety devices of any type. Outage must be sufficient to prevent tanks from becoming liquid full at 130° F. (55° C.). (See § 177.834(m) of this subchapter for special requirements for highway shipments.)

(5) Spec. 105A300-W, 105A400-W, or 105A500-W (§§ 179.100 and 179.101 of this subchapter). Tank cars.

(c) Chloropicrin and mixtures of chloropicrin containing no compressed gas or Poison A liquid, must be packaged as follows:

(1) Specification 15A, 15B, 15C, 16A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in hermetically sealed metal cans in corrugated fiberboard cartons, Spec. 2C (§ 178.22 of this subchapter). Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount

of liquid in outside box must not exceed 24 pounds.

(2) Specification 15A, or 19B (§§ 178.168, 178.191 of this subchapter). Wooden boxes, metal strapped, with chloropicrin absorbed in an efficient absorbing material packed in hermetically sealed metal cans not over 1-quart capacity each.

(3) Spec. 12B (§ 178.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with inside glass bottles or tubes in hermetically sealed metal cans in individual unsealed one-piece corrugated fiberboard boxes. Spec. 12B at least 200-pound test. Bottles must contain not over 1 pound of liquid each, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard. Total amount of liquid in outside box must not exceed 12 pounds.

(4) Spec. 12B (§ 178.205 of this subchapter). One-piece corrugated fiberboard boxes at least 200-pound test with not more than one inside glass bottle or tube in a hermetically sealed metal can. Bottles must contain not over 1 pound of liquid, must be filled to not over 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least ½ inch of absorbent material. Cans must be made of metal at least 32 gauge United States standard.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.357, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.358 Hexaethyl tetraphosphate, methyl parathion, organic phosphate compound, organic phosphorous compound, parathion, tetraethyl dithio pyrophosphate, and tetraethyl pyrophosphate, liquid.

(a) Hexaethyl tetraphosphate, methyl parathion, organic phosphate compound, organic phosphorous compound, parathion, tetraethyl dithio

pyrophosphate, and tetraethyl pyrophosphate, liquid must be packed in specification containers as follows:

(1) Spec. 5, 5A, or 5B (§§ 178.80, 178.81, 178.82 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C or 17E (§§ 178.115, 178.116 of this subchapter). Metal drums (single-trip), with openings not exceeding 2.3 inches in diameter. Spec. 17E drums authorized for not over 5 gallons capacity each.

(3) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers of not over 5 gallons capacity each.

(4) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes, with inside glass bottles not over 1 gallon capacity each, securely cushioned in liquid-tight metal cans.

(5) Specification 21C (§ 178.224 of this subchapter). Fiber drums, with inside glass or metal containers not over 1-gallon capacity each.

(6) Spec. 37A (§ 178.131 of this subchapter). Metal drums (single-trip), with inside glass containers not over 1 gallon capacity each.

(7) Specification cylinders as prescribed for any compressed gas except acetylene. DOT 3AL cylinders are authorized only for parathion and methyl parathion service.

(8) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity, securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides and top without breakage.

(9) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than one inside container of polyethylene, or other nonfragile plastic material, and closed by a screw cap of similar material, not over 16 ounces, surrounded by absorbent cushioning and packed in a one gallon securely closed metal can which shall be surrounded with absorbent cushioning material within the outside fiberboard box.

(10) Spec. 42B (§ 178.107 of this subchapter). Aluminum drums.

(11) Specification 105A200ALW or 105A300W (§§ 179.100, 179.101 of this subchapter). Tank cars. Authorized for parathion, methyl parathion, and liquid organic phosphate compounds only. The nominal water capacity of a tank car must not exceed 12,000 gallons.

(12) Specification 6D (§ 178.102 of this subchapter). Cylindrical steel overpack with an inside Specification 2S (§ 178.35 of this subchapter) polyethylene container. Each full removable head overpack over 5 gallons capacity must be closed by means of a 12-gauge steel bolted ring closure with drop forged lugs, one of which is appropriately threaded. For an overpack not over 30 gallons capacity, the threaded lug must have at least a  $\frac{1}{8}$ -inch bolt and locking nut, and for an overpack over 30 gallons capacity the bolt and locking nut must be at least  $\frac{1}{2}$ -inch. Authorized only for materials that will not react with polyethylene and result in container failure.

(13) Specification 51 (§ 178.245 of this subchapter). Portable tanks. Tanks must have no bottom opening except one 3-inch maximum plugged opening for maintenance purposes is authorized. Contents of the tank must be under no gas pressure except its own vapor pressure and the commodity must be loaded into, and unloaded from, the tank while the tank is mounted on the vehicle chassis. Authorized for parathion, methyl parathion, and organic phosphate compound only and by private motor carrier only.

(14) Specification MC 310, MC 311, MC 312, MC 330 or MC 331 (§§ 178.343, 178.337 of this subchapter). Cargo tanks. Bottom outlets, if any, must be equipped with valves conforming with § 178.337-11(c) of this subchapter. MC 311 or MC 312 must have a minimum material thickness of  $\frac{1}{16}$ -inch and designed for a product weight of 13 pounds per gallon or over. Contents of the tank must be under no gas pressure except its own vapor pressure. Authorized for parathion, methyl parathion and organic phosphate compound only, and by private motor carrier only.

(15) Specification 17E (§ 178.116 of this subchapter). Steel drum (single-trip) which must be made of not less than 18-gauge body and heads. Authorized only for methyl parathion, organic phosphate compound, and parathion. Shipments authorized by private motor carrier only.

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

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

[29 FR 18743, Dec. 20, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.358, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

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

(a) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures (solutions, emulsions, or emulsifiable liquids) containing not more than 50 percent hexaethyl tetraphosphate, methyl parathion, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate by weight, must be packed in specification containers as follows:

(1) Spec. 5, 5A, or 5B (§§ 178.80, 178.81, or 178.82 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C (§ 178.115 of this subchapter). Metal drums (single-trip), with openings not exceeding 2.3 inches in diameter.

(3) Spec. 17E or 37B (§ 178.116 or § 178.132 of this subchapter). Metal

drums (single-trip) with openings not exceeding 2.3 inches in diameter. Capacity not to exceed 10 gallons for Spec. 17E drums. Spec. 37B drums must be constructed of at least 24-gauge metal with welded side seams, of capacity not over 5½ gallons, and must be tested as prescribed by § 178.116-12 and 178.116-13 of this subchapter. Authorized only for mixtures not classed as flammable under these regulations.

(4) Specification 15A, 15B, 15C, 15E, or 19B (§§ 178.168, 178.169, 178.170, 178.172, 178.191 of this subchapter). Wooden boxes with inside metal containers not over 10 gallons capacity each.

(5) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes, with inside glass bottles not over 1 gallon capacity each, securely cushioned in liquid-tight metal cans.

(6) Specification 21C (§ 178.224 of this subchapter). Fiber drums, with inside glass or metal containers not over 1-gallon capacity each.

(7) Spec. 37A (§ 178.131 of this subchapter). Metal drums (single-trip), with inside glass containers not over 1 gallon capacity each.

(8) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes as authorized by § 178.205-19(a) of this subchapter.

(9) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity, securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides, and top without breakage.

(10) Spec. 42B (§ 178.107 of this subchapter). Aluminum drums.

(11) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with inside high-density polyethylene bottles not over 1-gallon capacity each. Polyethylene bottles must have a minimum wall thickness of 0.015 inch and be equipped with screw-cap closures additionally taped for securement. Each polyethylene bottle shall be packed in an inside fiberboard box. Not more than four inside fiberboard boxes with

inside polyethylene bottles shall be packed in one outside shipping container. Polyethylene used in construction of inside polyethylene bottles must be of a type compatible with the lading and shall prevent permeation of contents to a degree that would cause a hazardous condition in transportation and handling.

(12) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside securely closed metal containers not over 1-gallon capacity each. Fiberboard boxes shall be constructed of not less than 500-pound test (Mullen or Cady) double-wall corrugated fiberboard. Not more than six 1-gallon metal containers shall be packed in one outside container. Authorized gross weight not over 65 pounds.

(13) Spec. 105A300-W (§§ 179.100 and 179.101 of this subchapter). Tank cars. Authorized for organic phosphate compound mixtures, only.

(14) Specification 6D (§ 178.102 of this subchapter). Cylindrical steel overpack with an inside Specification 2S (§ 178.35 of this subchapter) polyethylene container. Each full removable head overpack over 5 gallons capacity must be closed by means of a 12-gauge steel bolted ring closure with drop forged lugs, one of which is appropriately threaded. For an overpack not over 30 gallons capacity, the threaded lug must have at least a  $\frac{3}{8}$ -inch bolt and locking nut, and for an overpack over 30 gallons capacity the bolt and locking nut must be at least  $\frac{3}{8}$ -inch. Authorized only for materials that will not react with polyethylene and result in container failure.

(15) Specification 51 (§ 178.245 of this subchapter). Portable tanks. Tanks must have no bottom opening except one 3-inch maximum plugged opening for maintenance purposes is authorized. Contents of the tank must be under no gas pressure except its own vapor pressure and the commodity must be loaded into, and unloaded from, the tank while the tank is mounted on the vehicle chassis. Authorized for methyl parathion mixtures, organic phosphate compound mixtures, and parathion mixtures only and by private motor carrier only.

(16) Specification MC 310, MC 311, MC 312, MC 330, or MC 331

(§§ 178.343, 178.337 of this subchapter). Cargo tanks. Bottom outlets, if any, must be equipped with valves conforming with § 178.337-11(c) of this subchapter. MC 311 or MC 312 must have a minimum material thickness of  $\frac{3}{16}$  inch and designed for a product weight of 13 pounds per gallon or over. Contents of the tank must be under no gas pressure except its own vapor pressure. Authorized for parathion mixtures, methyl parathion mixtures and organic phosphate compound mixtures only, and by private motor carrier only.

(17) Specification 37D (§ 178.137 of this subchapter). Nonreusable steel drum which must be made of not less than 21-gauge body and 20-gauge heads. Authorized only for methyl parathion mixtures, parathion mixtures, and organic phosphate compound mixtures, not exceeding a weight of 12 pounds per gallon.

(18) Specification 17E (§ 178.116 of this subchapter). Steel drum (single-trip), which must be made of not less than 18-gauge body and heads. Authorized for methyl parathion mixtures, organic phosphate compound mixtures, and parathion mixtures only, and by private motor carrier only.

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

(b) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures (solutions, emulsions, or emulsifiable liquids) containing more than 50 percent hexaethyl tetraphosphate, methyl parathion, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate by weight, must be packed in specification containers as follows:

(1) Spec. 5, 5A, or 5B (§§ 178.80, 178.81, or 178.82 of this subchapter). Metal barrels or drums, with openings not exceeding 2.3 inches in diameter.

(2) Spec. 17C, 17E, or 37B (§ 178.115, § 178.116, or § 178.132 of this subchapter). Metal drums (single-trip) with openings not exceeding 2.7 inches in diameter. Spec. 17E drums authorized for not over 5 gallons capacity each. Spec. 37B drums must be constructed of at least 24-gauge metal with welded side seam, of not over 5½ gallons capacity, and must be tested as prescribed by §§ 178.116-12 and 178.116-13 of this subchapter.

(3) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers of not over 5 gallons capacity each.

(4) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes, with inside glass bottles not over 1 gallon capacity each, securely cushioned in liquid-tight metal cans.

(5) Specification 21C (§ 178.224 of this subchapter). Fiber drums, with inside glass or metal containers not over 1-gallon capacity each.

(6) Spec. 37A (§ 178.131 of this subchapter). Metal drums (single-trip), with inside glass containers not over 1 gallon capacity each.

(7) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than one inside glass container of not over 1 gallon capacity securely cushioned. Completed package, with glass container filled with water, when closed for shipment, must be capable of withstanding six four-foot drops onto solid concrete in the order bottom, four sides, and top without breakage.

(8) Spec. 42B (§ 178.107 of this subchapter). Aluminum drums.

(9) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with not more than six inside high-density polyethylene bottles having screw-cap closures, not over 1-quart capacity each. Fiberboard boxes must have full-height corrugated fiberboard liner, top and bottom pads, and bottles must be separated by corrugated fiberboard partitions. Plastic used in construction of bottles must be of a type compatible with the lading.

(10) Specification 6D (§ 178.102 of this subchapter). Cylindrical steel overpack with an inside Specification 2S (§ 178.35 of this subchapter) poly-

ethylene container. Each full removable head overpack over 5 gallons capacity must be closed by means of a 12-gage steel bolted ring closure with drop forged lugs, one of which is appropriately threaded. For an overpack not over 30 gallons capacity, the threaded lug must have at least a ¾-inch bolt and locking nut, and for an overpack over 30 gallons capacity the bolt and locking nut must be at least ¾-inch. Authorized only for materials that will not react with polyethylene and result in container failure.

(11) Specification 12B30 (§ 178.205 of this subchapter). Fiberboard boxes of not less than 275-pound test double wall corrugated with a 5-mil one piece polyethylene bag form-fitted to the inner wall. Authorized only for pressure sealed polyethylene capsules containing not over 3 milliliters each.

(12) Specification 37D (§ 178.137 of this subchapter). Nonreusable steel drum which must be made of not less than 21-gauge body and 20-gauge heads. Authorized only for methyl parathion mixtures, parathion mixtures, and organic phosphate compound mixtures, not exceeding a weight of 12 pounds per gallon.

(13) Specification 17E (§ 178.116 of this subchapter). Steel drum (single-trip), which must be made of not less than 18-gauge body and heads. Authorized for methyl parathion mixtures, organic phosphate compound mixtures, and parathion mixtures only, and by private motor carrier only.

(c) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures (solutions, emulsions, or emulsifiable liquids) containing not more than 25 percent hexaethyl tetraphosphate, methyl parathion, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate by weight, in inside metal containers not over 8 fluid ounces capacity each, packed in strong outside containers together with sufficient absorbent material to completely absorb the liquid in the

event of leakage, are excepted from specification packaging requirements of this part.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.359, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.360 Perchloro-methyl-mercaptan.

(a) Perchloro-methyl-mercaptan in any quantity must not be packed with any other article. When offered for transportation by carriers by rail freight, highway, or water must be packed in specification containers as follows:

(1) [Reserved]

(2) Specification 15A, 15B, 15C, 16A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles not over 2 quarts capacity each, individually enclosed in tightly closed metal cans and cushioned therein with incombustible material. Net weight not to exceed 100 pounds in one outside box.

(3) [Reserved]

(4) Spec. 5K or 5M (§ 178.88 or § 178.90 of this subchapter). Nickel or monel barrels or drums.

(5) Specification 51 (§ 178.245 of this subchapter). Portable tanks, monel-clad. Tanks with bottom discharge outlets are prohibited. For rail transportation see § 174.63 of this subchapter.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.360, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.361 Aldrin mixtures, liquid, with more than 60 percent aldrin.

(a) Aldrin mixtures, liquid, with more than 60 percent aldrin must be shipped in specification containers as follows:

(1) As prescribed in § 173.346.

(2) Specification 6B or 6C (§§ 178.98, 178.99 of this subchapter). Metal barrels or drums. Authorized only for viscous mixtures or those which may become partially solid.

(3) Spec. 17C or 17H (§ 178.115 or § 178.118 of this subchapter). Metal drums (single-trip). Drums with opening exceeding 2.3 inches in diameter authorized only for viscous mixtures or those which may become partially solid.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.361, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.362 4-Chloro-o-toluidine hydrochloride.

(a) 4-Chloro-o-toluidine hydrochloride must be shipped in specification containers as follows:

(1) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with glass polyethylene, or equally efficient inside containers not over 1 quart capacity each, securely packed in a tightly closed metal container.

(2) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside glass, polyethylene, or equally efficient containers not over 1-quart capacity each. Glass containers must be securely packed in tightly closed metal containers.

(3) Spec. 17C or 17H (§ 178.115 or § 178.118 of this subchapter). Metal drums (single-trip).

(4) Spec. 6B or 6C (§ 178.98 or § 178.99 of this subchapter). Metal barrels or drums.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5806, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.362, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.362a Dinitrophenol solutions.

(a) Dinitrophenol solutions must be packed in specification containers as follows:

(1) In containers prescribed in § 173.346.

(2) Spec. 12B (§ 178.205 of this subchapter). Fiberboard box with glass, earthenware, or metal inside containers not over 1 gallon capacity each; not to contain more than 4 inside glass or earthenware containers if their capacity is greater than 5 pints each.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.362a, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.363 General packaging requirements for Poison B solids.

(a) Closing and cushioning. All containers must be tightly and securely closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

(b) Testing inside containers. All inside containers, except those made of glass, must be able to pass a test by dropping, after filling, from a height of 4 feet to solid concrete without rupture or sifting of contents, except that for bags with contents weighing 25 pounds, a drop test of 2 feet is required.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16084, Apr. 15, 1976]

§ 173.364 Limited quantities of Poison B solids.

(a) Unless otherwise excluded by paragraph (a)(3) of this section, Limited Quantities of Poison B solids for which exceptions are permitted, as noted by reference to this section in § 172.101 of this subchapter, are excepted from specification packaging requirements of this part if in tightly closed inside packaging securely cushioned when necessary to prevent breakage according to the following

paragraphs. (In addition, these shipments are not subject to Subpart F of Part 172 of this subchapter, to Part 174 of this subchapter except § 174.24 and § 174.680, or to Part 177 of this subchapter except § 177.817 and § 177.841(e).)

(1) In inside glass, earthenware, or composition bottles or jars, or metal packaging, or lock-corner sliding-lid wooden boxes, not over 5 pounds capacity each; or inside chipboard, pasteboard, or fiber cartons, cans, boxes, or tightly closed strong plastic bags or bottles compatible with product, not over 1 pound capacity each, packed in an outside wooden or fiberboard box, or wooden barrel or keg, or molded expanded polystyrene case. Net weight of contents of each outside container may not exceed 100 pounds.

(2) In inside plastic bottles or jars, chipboard, pasteboard or fiber cartons, cans, or boxes, of not over 5 pounds capacity each, packed in outside fiberboard or wooden boxes. Not more than 6 of these cartons shall be packed in any outside container.

(3) The following materials are excluded from this exception: Cyanides (other than as specified in § 173.370 (b) and (d)), hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, and organic phosphate mixtures.

(b) Special exceptions for shipment of certain drugs and medicines in the ORM-D class are prescribed in Subpart N of this part.

[Amdt. 173-94, 41 FR 16084, Apr. 15, 1976]

EDITORIAL NOTE: For Federal Register citations affecting § 173.364, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.365 Poison B solids not specifically provided for.

(a) Poison B solids, as defined in § 173.343, other than those for which special requirements are prescribed, must be packaged as follows:

(1) Specification 5, 5A, 5B, 6B, or 6C (§§ 178.80, 178.81, 178.82, 178.98, 178.99 of this subchapter). Metal barrels or drums.

(2) Specification 17E, 17H, 37A, or 37B (§§ 178.116, 178.118, 178.131,

178.132 of this subchapter). Metal drums (single-trip). Gross weight may not exceed 460 pounds. Regardless of the gross weight marking embossed on the drum, a drum constructed of 22-gauge steel is authorized for material fused solid in the drum with a gross weight not to exceed 880 pounds and for waste material containing arsenic trioxide with a gross weight not to exceed 550 pounds.

(3) Specification 44D (§ 178.238 of this subchapter). Multiwall paper bags. Where extensible Kraft is used, the minimum total basis weight must be 260 pounds and the outer wall may be no less than 60 pounds basis weight. Bag must have a metal foil inner liner. Net weight not over 50 pounds each. For transportation by vessel, bags must be unitized or containerized. Not authorized for transportation by aircraft. Authorized only for carbamate pesticide mixtures containing not more than 15 percent active ingredient.

(4) [Reserved]

(5) Specification 12B (§ 178.205 of this subchapter). Fiberboard boxes, with inside wide-mouth, high-density polyethylene jars of 2½-pound capacity with a minimum wall thickness of 0.020 inch, or of 3-pound capacity with a minimum wall thickness of 0.035 inch. Each jar must have a screw-cap closure and not more than six jars are authorized per box. Completed package must meet test requirements of § 178.210-10 of this subchapter.

(6) Spec. 12B or 12C (§ 178.205 or § 178.206 of this subchapter). Fiberboard boxes, with inside containers which must be metal cans not over 25 pounds capacity each; glass bottles not over 1 gallon capacity each; fiber cans or boxes, Spec. 2G (§ 178.26 of this subchapter); sliding-top wooden boxes, lined to prevent sifting, not over 25 pounds capacity each; or paper bags, Spec. 2D (§ 178.23 of this subchapter). Packages containing glass or earthenware containers must not weigh over 65 pounds gross nor contain more than 4 inside containers of over 5 pints capacity each. Outside containers must be not over 5,000 cubic inches capacity nor contain over 50 pounds net weight each, except as provided in § 178.205-23 of this subchapter.

**Test:** The completed package prepared as for shipping must be capable of standing a drop of 4 feet to solid concrete without breakage of the container or any sifting of contents.

(7) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with securely closed inside fiberboard or chipboard boxes not over 6 pounds net weight each. Interior containers must be at least .028 inch thick for those not over 2½ pounds net weight each and at least .034 inch thick for others. Outside packages must contain not over 36 pounds net weight of material each.

**Test:** The individual interior containers as well as the completed package prepared as for shipping must be capable of standing a drop of 4 feet to solid concrete without breakage of the container or any sifting of contents.

(8) Specification 15A or 19B (§§ 178.168, 178.191 of this subchapter). Wooden boxes with inside paper bags, securely closed and packed within a waterproof duplex bag, Spec. 2J (§ 178.28 of this subchapter). Net weight not to exceed 100 pounds in one outside box.

(9) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside metal cans not over 25 pounds capacity each; glass or earthenware containers not over 1-gallon capacity each; except that inside containers of not over 5 gallons capacity each and containing not over 25 pounds net weight are authorized when only one inside container is packed in each outside box. Fiber cans or boxes, Spec. 2G (§ 178.26 of this subchapter), or sliding-top wooden boxes, lined to prevent sifting, not over 25 pounds capacity each. Net weight not to exceed 100 pounds in one outside box.

(10) Spec. 18B (§ 178.193 of this subchapter). Wooden kits lined as prescribed by Spec. 2K (§ 178.29 of this subchapter). Net weight not over 30 pounds each.

(11) Specification 56 (§ 178.252 of this subchapter). Metal portable tank. Authorized only for *p*-nitrobenzyl bromide.

(12) Spec. 22A (§ 178.196 of this subchapter). Plywood drums. Net weight not over 115 pounds each.

(13) Specification 103,<sup>1</sup> 103W, 103A,<sup>1</sup> 103AW, 111A60F1, 111A60W1, 111A60W2, or 111A100F2 (§§ 179.200, 179.201 of this subchapter). Tank cars.

(14) Specification 21C (§ 178.224 of this subchapter). Fiber drums. Maximum net weight may not exceed 225 pounds except that a 21C400 fiber drum may have a net weight not exceeding 350 pounds.

(15) Specification 12B (§ 178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and bottom pad of at least 200-pound test fiberboard. Boxes constructed of at least 350-pound fiberboard having top and bottom pads need not have a perimeter liner. Product must be contained within a tightly closed polyethylene or other equally efficient plastic bag constructed of material having a minimum thickness of 0.004-inch. Not more than 25 pounds net weight of product may be packed in one outside box. Not authorized for transportation by air.

(16) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside glass bottles not over 5 pounds capacity each. Not more than 4 inside glass bottles of 5 pounds capacity each shall be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(17) Spec. 37P (§ 178.133 of this subchapter). Steel drums with polyethylene liner (nonreusable container), not over 45-gallons capacity.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.366, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

<sup>1</sup>The use of existing tanks authorized but new construction not authorized.

§ 173.366 Arsenic (arsenic trioxide) or arsenic acid (solid).

(a) Arsenic (arsenic trioxide) or arsenic acid (solid) must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

(b) Import shipments of arsenic (arsenic trioxide) may also be shipped when packed as follows:

(1) Enclosed in strong waterproofed cloth containers, securely sewn and closed so as to provide a sift-proof package, and then packed in strong, tight, metal-strapped wooden boxes constructed of material not less than three-fourths inch thick throughout.

(2) In strong and tight metal drums inclosed in a strong outside wooden barrel.

(3) In tight metal drums of not over 25-gallon capacity and a maximum gross weight of 460 pounds. Drums must be constructed of at least 22-gauge steel.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-81, 39 FR 17320, May 15, 1974; Amdt. 173-102, 41 FR 55878, Dec. 23, 1976; Amdt. 173-138, 45 FR 32698, May 19, 1980; Amdt. 173-196, 51 FR 5973, Feb. 18, 1986]

§ 173.367 Arsenical compounds, n.o.s.; arsenate of lead; calcium arsenate; Paris green; and arsenical mixtures.

(a) Arsenical compounds n.o.s., arsenate of lead, calcium arsenate, Paris green, and arsenical mixtures must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

(2) Specification 36A or 36B (§§ 178.230, 178.233 of this subchapter). Triplex bags. Authorized only for arsenical insecticides and fungicides containing 10 percent or less of arsenic trioxide. Not authorized for transportation by air.

(3) Specification 44B (§ 178.236 of this subchapter). Multiwall paper bags with inside paper bags, Specification 2D (§ 178.23 of this subchapter). Net weight not over 50 pounds each. Not authorized for transportation by air.

(4) Specification 44C (§ 178.237 of this subchapter). Multiwall paper bags. For carload and truckload shipments only. Net weight not over 50 pounds each.

(5) Specification 44D (§ 178.238 of this subchapter). Multiwall paper bags. Where extensible Kraft is used the minimum total basis weight must be 260 pounds and the outer wall may be no less than 60 pounds basis weight. Net weight not over 50 pounds each. Not authorized for transportation by air.

(6) Specification 44E (§ 178.239 of this subchapter). Multiwall paper bags constructed with minimum total basis weight of 160 pounds. For carload or truckload shipments only by rail or highway transportation; loaded by the consignor and unloaded by the consignee or his duly authorized agent. Net weight not over 50 pounds each. Where extensible Kraft is used, the minimum total basis weight for 40-pound net weight bags must be 190 pounds and for 20-pound net weight bags it must be 150 pounds. Not authorized for transportation by air or water.

(b) Arsenical compounds n.o.s. containing not more than 6 percent arsenic of which not more than 0.5 percent is water soluble must be packed in specification containers as follows:

(1) As prescribed in paragraph (a) (1), (2), or (3) of this section.

(2) Specification 44B (§ 178.236 of this subchapter). Paper bags with two added inside thicknesses of No. 1 Kraft paper one sheet having a Mullen test of 50 and the other sheet having a Mullen test of 40. Net weight not over 50 pounds each. Not authorized for transportation by air.

[29 FR 18753, Dec. 29, 1964, as amended by Order 66, 30 FR 5747, Apr. 23, 1965. Redesignated at 32 FR 5608, Apr. 5, 1967, and amended by Amdt. 173-81, 39 FR 17320, May 15, 1974; Amdt. 173-94, 41 FR 16085, Apr. 15, 1976]

§ 173.368 Arsenical dust, arsenical flue dust, and other poisonous noncombustible by-product dusts; also arsenic trioxide, calcium arsenate, and sodium arsenate.

(a) Arsenic dust, arsenical flue dust, and other poisonous noncombustible by-product dusts from metal recovery operations not subject to dangerous spontaneous heating, and arsenic trioxide, calcium arsenate, or sodium arsenate, when delivery is made to

plants with private sidings only, may, in addition to packagings prescribed in § 173.367, be shipped in bulk in the following kinds of transport vehicles, if those transport vehicles are assigned exclusively to this type of service;

(1) Sift-proof; self-clearing, hopper or bottom outlet steel cars.

(2) Sift-proof, all steel flat bottom gondola cars with fixed sides and ends equipped with waterproof and dust-proof wooden or steel covers well secured in place for all openings.

(3) Sift-proof box cars of all steel construction, or "Sift-proof, self-clearing, hopper-type or dump-type motor vehicles having bodies with waterproof and dust-proof covers well secured in place."

(b) Transport vehicles assigned exclusively to this service must be marked "ARSENICAL SERVICE ONLY," in addition to other required markings, and are not subject to § 174.615 or § 177.841 of this subchapter while in that service.

[Amdt. 173-94, 41 FR 16085, Apr. 15, 1976, as amended by Amdt. 173-94A, 41 FR 40684, Sept. 20, 1976]

§ 173.369 Carbohc acid (phenol), not liquid.

(a) Carbohc acid (phenol), not liquid must be packed in specification containers as follows:

(1) Spec. 5, 5A, 5B, 5C, 6B, or 6C (§§ 178.80, 178.81, 178.82, 178.83, 178.96, or 178.99 of this subchapter). Metal barrels or drums.

(2)—(3) [Reserved]

(4) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with inside containers which must be metal cans not over 25 pounds capacity each.

(5) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes with glass or earthenware inside containers not over 1 quart capacity each, or with metal inside containers not over 1 gallon capacity each. Packages containing glass or earthenware containers must not weigh over 65 pounds gross; packages containing metal cans not over 84 pounds gross as provided in § 178.205-23 of this subchapter, 65 pounds for others.

(6) Spec. 12D (§ 178.207 of this subchapter). Fiberboard boxes with inside

containers which must be: Glass or earthenware not over 1 gallon or 5 pounds capacity each; authorized for not more than 75 pounds gross weight; not to contain more than 4 such inside containers if their capacity is greater than 5 pints each.

(7) Specification 15A, 15B, 15C, 16A, 19A or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.190, 178.191 of this subchapter). Wooden boxes with inside glass or earthenware containers not over 1-gallon or 5 pounds capacity each, except that inside containers not over 3 gallons or 15 pounds capacity each are authorized when only 1 is packed in each outside box; or with inside metal containers not over 10 gallons capacity each.

(8) Specification 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§ 178.25 of this subchapter). Net weight not to exceed 250 pounds in one outside box.

(9) Spec. 17E or 17H (§ 178.116 or § 178.118 of this subchapter). Metal drums (single-trip).

(10) [Reserved]

(11) Specification 37A or 37B (§§ 178.131, 178.132 of this subchapter). Metal drums (single-trip). Not authorized for transportation by air.

(12) Specification 42B (§ 178.107 of this subchapter). Aluminum drums.

(13) Specification 103,<sup>1</sup> 103W, 103-ALW, 103A,<sup>1</sup> 103AW, 103A-ALW, 111A60-ALW1, 111A60F1, 111A60W1, 111A60W2, 111A100F2, or 115A60W6 (§§ 179.200, 179.201, 179.220, 179.221 of this subchapter). Tank cars.

(i) Tank cars must not be entirely filled. Sufficient interior space must be left vacant to prevent leakage from or distortion due to the contents liquefying and expanding from increase of temperature during transit.

(ii) Solid phenol must not be loaded into domes of tank cars.

(iii) In tank cars, outage must be calculated to percentage of the total capacity of the tank, i.e., shell and dome capacity combined. If the dome of the tank car does not provide sufficient outage, then vacant space must be left

in the shell to make up the required outage.

(iv) The outage for tank cars must not be less than one percent.

(14) Specifications MC 300, MC 301, MC 302, MC 303, MC 305, MC 306, MC 307, MC 310, MC 311, or MC 312 (§§ 178.341, 178.342, 178.343 of this subchapter). Cargo tanks.

(i) No cargo tank or compartment thereof shall be completely filled; sufficient space shall be left vacant in every case to prevent leakage from or distortion of any such cargo tank by expansion of the contents due to rise in temperature in transit, and such free space (outage) shall be sufficient in every case so that such cargo tank shall not become entirely filled with the commodity at 130° F.

(15) Spec. 12A (§ 178.210 of this subchapter). Fiberboard boxes with inside glass, polyethylene, or other nonfragile plastic bottles not over 5 pounds capacity each. Not more than 4 inside glass bottles of 5 pounds capacity each shall be packed in one outside container. Shipper must have established that the completed package meets test requirements prescribed by § 178.210-10 of this subchapter.

(16) Spec. 21C (§ 178.224 of this subchapter). Fiber drums with not more than one inside metal container, Spec. 2A (§ 178.20 of this subchapter), having maximum net weight of 50 pounds.

(b) Carboic acid (phenol), not liquid, in tightly closed inside packagings, securely cushioned when necessary to prevent breakage and packaged as follows, is excepted from the specification packaging requirements of this part.

(1) In inside glass, earthenware, polyethylene or other nonfragile plastic bottles or jars not over 1 pound capacity each, or metal containers not over 5 pounds capacity each, packed in outside wooden boxes, barrels or kegs, or fiberboard boxes. Net weight of contents in fiberboard boxes shall not exceed 65 pounds; and not more than 100 pounds in wooden boxes, barrels or kegs.

<sup>1</sup>The use of existing tanks authorized but new construction not authorized.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.369, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.370 Cyanides and cyanide mixtures, dry.

(a) Cyanides and cyanide mixtures, dry, except cyanide of calcium and mixtures thereof, unless otherwise provided for in this section, if containing the cyanide equivalent of 10 percent or more of potassium cyanide, must be packaged as follows:

(1) Specification 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§ 178.25 of this subchapter), not over 25 pounds capacity each; or hermetically sealed (soldered) metal lining, Spec. 2F (§ 178.25 of this subchapter), or in glass bottles not over 5 pounds capacity each.

(2) Specification 12B40 (§ 178.205 of this subchapter). Fiberboard box with inside polyethylene bottles having a minimum thickness of 0.030-inch and not over 5-pound capacity each. Maximum net weight of contents must not exceed 25 pounds per box.

(3) Spec. 12B or 12C (§ 178.205 or § 178.206 of this subchapter). Fiberboard boxes with metal inside containers, Spec. 2F (§ 178.25 of this subchapter) not over 25 pounds capacity each.

(4) Spec. 5, 5A, 5B, 6B, or 6C (§§ 178.80, 178.81, 178.82, 178.98, 178.99 of this subchapter). Metal barrels or drums.

(5) Spec. 37A or 37B (§ 178.131 or § 178.132 of this subchapter), metal drums (single-trip containers).

(6) Bulk in watertight metal cars or in watertight container car metal containers.

(7) Spec. 17H (§ 178.118 of this subchapter) metal drums. Gross weight not over 450 pounds.

(8) Specification 45B (§ 178.240 of this subchapter). Bags, cloth, and paper, lined. Authorized only for sodium cyanides of globular or pellet form, diameter not less than  $\frac{3}{4}$ -inch. Net weight not over 100 pounds. Not authorized for transportation by air.

(9) Bulk in watertight metal-bodied covered motor vehicles.

(10) [Reserved]

(11) Spec. 21C (§ 178.224 of this subchapter). Fiber drums. Authorized net weight not over 225 pounds.

(12) Specification 12B (§ 178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and bottom pad of at least 200-pound test fiberboard. Boxes constructed of at least 350-pound fiberboard having top and bottom pads may not require perimeter liner. Products must be contained within a tightly closed polyethylene or other equally efficient plastic container constructed of material having minimum thickness of 0.004-inch. Not more than 25 pounds net weight of product may be packed in one outside box. Not authorized for transportation by air.

(13) Bulk in strong, water-tight, metal portable containers of not over 70 cubic feet capacity each and approved by the Director, OHMT.

(b) *Exceptions for cyanides, and cyanide mixtures, except cyanide of calcium and mixtures thereof.* Cyanides and cyanide mixtures, except cyanide of calcium and mixtures thereof, when described and packaged as follows, are excepted from the specification packaging requirements of this part:

(1) Cyanides, or cyanide mixtures, in tightly closed glass, earthenware, metal, or polyethylene inside containers, not over 1 pound each, securely cushioned and packed in outside wooden or fiberboard boxes, or in wooden barrels. Net weight of cyanides or cyanide mixtures in any outside container, not over 25 pounds.

(2) Cyanide mixtures in tightly closed glass, earthenware, or metal inside containers, securely cushioned and packed in outside wooden or fiberboard boxes, or in wooden barrels. Net weight of cyanide mixtures in any outside container not over 5 pounds.

(3) Cyanides of copper, zinc, lead, and silver are excepted from all packaging requirements except §§ 173.24 and 173.363.

(c) *Cyanide of calcium and mixtures thereof.* Cyanide of calcium and mixtures thereof must be packed in specification containers as follows:

(1) As prescribed in paragraph (a) (2), (3), (4), (6), (9), or (11) of this section.

(2) Specification 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter). Wooden boxes with inside metal containers, Spec. 2F (§ 178.25 of this subchapter), not over 25 pounds capacity each; or hermetically sealed (soldered) metal lining, Spec. 2F (§ 178.25 of this subchapter).

(3) Spec. 37A or 37B (§ 178.131 or § 178.132 of this subchapter), metal drums (single-trip containers); welded side seams required for Spec. 37B drums and all seams and closures must be watertight and hermetically sealed.

(d) *Exceptions for cyanide of calcium and mixtures thereof.* Cyanide of calcium and mixtures thereof, when described and packaged as follows, are excepted from the specification packaging requirements of this part.

(1) Cyanide of calcium and mixtures thereof in tightly closed metal inside containers having not over 1 pound net weight each, or metal cans having not over 5 pounds net weight each. Not more than 25-1-pound containers or more than 1-5-pound container securely cushioned may be packed in the outside container which must be wooden or fiberboard boxes, or wooden barrels.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.370, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.371 Dinitrobenzol (dinitrobenzene).

(a) Dinitrobenzol must be packaged as follows:

(1) As prescribed in § 173.346 or § 173.366 according to its physical form at 130° F. (55° C.).

[Amdt. 173-94, 41 FR 16085, Apr. 15, 1976]

§ 173.372 Mercury bichloride (mercuric chloride).

(a) Mercury bichloride (mercuric chloride) must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

(2) Specification 15A or 19B (§§ 178.168, 178.191 of this subchapter). Wooden boxes with inside strong

paper bags in tightly closed inside wooden boxes.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16085, Apr. 15, 1976; Amdt. 173-149, 46 FR 49905, Oct. 8, 1981]

§ 173.373 Ortho-nitroaniline and paranitroaniline.

(a) Ortho-nitroaniline and paranitroaniline must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

(2) [Reserved]

(3) Spec. 21C (§ 178.224 of this subchapter). Fiber drums. Authorized net weight not over 400 pounds.

(4) In addition to specification containers prescribed in this section, paranitroaniline may be shipped by highway in bulk in strong, water-tight, metal bodied covered hopper motor vehicles.

(5) Specification 56 (§ 178.252 of this subchapter). Metal portable tank. Authorized for paranitroaniline only. For rail transportation see § 174.63 of this subchapter.

(6) Specification MC 304, MC 307, MC 310, MC 311, or MC 312 (§§ 178.340, 178.342, 178.343 of this subchapter). Cargo tanks. If the cargo tank is constructed with bottom outlets, they must meet §§ 178.342-5(a) and 178.343-5 of this subchapter. Cargo tank must be insulated and have a steel inner tank. Authorized only for ortho-nitroaniline loaded in a liquefied state at a temperature not over 180° F. Not authorized for transportation by water.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16086, Apr. 15, 1976; Amdt. 173-101, 41 FR 50264, Nov. 15, 1976; Amdt. 173-114, 43 FR 8522, Mar. 2, 1978; Amdt. 173-196, 51 FR 5974, Feb. 18, 1986]

§ 173.374 Nitrochlorobenzene, meta or para.

(a) Nitrochlorobenzene, meta or para, must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

(2) Specification 21C (§ 178.224 of this subchapter). Fiber drums. Authorized only for nitrochlorobenzene, para,

flaked. Net weight not to exceed 400 pounds.

(3) Spec. 17E (§ 178.116 of this subchapter). Metal drums (single-trip).

(4) Specification MC-312 (§ 178.343 of this subchapter). Insulated cargo tank equipped with heating coils. Authorized only for nitrochlorobenzene, para, solid. Not authorized for transportation by water.

(5) Specification 105A400W, 112A400W or 114A400W (§§ 179.100, 179.101 of this subchapter). Tank cars.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16086, Apr. 15, 1976; Amdt. 173-159, 47 FR 54827, Dec. 6, 1982; Amdt. 173-171, 49 FR 2253, Jan. 19, 1984]

#### § 173.375 Sodium azide.

(a) Sodium azide must be packed in specification containers as follows:

(1) Specification 15A or 19B (§§ 178.168, 178.191 of this subchapter). Wooden boxes with inside paper bags, securely closed and packed within a waterproof duplex bag, Spec. 2J (§ 178.28 of this subchapter). Net weight not to exceed 100 pounds in one outside box.

(2) Specification 21C (§ 178.224 of this subchapter). Fiber drums with inside polyethylene moisture barrier. Maximum net weight may not exceed 115 pounds.

(3) Specification 56 (§ 178.252 of this subchapter). Stainless steel portable tank designed for top loading and unloading only. Tanks may be equipped with a bottom clean out plug. No part of the tank or fittings that come in contact with the sodium azide may contain any metal such as copper, lead, silver or mercury which can form explosive azide compounds. Each transport vehicle must be loaded by the consignor and unloaded by the consignee or by persons trained by the consignor. Not authorized for transportation by water.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-94, 41 FR 16086, Apr. 15, 1976; Amdt. 173-111, 42 FR 58938, Nov. 14, 1977; Amdt. 173-149, 46 FR 49905, Oct. 8, 1981; Amdt. 173-151, 46 FR 58696, Dec. 3, 1981]

§ 173.376 Aldrin and aldrin mixtures, dry, with more than 65 percent aldrin.

(a) Aldrin and aldrin mixtures, dry, with more than 65 percent aldrin, must be packed in specification containers as follows:

(1) As prescribed in § 173.365.

[29 FR 18753, Dec. 29, 1964, as amended by Order 67, 30 FR 7423, June 6, 1965. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.376, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 173.377 Hexaethyl tetraphosphate mixtures; methyl parathion mixtures; organic phosphorus compound mixtures; organic phosphate compound mixtures; parathion mixtures; tetraethyl dithio pyrophosphate mixtures; and tetraethyl pyrophosphate mixtures, dry.

(a) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures in which the liquid is absorbed in concentrations greater than 2 percent but not exceeding 27 percent in an inert dry material so as to form a dry mixture, must be packed in specification containers as follows:

(1) Specification 12B or 12C (§§ 178.205, 178.206 of this subchapter), fiberboard boxes, with inside containers which must be metal or fiber cans not over 12 pounds capacity each, or paper bags. Specification 2D (§ 178.23 of this subchapter), not over 20½ pounds capacity each. Fiberboard boxes manufactured and marked for a gross weight of 65 pounds may have a gross weight of 70 pounds provided net weight of contents does not exceed 62 pounds. Inside containers and the completed package must be capable of withstanding the tests prescribed in paragraphs (c), (d), and (e) of this section.

(2) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal or fiber cans not over 12 pounds capacity each, or paper bags, Spec. 2D (§ 178.23 of this subchapter),

not over 20% pounds capacity each. Inside containers must be capable of withstanding the tests prescribed in paragraphs (c) and (d) of this section.

(3) Spec. 5, 5B or 6C (§§ 178.80, 178.82, 178.99 of this subchapter). Metal barrels or drums.

(4) Spec. 17C, 17H or 37A (§§ 178.115, 178.118, or § 178.131 of this subchapter), metal drums (single-trip). Spec. 37A metal drums authorized for not over 100 pounds net weight.

(5) Spec. 21C (§ 178.224 of this subchapter). Fiber drums. Authorized net weight not over 250 pounds.

(b) Hexaethyl tetraphosphate mixtures, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion mixtures, tetraethyl dithio pyrophosphate mixtures, and tetraethyl pyrophosphate mixtures in which the liquid is absorbed in concentrations greater than 27 percent in an inert dry material so as to form a dry mixture, must be packed in specification containers as follows:

(1) Spec. 12B or 12C (§§ 178.205 or 178.206 of this subchapter), fiberboard boxes, with inside containers which must be metal cans not over 12 pounds capacity each. Inside containers and the completed package must be capable of withstanding the tests prescribed in paragraphs (c), and (e) of this section.

(2) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal cans not over 12 pounds capacity each. Inside containers must be capable of withstanding the tests prescribed in paragraph (c) of this section.

(3) Spec. 5, 5B or 6C (§§ 178.80, 178.82, or 178.99 of this subchapter). Metal barrels or drums.

(4) Spec. 17C, 17H, or 37A (§§ 178.115, 178.118, or 178.131 of this subchapter), metal drums (single-trip). Spec. 37A metal drums authorized for not over 100 pounds net weight.

(5) Specification 21C (§ 178.224 of this subchapter). Fiber drums. Authorized only for mixtures in which the liquid is absorbed in concentration not greater than 55 percent. Maximum net weight may not exceed 225 pounds.

(6) Specification 12B (§ 178.205 of this subchapter). Fiberboard box with inside Specification 2D (§ 178.23 of this subchapter) paper bags not over 5-pound capacity each and having an additional foil liner. Completed package may not exceed 65 pounds gross weight and must meet the test requirements of paragraphs (d) and (e) of this section. Authorized only for mixtures in which the liquid is absorbed in concentrations no greater than 67 percent.

(c) Inside metal or fiber cans when closed as for shipment must be capable of withstanding two four-foot drops onto solid concrete without breakage of the container or any sifting of the contents. One drop must be on side of can and the other diagonally on the top rim or chime.

(d) Inside paper bags when closed as for shipment must be capable of withstanding two four-foot drops onto solid concrete without breakage of the container or any sifting of the contents. One drop must be made on bottom of bag and the other on either large face.

(e) Completed packages when closed as for shipment must be capable of withstanding two four-foot drops onto solid concrete without breakage of the container or any sifting of the contents. One drop must be made on bottom of package and the other drop on the smallest adjacent side area.

(f) Dry mixtures containing not more than 2 percent by weight of hexaethyl tetraphosphate, methyl parathion, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate and in which the liquid is absorbed in an inert material, are excepted from specification packaging requirements of this part.

(g) Dry mixtures containing more than 2 percent but not exceeding 15 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithio pyrophosphate, or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in

paragraphs (a) and (b) of this section, may be packed in specification containers as follows:

(1) Spec. 44B (§ 178.236 of this subchapter). Multiwall paper bags with inside paper bags, Spec. 2D (§ 178.23 of this subchapter), not over 5 pounds capacity each. Net weight of material in outside container not over 30 pounds each. Not authorized for transportation by air.

(2) Spec. 12B (§ 178.205 of this subchapter). Fiberboard boxes constructed of at least 275-pound test double-faced fiberboard and provided with a perimeter liner and top and bottom pad of at least 275-pound test fiberboard. Product must be contained within a tightly closed polyethylene or other equally efficient plastic bag constructed of material having minimum thickness of 0.003 inch. Not more than 50 pounds net weight of product may be packed in one outside box.

(h) Dry mixtures containing more than 2 percent but not exceeding 5 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithiopyrophosphate, or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a), (b), and (g) of this section, may be packed in specification containers as follows:

(1) Spec. 44D (§ 178.238 of this subchapter). Multiwall paper bags not over 50 pounds net weight each. Where extensible kraft is used the minimum total basis weight shall be 260 pounds. Not authorized for transportation by air.

(i) Dry mixtures containing more than 2 percent but not exceeding 12 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithiopyrophosphate or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a), (b), and (g) of this section, may be packed in specification containers as follows:

(1) Spec. 44D (§ 178.238 of this subchapter). Multiwall paper bags not over 50 pounds net weight each. Outer ply to be not less than 60 pounds basis weight. Not authorized for transportation by air.

(j) Dry mixture containing more than 2 percent but not exceeding 16.5 percent by weight of hexaethyl tetraphosphate, methyl parathion mixtures, organic phosphorus compound mixtures, organic phosphate compound mixtures, parathion, tetraethyl dithiopyrophosphate, or tetraethyl pyrophosphate, and in which the liquid is absorbed in an inert material, in addition to containers prescribed in paragraphs (a) and (b) of this section, may be packed in specification containers as follows:

(1) Specification 44B (§ 178.236 of this subchapter). Multiwall paper bags having not more than 5 Specification 2D (§ 178.23 of this subchapter) inner bags, each fabricated with a foil liner and containing not more than ten pounds net weight. Maximum net weight of material in each outside container may not exceed 50 pounds. For water transportation, the material must also be in containers as prescribed in paragraph (j)(4) of this section or palletized and unit packed as prescribed in paragraph (j)(5) of this section. Not authorized for transportation by air.

(2) Specification 44D (§ 178.238 of this subchapter). Multiwall paper bags consisting of 6-ply extensible kraft paper having a minimum total basis weight of 320 pounds. Bags must have a metal foil inner liner and contain not over 60 pounds net weight. For transportation by water, material must be in containers as prescribed in paragraph (j)(4) of this section or palletized and unit packed as prescribed in paragraph (j)(5) of this section. Not authorized for transportation by air.

(3) Specification 44D (§ 178.238 of this subchapter). Multiwall paper bags consisting of 5-ply extensible kraft paper having a minimum total basis weight of 300 pounds. Bags may have outer sheet of 60 pound kraft in place of 70-pound basis weight but must have a metal foil inner liner. Maximum net weight may not exceed 54 pounds each. For transportation by

water, material must be in containers as prescribed by paragraph (j)(4) of this section or palletized and unit packed as prescribed by paragraph (j)(5) of this section. Not authorized for transportation by air.

(4) Containers must be loaded and sealed at the shipper's plant or warehouse and unsealed and unloaded only at the ultimate destination, unless the Coast Guard Captain of the Port desires to inspect the containers at his Port.

(5) Pallets must be designed to accommodate straps. The bags, fully enclosed by fiberboard or plastic film must be securely strapped to the pallet. The layer or layers of fiberboard or plastic film must fully protect the bags from excessive stress concentration caused by the strapping and normal handling loads.

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

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

**EDITORIAL NOTE:** For Federal Register citations affecting § 173.377, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.379 Cyanogen bromide.

Cyanogen bromide must be packaged in tightly closed metal inside containers not over 1-pound capacity each, securely cushioned and packaged in an outside wooden box. Net weight may not exceed 25 pounds in one outside packaging.

[Amdt. 173-94, 41 FR 16086, Apr. 15, 1976]

#### § 173.381 Irritating materials; definition and general packaging requirements.

(a) For the purpose of Parts 170 through 189 of this subchapter, an irritating material is a liquid or solid substance which upon contact with fire or when exposed to air gives off dangerous or intensely irritating fumes, such as brombenzylcyanide, chloracetophenone, diphenylaminechlorarsine, and diphenylchlorarsine, but not including any poisonous material, Class A.

(b) *Cushioning.* All packagings must be hermetically closed. Inside packagings must be cushioned as prescribed

when necessary to prevent breakage or leakage.

(c) *Outage.* No packaging used for the transportation of any liquid irritating material may be completely filled. For packagings with a capacity of 110 gallons or less, sufficient outage must be provided so the packaging will not be liquid full at 130° F. (55° C.).

(d) The transportation of an irritating material is not permitted if there is any type of interconnection between packagings.

(e) Any pressure in a cylinder at 130° F. (55° C.) must not exceed  $\frac{1}{4}$  the marked service pressure of the cylinder.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-70, 38 FR 5309, Feb. 27, 1973; Amdt. 173-94, 41 FR 16086, Apr. 15, 1976]

#### § 173.382 Irritating materials, not specifically provided for.

(a) Irritating materials, as defined in § 173.381 for which special packaging is not otherwise prescribed, except as provided in paragraph (b) of this section, must be packaged as follows:

(1) Spec. 5, 5A, 5B or 5C (§ 178.80, 178.81, 178.82 or § 178.83 of this subchapter) metal barrels or drums; or spec. 17C (single-trip) (§ 178.115 of this subchapter) metal drums not over 5 gallons capacity each.

(2) Spec. 6B or 6C (§§ 178.98, 178.99 of this subchapter). Metal barrels or drums.

(3) Specification 15A, 15B, or 19B (§§ 178.168, 178.169, 178.191 of this subchapter). Wooden boxes with inside metal containers not over 1-gallon capacity each. Net weight not to exceed 80 pounds in one outside box.

(4) Cylinders as prescribed for any compressed gas, except acetylene are also authorized for use. These cylinders must be qualified maintained and filled in accordance with §§ 173.34 and 173.301(g), if used for material with pressure exceeding 25 pounds per square inch at 70° F., they must also be retested as required by § 173.34.

(b) Chloroacetophene, diphenylamine-chloroarsine, irritating material, n.o.s., or xylyl bromide, charged with a non-flammable gas exceeding 25 psig

at 70° F. must be packaged as specified in paragraph (a)(4) of this section.

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.382, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.383 Chemical ammunition.

(a) Chemical ammunition consisting of projectiles, shells, bombs, or other containers, except grenades, filled with an irritating material without ignition elements, bursting charges, detonating fuzes, or other explosive components, must be packaged for shipment in strong outside wooden or metal boxes. Boxes must be marked with name of contents and labeled as prescribed in this part for gases, liquids, or chemicals contained therein.

(b) Chemical ammunition, when shipped as such must not be equipped or packed with explosive or ignition elements (see §§ 173.53(r) and 173.59 for explosive chemical ammunition).

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 173-70, 38 FR 5309, Feb. 27, 1973]

#### § 173.384 Monochloroacetone, stabilized.

(a) Monochloroacetone, stabilized, must be packed in specification containers as follows:

(1) Specification 5, 5A, or 17C (single-trip) (§§ 178.80, 178.81, 178.115 of this subchapter). Metal barrels or drums.

(2) Specification 15A, 15B, 15C, 16A, or 19B (§§ 178.168, 178.169, 178.170, 178.185, 178.191 of this subchapter). Wooden boxes with inside glass bottles or tubes in metal cans hermetically sealed or with covers securely taped. The metal cans must be in corrugated fiberboard cartons, Specification 2C (§ 178.22 of this subchapter). Bottles must not contain more than 1 pound of liquid each, must not be filled to more than 95 percent capacity, must be tightly and securely closed, and must be cushioned in cans with at least one-half inch of absorbent material. Cans must be made of metal at least 32-gauge U.S. Standard. The total amount of liquid per package must not exceed 24 pounds.

[Amdt. 173-94B, 41 FR 57070, Dec. 30, 1976; 42 FR 2071, Jan. 10, 1977, as amended by Amdt. 173-149, 46 FR 49905, Oct. 8, 1981]

#### § 173.385 Tear gas grenades, tear gas candles, or similar devices.

(a) Tear gas grenades, tear gas candles, or similar devices containing lachrymatory (tear producing) substances, for civil or military use must be packed in specification containers as follows (see § 173.101(d) and (e) for packing tear gas cartridges):

(1) Specification 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter). Metal-strapped wooden boxes. Functioning elements not assembled in grenades or devices must be in a separate compartment of these boxes, or in inside or separate outside boxes, Spec. 15A, 15B, 15C, or 19B and must be so packed and cushioned that they may not come in contact with each other or with the walls of box during transportation. Not more than 50 grenades and 50 functioning devices shall be packed in one box and the gross weight of the outside box must not exceed 75 pounds.

(2) Spec. 37A (§ 178.131 of this subchapter). Metal drum (single-trip). Functioning elements must be packed in separate compartment. Not more than 24 grenades and 24 functioning devices shall be packed in one outside container and the gross weight of the container must not exceed 75 pounds.

(3) Specification 12B (§ 178.205 of this subchapter). Fiberboard box with inside tear gas devices meeting Specifications 2P or 2Q (§§ 178.33, 178.33a of this subchapter). Each inside container must be placed into spiral wound tubes fitted with metal ends or a double-faced fiberboard box with suitable padding. Not more than 30 inside containers shall be placed in one outside box and gross weight shall not exceed 35 pounds.

(b) These articles may not be assembled with or packed in the same compartment with mechanically or manually operated firing, igniting, bursting, or other functioning elements, unless of a type or design examined by the Bureau of Explosives and approved by the Director, OHMT.

(c) No shipment of packages containing articles under this section may be made until samples thereof have been examined by the Bureau of Explosives, or examined under their supervision, and approved by the Director, OHMT.

NOTE 1: Grenades or other similar devices may be shipped completely assembled when offered by or consigned to the U.S. Department of Defense, provided the functioning element is so packed that it cannot accidentally function. The outside containers must be metal-strapped wooden boxes, Spec. 15A, 15B, 15C, or 19B (§§ 178.168, 178.169, 178.170, 178.191 of this subchapter).

[29 FR 18753, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For Federal Register citations affecting § 173.385, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 173.386 Etiologic agents; definition and scope.

(a) *Definition.* For the purpose of Parts 170 through 189 of this subchapter:

(1) An "etiologic agent" means a viable microorganism, or its toxin, which causes or may cause human disease, and is limited to those agents listed in 42 CFR 72.3 of the regulations of the Department of Health and Human Services.

(2) A "diagnostic specimen" means any human or animal material including, but not limited to, excreta, secretions, blood, and its components, tissue, and tissue fluids, being shipped for purposes of diagnosis.

(3) A "biological product" means a material prepared and manufactured in accordance with the provisions of 9 CFR Part 102 (Licensed veterinary biological products), 21 CFR Part 601 (Licensing), 21 CFR 312.1 (Conditions for exemption of new drugs for investigational use), 9 CFR Part 103 (Biological products for experimental treatment of animals), or 21 CFR 312.9 (New drugs for investigational use in laboratory research animals or in vitro tests), and which in accordance with these provisions, may be shipped in interstate commerce.

(b) *Applicability.* Except as provided in paragraph (d), no person may ship any material, including a diagnostic specimen or a biological product, con-

taining an etiologic agent unless this material is packaged and prepared for shipment in accordance with § 173.24 and the other applicable regulations of this subchapter.

(c) *General provisions.* The requirements of these regulations (Parts 170 through 189 of this subchapter) supplement the requirements of the Department of Health and Human Service's regulations contained in 42 CFR Part 72.

(d) *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 Parts 170 through 189 of this subchapter:

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

(3) Cultures of etiologic agents of 50 milliliters (1.666 fluid ounces) or less total quantity in one outside package.

[Amdt. 173-67, 37 FR 20555, Sept. 30, 1972, as amended by Amdt. 173-72, 38 FR 8162, Mar. 29, 1973, Amdt. 173-94B, 41 FR 57070, Dec. 30, 1976; Amdt. 173-121, 43 FR 48644, Oct. 19, 1978; Amdt. 173-16, 48 FR 50460, Nov. 1, 1983; Amdt. 173-204, 52 FR 36672, Sept. 30, 1987]

#### § 173.387 Packaging requirements for etiologic agents.

(a) Except as provided in § 173.386(d) no person may ship a package containing over 4 liters gross volume of an etiologic agent.

(b) In addition to the requirements of 42 CFR Part 72, each package containing an etiologic agent must be designed and constructed so that, if it were subject to the environment and test conditions prescribed in this section, there would be no release of the contents to the environment, and the effectiveness of the packaging would not be significantly reduced.

(1) *Environmental conditions.* (i) Heat—direct sunlight in an ambient temperature of 130° F. in still air.

(ii) Cold—an ambient temperature of -40° F. in still air and shade.

(iii) Reduced pressure—ambient atmospheric pressure of 0.50 atmosphere (7.3 p.s.i.a.).

(iv) Vibration—vibration normally incident in the mode of transportation the package is to be shipped.

(2) *Test conditions.* (i) Water spray—a water spray heavy enough to keep the entire exposed surface of the package (except the bottom) continuously wet during a period of 30 minutes. Packages for which the outer layer consists of metal, wood, ceramic, or plastic, or combination thereof, are exempt from this test.

(ii) Freedrop—a freedrop through a distance of 30 feet onto a flat, essentially unyielding horizontal target surface, the package striking the surface in a position for which maximum damage is expected.

(iii) Penetration—impact of the hemispheric end of a steel cylinder 1.25 inches in diameter and weighing 15 pounds, dropped from a height of 40 inches on to the exposed surface of the package expected to be most vulnerable to puncture. The long axis of the cylinder must be perpendicular to the impacted surface. This test is not required for a package subject to paragraph (b)(2)(iv) of this section.

(iv) Penetration (required for packages exceeding 15 pounds gross weight only)—a freedrop of the package through a distance of 40 inches, striking the top end of a vertical cylindrical mild steel solid bar on an essentially unyielding surface, in a position for which maximum damage is expected. The bar must be 1.5 inches in diameter. The top of the bar must be horizontal, with its edge rounded to a radius not exceeding one-quarter inch. The bar must be of such length as to cause maximum damage to the package, but not less than 8 inches long. The long axis of the bar must be vertical to the unyielding horizontal impact surface of the package.

(3) *Testing procedure.* (1) At least one sample of each type package (maximum size and gross weight), filled with water, must be subjected to the water spray test unless exempted by paragraph (b)(2)(i) of this section.

(ii) This sample package then must be given the freedrop and one of the penetration tests, as applicable. Separate wetted sample packages may be used for the freedrop and the penetration test.

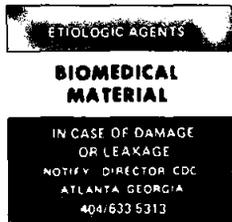
(iii) If the sample package is exempted from the water spray test by paragraph (b)(2)(i) of this section, at least

one sample of each type package (maximum size and gross weight), filled with water, must be subjected consecutively to the freedrop and the penetration test.

[Amdt. 173-67, 37 FR 20556, Sept. 30, 1972, as amended by Amdt. 173-16, 48 FR 50460, Nov. 1, 1983]

§ 173.388 Labeling of packages containing etiologic agents.

(a) Each package containing an etiologic agent, except a diagnostic specimen or a biological product, must be labeled as prescribed by the regulations of the Department of Health and Human Services, 42 CFR 72.3(d). For information, this label is required to be a rectangle measuring 51 mm. (2 inches) high and 102.5 mm. (4 inches) long, predominantly red printing on a white background, and appears as follows:



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

[Amdt. 173-67, 37 FR 20556, Sept. 30, 1972, as amended by Amdt. 173-16, 48 FR 50460, Nov. 1, 1983; Amdt. 173-178, 49 FR 38134, Sept. 27, 1984]

Subpart I—Radioactive Materials

AUTHORITY: 49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, App. A to Part 1.

SOURCE: Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, unless otherwise noted.

§ 173.401 Scope.

(a) This subpart sets forth requirements for the transportation of radioactive materials by carriers and shippers subject to this subchapter. The requirements prescribed in this subpart are in addition to, but not in lieu of, other requirements set forth in this subchapter and in 10 CFR Part 71 for the packaging and transportation of radioactive materials.

(b) This subpart does not apply to:

(1) Radioactive materials produced, used, transported, or stored within an establishment other than during the course of transportation.

(2) Radioactive materials contained in a medical device, such as a heart pacemaker, which is implanted in a human being or live animal.

(3) Radiopharmaceuticals that have been injected into, or ingested by, and are still in human beings or live animals.

§ 173.403 Definitions.

In this subpart:

(a) "A<sub>1</sub>" means the maximum activity of special form radioactive material permitted in a Type A package.

(b) "A<sub>2</sub>" means the maximum activity of radioactive material, other than special form or low specific activity radioactive material, permitted in a Type A package. These values are either listed in § 173.435 or may be derived in accordance with the procedure prescribed in § 173.433.

(c) "Closed transport vehicle" means a transport vehicle equipped with a securely attached exterior enclosure that during normal transportation restricts the access of unauthorized persons to the cargo space containing the radioactive materials. The enclosure may be either temporary or permanent, and in the case of packaged materials may be of the "see-through" type, and must limit access from top, sides, and ends.

(d) "Containment system" means the components of the packaging intended to retain the radioactive contents during transportation.

(e) "Conveyance" means:

(1) For transport by public highway or rail: any transport vehicle or large freight container;

(2) For transport by vessel: any vessel, or any hold, compartment, or defined deck area of a vessel; and

(3) For transport by aircraft: any aircraft.

(f) "Depleted uranium" means uranium containing less uranium-235 than the naturally occurring distribution of uranium isotopes.

(g) "Design" means the description of a special form material, a package, or a packaging, that enables those items to be fully identified. The description may include specifications, engineering drawings, reports showing compliance with regulatory requirements, and other relevant documentation.

(h) "Enriched uranium" means uranium containing more uranium-235 than the naturally occurring distribution of uranium isotopes.

(i) "Exclusive use" (also referred to in other regulations as "sole use" or "full load") means the sole use of a conveyance by a single consignor and for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee. Any loading or unloading must be performed by personnel having radiological training and resources appropriate for safe handling of the consignment. Specific instructions for maintenance of exclusive use shipment controls must be issued in writing and included with the shipping paper information provided to the carrier by the consignor.

(j) "Fissile material" means any material consisting of or containing one or more fissile radionuclides. Fissile radionuclides are plutonium-238, plutonium-239, plutonium-241, uranium-233 and uranium-235. Neither natural nor depleted uranium are fissile material. Fissile materials are classified according to the controls needed to provide nuclear criticality safety during transportation, as provided in § 173.455. Certain exclusions are provided in § 173.453.

(k) "Freight container" means a reusable container having a volume of 1.81 cubic meters (64 cubic feet) or more, designed and constructed to permit being lifted with its contents intact and intended primarily for containment of packages in unit form

during transportation. A small freight container is one which has either one outer dimension less than 1.5 meters (4.9 feet) or an internal volume of not more than 3.0 cubic meters (106 cubic feet). All other are designated as "large freight containers."

(l) "Highway route controlled quantity" means a quantity within a single package which exceeds:

(1) 3000 times the  $A_1$  value of the radionuclides as specified in § 173.433 for special form radioactive material;

(2) 3000 times the  $A_2$  value of the radionuclides as specified in § 173.433 for normal form radioactive material; or

(3) 30,000 curies, whichever is least.

(m) "Limited quantity of radioactive material" means a quantity of radioactive material not exceeding the materials package limits specified in § 173.423 and which conform with requirements specified in § 173.421.

(n) "Low specific activity material (LSA)" means any of the following:

(1) Uranium or thorium ores and physical or chemical concentrates of those ores.

(2) Unirradiated natural or depleted uranium or unirradiated natural thorium.

(3) Tritium oxide in aqueous solutions provided the concentration does not exceed 5.0 millicuries per milliliter.

(4) Material in which the radioactivity is essentially uniformly distributed and in which the estimated average concentration of contents does not exceed:

(i) 0.0001 millicurie per gram of radionuclides for which the  $A_1$  quantity is not more than .05 curie;

(ii) 0.005 millicurie per gram of radionuclides for which the  $A_2$  quantity is more than .05 curie, but not more than 1 curie; or

(iii) 0.3 millicurie per gram of radionuclides for which the  $A_2$  quantity is more than 1 curie.

(5) Objects of nonradioactive material externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible and the surface contamination, when averaged over an area of 1 square meter, does not exceed 0.0001 millicurie (220,000 disintegrations per minute) per square centimeter of ra-

dionuclides for which the  $A_2$  quantity is not more than .05 curie, or 0.001 millicurie (2,200,000 disintegrations per minute) per square centimeter for other radionuclides.

(o) "Multilateral approval" means approval by both the appropriate competent authority of the country of origin and of each country through or into which the shipment is to be transported. This definition does not imply approval from countries over which radioactive materials are carried in aircraft, if there is no scheduled stop in that country.

(p) "Natural thorium" means thorium with the naturally occurring distribution of thorium isotopes (essentially 100 weight percent thorium-232).

(q) "Natural uranium" means uranium with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235 and the remainder essentially uranium-238).

(r) "Non-fixed radioactive contamination" means radioactive contamination that can be readily removed from a surface by wiping with an absorbent material. Non-fixed (removable) radioactive contamination is not significant if it does not exceed the limits specified in § 173.443.

(s) "Normal form radioactive material" means radioactive material which has not been demonstrated to qualify as "special form radioactive material."

(t) "Package" means, for radioactive materials, the packaging together with its radioactive contents as presented for transport.

(u) "Packaging" means, for radioactive materials, the assembly of components necessary to ensure compliance with the packaging requirements of this subpart. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The conveyance, tie-down system, and auxiliary equipment may sometimes be designated as part of the packaging.

(v) "Radiation level" means the radiation dose-equivalent rate expressed in millirem per hour (mrem/h). Neutron flux densities may be converted into radiation levels according to Table 1:

TABLE 1—NEUTRON FLUX DENSITIES TO BE REGARDED AS EQUIVALENT TO A RADIATION LEVEL OF 1 MILLIREM PER HOUR (MREM/H)<sup>1</sup>

Energy of neutron	Flux density equivalent to 1 mrem/h (Neutrons per square centimeter per second)(n/cm <sup>2</sup> /s)
Thermal.....	268.0
5 keV.....	228.0
20keV.....	112.0
100 keV.....	32.0
500 keV.....	12.0
1 MeV.....	7.2
5 MeV.....	7.2
10 MeV.....	6.8

<sup>1</sup> Flux densities equivalent for energies between those listed above may be obtained by linear interpolation.

(w) "Radioactive article" means any manufactured instruments and articles such as an instrument, clock, electronic tube or apparatus, or similar instruments and articles having radioactive material as a component part.

(x) "Radioactive contents" means the radioactive material, together with any contaminated liquids or gases, within the package.

(y) "Radioactive material" means any material having a specific activity greater than 0.002 microcuries per gram (uCi/g)(see definition of "specific activity").

(z) "Special form radioactive material" means radioactive material which satisfies the following conditions:

(1) It is either a single solid piece or is contained in a sealed capsule that can be opened only by destroying the capsule;

(2) The piece or capsule has at least one dimension not less than 5 millimeters (0.197 inch); and

(3) It satisfies the test requirements of § 173.469. Special form encapsulations designed in accordance with the requirements of § 173.389(g) in effect on June 30, 1983, and constructed prior to July 1, 1985 may continue to be used. Special form encapsulations either designed or constructed after June 30, 1985 must meet the requirements of this paragraph.

(aa) "Specific activity" of a radionuclide, means the activity of the radionuclide per unit mass of that nuclide. The specific activity of a material in

which the radionuclide is essentially uniformly distributed is the activity per unit mass of the material.

(bb) "Transport index" means the dimensionless number (rounded up to the first decimal place) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined as follows:

(1) The number expressing the maximum radiation level in millirem per hour at one meter (3.3 feet) from the external surface of the package; or

(2) For Fissile Class II packages or packages in a Fissile Class III shipment, the number expressing the maximum radiation level at one meter (3.3 feet) from the external surface of the package, or the number obtained by dividing 50 by the allowable number of packages which may be transported together, whichever is larger.

(cc) "Type A package" means a Type A packaging together with its limited radioactive contents. A Type A package does not require competent authority approval, since its contents are limited to A<sub>1</sub> or A<sub>2</sub>.

(dd) "Type B package" means a Type B packaging together with its radioactive contents.

(ee) "Type B(M) package" means a Type B packaging, together with its radioactive contents, that for international shipments requires multilateral approval of the package design, and may require approval of the conditions of shipment. Type B(M) packages are those Type B package designs which have a maximum normal operating pressure of more than 7 kilograms per square centimeter (100 pounds per square inch) gauge or a relief device which would allow the release of radioactive material to the environment under the hypothetical accident conditions specified in 10 CFR Part 71.

(ff) "Type B(U) package" means a Type B packaging, together with its radioactive contents, that for international shipments, requires unilateral approval only of the package design and of any stowage provisions that may be necessary for heat dissipation.

(gg) "Type A packaging" means a packaging designed to retain the integrity of containment and shielding re-

quired by this part under normal conditions of transport as demonstrated by the tests set forth in §§ 173.465 or 173.466, as appropriate.

(hh) "Type B packaging" means a packaging designed to retain the integrity of containment and shielding required by this part when subjected to the normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR Part 71.

(ii) "Uncompressed gas" means, for the purposes of this subpart, gas at a pressure not exceeding the ambient atmospheric pressure at the time and location the containment system is closed. All other radioactive gases are considered to be compressed.

(jj) "Unilateral approval" means approval by the competent authority of the country of origin only.

(kk) "Unirradiated thorium" means thorium containing not more than  $10^{-7}$  grams uranium-233 per gram of thorium-232.

(ll) "Unirradiated uranium" means uranium containing not more than  $10^{-6}$  grams plutonium per gram of uranium-235 and a fission product activity of not more than 0.25 millicuries of fission products per gram of uranium-235.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983; 48 FR 13431, Mar. 31, 1983, as amended at 48 FR 31217, July 7, 1983; Amdt. 173-193, 50 FR 41898, Oct. 16, 1985]

#### § 173.411 General design requirements.

Except for a package that contains a limited quantity or excepted instrument or article under §§ 173.421 through 173.424, each package used for shipment of radioactive materials shall be designed so that:

(a) The package can be easily handled and properly secured in or on a conveyance during transport;

(b) A package with a gross weight exceeding 10 kilograms (22 pounds) and up to 50 kilograms (110 pounds) has a means for manual handling;

(c) A package with a gross weight of 50 kilograms (110 pounds) or more can be safely handled by mechanical means;

(d) Each lifting attachment on the package, when used in the intended manner, with a minimum safety factor of three, does not impose an unsafe

stress on the structure of the package. In addition, the lifting attachment shall be so designed that failure under excessive load would not impair the ability of the package to meet all other requirements of this subpart. Each attachment or other feature on the outer surface of the packaging that could be used to lift the package must be removable or otherwise capable of being made inoperable for transport, or shall be designed with strength equivalent to that required for lifting attachments;

(e) The external surface, as far as practicable, may be easily decontaminated;

(f) The outer layer of packaging will avoid, as far as practicable, pockets or crevices where water might collect; and

(g) Each feature that is added to the package at the time of transport, and that is not a part of the package, will not reduce the safety of the package.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31218, July 7, 1983]

#### § 173.412 Additional design requirements for Type A packages.

In addition to meeting the general design requirements prescribed in § 173.411, each Type A packaging shall be designed so that:

(a) The smallest overall external dimension of the package is not less than 10 centimeters (4 inches);

(b) The outside of the packaging incorporates a feature, such as a seal, that is not readily breakable, and that, while intact, is evidence that the package has not been opened. In the case of packages shipped in exclusive use closed transport vehicles, the cargo compartment may be sealed instead of the individual packages;

(c) As far as practicable, the external surfaces are free from protrusions and are designed and finished so that they can be easily decontaminated;

(d) Containment and shielding would be maintained during transportation and storage in a temperature range of  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) to  $70^{\circ}\text{C}$  ( $158^{\circ}\text{F}$ ) with account being taken of the possibility of brittle fracture;

(e) It is able to withstand the effects of any acceleration, vibration, or vibra-

tion resonance that may arise during normal transportation, without any deterioration of the effectiveness of closing devices or of the integrity of the package as a whole and without loosening or unintentional release of nuts, bolts, or other securing devices even after repeated use;

(f) It includes a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by pressure that may arise within the package during normal transport. Special form, as demonstrated in accordance with § 173.469 may be considered as a component of the containment system;

(g) The materials of the packaging and any components or structures are physically and chemically compatible with each other and with the contents, taking into account the behavior of each under irradiation;

(h) For each component of the containment system account is taken, where applicable, of radiolytic decomposition of materials and the generation of gas by chemical reaction and radiolysis;

(i) The containment system will retain its radioactive contents under the reduction of ambient pressure to .25 kilograms per square centimeter (3.5 pounds per square inch);

(j) Each valve through which the radioactive contents could otherwise escape is protected against damage and unauthorized operation and, except for a pressure relief device, has an enclosure to retain any leakage;

(k) Any radiation shield that encloses a component of the packaging specified as part of the containment system will prevent the unintentional escape of that component from the shield;

(l) Failure of any tie down attachment on the packaging under excessive load will not impair the ability of the package to meet other requirements of this subpart;

(m) When subjected to the tests specified in § 173.465 or evaluated against these tests by any of the methods authorized by § 173.461(a), the packaging will prevent:

(1) Loss or dispersal of the radioactive contents; and

(2) Any significant increase in the radiation levels recorded or calculated at the external surfaces for the condition before the test;

(n) Each packaging designed for liquid will:

(1) Meet the conditions prescribed in paragraph (m) of this section when subjected to the tests specified in § 173.466 or evaluated against these tests by any of the methods authorized by § 173.461(a);

(2) For any package with a liquid volume not exceeding 50 cubic centimeters (1.7 fluid ounces), have sufficient suitable absorbent material to absorb twice the volume of the liquid contents. The absorbent material shall be compatible with the package contents and suitably positioned to contact the liquid in the event of leakage; and

(3) For any package with a liquid volume exceeding 50 cubic centimeters (1.7 fluid ounces), either:

(i) Have sufficient absorbent material as prescribed in paragraph (n)(2) of this section; or

(ii) Have a containment system composed of primary inner and secondary outer containment components designed to assure retention of the liquid contents within the secondary outer components in the event that the primary inner components leak; and

(o) Each package designed for compressed or uncompressed gases other than tritium or argon-37 not exceeding 200 curies will be able to prevent loss of contents when the package is subjected to the tests prescribed in § 173.466 or evaluated against these tests by any of the methods authorized by § 173.461(a).

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31218, July 7, 1983]

#### § 173.413 Requirements for Type B packages.

Each Type B(U) or Type B(M) package must be designed and constructed to meet the applicable requirements in 10 CFR Part 71.

#### § 173.415 Authorized Type A packages.

The following packages are authorized for shipment, if they do not con-

tain quantities exceeding  $A_1$  or  $A_2$  as appropriate:

(a) U.S. Department of Transportation (DOT) Specification 7A (§ 178.350 of this subchapter) Type A general packaging. Each shipper of a Specification 7A package must maintain on file for at least one year after the latest shipment, and shall provide to DOT on request, a complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification. Specification 7A packagings designed in accordance with the requirements of § 178.350 in effect on June 30, 1983, and constructed prior to July 1, 1985, may continue to be used. Packagings either designed or constructed after June 30, 1985, must meet the requirements of § 178.350 applicable at the time of their design or construction.

(b) DOT Specification 55 metal-encased shielded packaging constructed before April 1, 1975. Such packaging constructed after March 31, 1975 is not authorized unless it is requalified under DOT Specification 7A. Each packaging designed for liquids must also meet the requirements of § 173.412 (m) and (n). Use of this packaging as DOT Specification 55 is not authorized after June 30, 1985.

(c) Any Type B, B(U) or B(M) packaging pursuant to § 173.416.

(d) Any foreign made packaging that bears the marking "Type A" and which was used for the import of radioactive materials. Such packagings may be subsequently used for domestic and export shipments of radioactive materials. These packagings shall conform with requirements of the country of origin (as indicated by the packaging marking) applicable to Type A packagings.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0533)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31218, July 7, 1983; Amdt. 173-197, 51 FR 34987, Oct. 1, 1986]

§ 173.416 Authorized Type B packages.

Each of the following packages is authorized for shipment of quantities exceeding  $A_1$  or  $A_2$ , as appropriate:

(a) DOT Specification 55 metal-encased shielded packaging constructed before April 1, 1975, for domestic shipments only of special form radioactive materials of 300 curies or less. Such packaging constructed after March 31, 1975 may not be designated as DOT Specification 55. Use of this packaging is not authorized after June 30, 1985 unless approved in accordance with paragraph (b) of this section.

(b) Any Type B, Type B(U) or Type B(M) packaging that meets the applicable requirements in the regulations of the U.S. Nuclear Regulatory Commission (10 CFR Part 71) and that has been approved by that Commission may be shipped pursuant to § 173.471.

(c) Any type B(U) or B(M) packaging that meets the applicable requirements of the regulations of the International Atomic Energy Agency (IAEA) in its "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)" and for which the foreign competent authority certificate has been revalidated by DOT pursuant to § 173.473. Authorized only for export and import shipments.

(d) DOT Specification 6M (§ 178.104 of this subchapter) metal packaging, only for solid or gaseous radioactive materials that will not undergo pressure generating decomposition at temperatures up to 121°C (250° F) and that do not generate more than 10 watts of radioactive decay heat.

(e) For contents in other than special form; DOT Specification 20 WC (§ 178.194 of this subchapter), wooden protective jacket, when used with a single, snug-fitting inner DOT Specification 2R (§ 178.34 of this subchapter), or a DOT Specification 55 container constructed prior to April 1, 1975. Such packagings constructed after March 31, 1975, may not be designated as DOT Specification 55. For liquid contents, the inner packaging must comply with § 173.412 (m) and (n).

(f) For contents in special form only; DOT Specification 20WC (§ 178.194 of

this subchapter), wooden protective jacket, with a single snug-fitting inner Type A packaging that has a metal outer wall and conforms to § 173.350 of this subchapter, or an inner DOT Specification 55 packaging constructed prior to April 1, 1975. Such packagings constructed after March 31, 1975, may not be designated as DOT Specification 55. Radioactive decay heat may not exceed 100 watts.

(g) For contents in special form only; DOT Specification 21WC (§ 178.195 of this subchapter), wooden protective overpack, with a single inner DOT Specification 2R (§ 178.34 of this subchapter) or an inner DOT Specification 55 container constructed prior to April 1, 1975. Such packagings constructed after March 31, 1975, may not be designated as DOT Specification 55. Contents shall be loaded within the inner packaging in such a manner as to prevent loose movement during transportation. The inner packaging shall be securely positioned and centered within the overpack so that there will be no significant displacement of the inner packaging if subjected to the 9 meter (30 feet) drop test described in 10 CFR Part 71.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31218, July 7, 1983]

**§ 173.417 Authorized packaging—fissile materials.**

(a) Except as provided in § 173.453, fissile materials containing not more than  $A_1$  or  $A_2$  as appropriate, shall be packaged in one of the following packagings:

(1) DOT Specification 6L (§ 178.103 of this subchapter), metal packaging, for materials prescribed in paragraph (b)(1) of this section.

(2) DOT Specification 6M (§ 178.104 of this subchapter), metal packaging, for materials prescribed in paragraph (b)(2) of this section.

(3) Any packaging listed in § 173.415, limited to the following radioactive materials:

(i) 500 grams of uranium-235 in a single shipment as Fissile Class III or not more than 40 grams of uranium-235 per package as Fissile Class II. For Fissile Class II shipments, the transport index assigned to each package shall not be less than 0.4 for each

gram of uranium-235 above 15 grams up to the maximum of 40 grams (transport index of 10).

(ii) 320 grams of plutonium-239 as plutonium-beryllium neutron sources in special form. Total radioactivity content may not exceed 20 curies. The transport index to be assigned to each package must be 0.5 for each 20 grams, or fraction thereof, of fissile plutonium.

(4) Any other Type A or Type B, Type B(U), or Type B(M) packaging for fissile radioactive materials that also meets the applicable standards for fissile materials in the regulations of the U.S. Nuclear Regulatory Commission (10 CFR Part 71), and is used in accordance with § 173.471.

(5) Any other Type A or Type B, Type B(U), or Type B(M) packaging that also meets the applicable requirements for fissile material packaging in Section VI of the International Atomic Energy Agency "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)", and for which the foreign competent authority certificate has been revalidated by the Director, OHMT, in accordance with § 173.473. Authorized only for export and import shipments.

(6) A DOT Specification 6J (§ 178.100 of this subchapter) or 17H (§ 178.118 of this subchapter) 55-gallon steel drum, subject to the following conditions:

(i) The quantity may not exceed 350 grams of uranium-235 in any non-pyrophoric form, enriched to any degree in the uranium-235 isotope.

(ii) Each drum must have a minimum 18 gauge body and bottom head and 16 gauge removable top head with one or more corrugations in the cover near the periphery.

(iii) Closure must conform to § 178.103-5(a) of this subchapter.

(iv) At least four equally spaced 12 millimeter (0.5 inch) diameter vent holes shall be provided on the sides of the drum near the top, each covered with weatherproof tape; or equivalent device.

(v) Appropriate primary inner containment of the contents and sufficient packaging material, such as plastic or metal jars or cans shall be pro-

vided such that Specification 7A (§ 178.350 of this subchapter) provisions are satisfied by the inner packaging.

(vi) Each inner container shall be capable of venting if subjected to the thermal test described in 10 CFR Part 71.

(vii) Liquid contents shall be packaged in accordance with § 173.412(m) and (n).

(viii) The maximum weight of contents including internal packaging may not exceed 91 kilograms (200 pounds) with fissile material content limited as shown in Table 2:

TABLE 2—FISSILE MATERIAL CONTENT AND TRANSPORT INDEX FOR SPECIFICATION 6J OR 17H PACKAGES

Maximum U-235 per package (grams)	Minimum transport index per package as Fissile Class II	Maximum packages per transport vehicle as Fissile Class III
350	1.8	72
300	1.0	129
250	0.6	256
200	0.3	500
150	0.1	500
100	0.1	500
50	( <sup>1</sup> )	( <sup>1</sup> )

<sup>1</sup> Fissile Class I.

(7) Any metal cylinder that meets the performance requirements of §§ 173.415 and 178.350 of this subchapter for Specification 7A Type A packaging may be used as a Fissile Class I package for the transport of residual "heels" of enriched solid uranium hexafluoride without a protective overpack in accordance with Table 3:

TABLE 3—ALLOWABLE CONTENT OF URANIUM HEXAFLUORIDE (UF<sub>6</sub>) "HEELS" IN A SPECIFICATION 7A CYLINDER

Maximum cylinder diameter		Cylinder volume		Maximum Uranium-235 enrichment (weight percent)	Maximum "heel" weight per cylinder			
Inches	Centimeters	Cubic Feet	Liters		UF <sub>6</sub>		Uranium-235	
				kg	(lb)	kg	(lb)	
5	12.7	0.311	8.8	100.0	0.045	0.1	0.031	0.07
8	20.3	1.359	39	12.5	0.227	0.5	.018	0.04
12	30.5	2.410	68	5.0	0.454	1.0	.016	0.03
30	76	25.64	725	5.0	11.3	25.0	.393	0.84
48	122	108.9 (10 ton)	3084	4.5	22.7	50	.690	1.52
		142.7 (14 ton)	4041	4.5	22.7	50	.690	1.52

(8) DOT Specifications 20PF-1, 20PF-2, or 20PF-3 (§ 178.120 of this subchapter) or Specifications 21PF-1 or 21PF-2 (§ 178.121 of this subchapter) phenolic-foam insulated overpack with snug fitting inner metal cylinders, for materials prescribed in paragraph (b)(5) of this section.

(b) Fissile radioactive materials with radioactive content exceeding  $A_1$  or  $A_2$  shall be packaged in one of the following packagings:

(1) DOT Specification 6L (§ 178.103 of this subchapter), metal packaging.

Authorized only for uranium-235, plutonium-239 or plutonium-241, as metal, oxide, or compounds that do not decompose at temperatures up to 149°C (300°F). Radioactive decay heat output may not exceed 5 watts. Radioactive materials in normal form shall be packaged in one or more tightly sealed metal cans or polyethylene bottles within a DOT Specification 2R (§ 178.34 of this subchapter) containment vessel. Packages are authorized as Fissile Class II and III with materials limited in accordance with Table 4:

TABLE 4—AUTHORIZED CONTENTS IN KILOGRAMS (KG) AND CONDITIONS FOR SPECIFICATION 6L PACKAGES

Uranium-235		Plutonium <sup>1</sup>		Fissile class II transport index	Fissile class III maximum number of packages per transport vehicle
H/X < 3 <sup>a</sup>	3 < H/X < 10	H/X < 10	10 < H/X < 20		
14	<sup>a</sup> 3.6	2.5	2.4	1.3 1.8	80 50

<sup>1</sup> Plutonium solutions are not authorized.

<sup>a</sup> H/X is the ratio of hydrogen to fissile atoms in the inner containment with all sources of hydrogen in the containment considered.

<sup>b</sup> Volume not to exceed 3.6 liters.

(2) DOT Specification 6M (§ 178.104 of this subchapter), metal packaging. Authorized only for solid radioactive materials that will not decompose at temperatures up to 121°C (250°F). Radioactive decay heat output may not exceed 10 watts. Radioactive materials in other than special form shall be packaged in one or more tightly sealed metal cans or polyethylene bottles within a DOT Specification 2R (§ 178.34 of this subchapter) containment vessel. For fissile materials:

(i) Fissile Class I packages are limited to the following amounts of fissile radioactive materials: 1.6 kilograms of uranium-235; 0.9 kilograms of plutonium (except that due to the 10-watt thermal decay heat limitation, the limit for plutonium-238 is 0.02 kilograms); and 0.5 kilograms of uranium-233. The maximum ratio of hydrogen to fissile material must not exceed three, including all of the sources of hydrogen within the DOT Specification 2R containment vessel.

(ii) Maximum quantities of fissile material for Fissile Class II and Fissile Class III, and other restrictions are given in Table 5. For a Fissile Class II package, the minimum transport index to be assigned is shown in Table 5 and for a Fissile Class III shipment, the allowable number of similar packages per conveyance and per transport vehicle is shown. Each Fissile Class III shipment is also subject to the requirements in § 173.457. Where a maximum ratio of hydrogen to fissile material is specified in Table 5, only the hydrogen interspersed with the fissile material need be considered. For a uranium-233 shipment, the maximum inside diameter of the inner containment vessel must not exceed 12.1 centimeters (4.75 inches). Where necessary, a tight fitting steel insert shall be used to reduce a larger diameter inner containment vessel specified in § 178.104-3(b) of this subchapter to the 12 centimeter (4.75 inch) limit.

TABLE 5—AUTHORIZED CONTENTS FOR SPECIFICATION 6M PACKAGES<sup>1</sup>

Metal or alloy	Uranium-235 <sup>5</sup>		Uranium-235 <sup>4, 7</sup>			Plutonium <sup>2, 3, 4</sup>			Fissile class II transport index	Fissile class III maximum number of packages per transport vehicle	
	Compounds		Metal or alloy	Compounds		Metal or alloy	Compounds				
	H/X=0	H/X<3		H/X=0	H/X=0		H/X<3	H/X=0			H/X=0
	3.6	4.4	2.9	7.2	7.6	5.3	3.1	4.1	3.4	0.1	1,250
	4.2	5.2	3.5	8.7	9.6	6.4	3.4	4.5	4.1	0.2	625
	5.2	6.8	4.5	11.2	13.9	8.3	4.2		4.5	0.5	250
				13.5	16.0	10.1	4.5			1.0	125
					26.0	16.1				5.0	25
					32.0	19.5				10.0	12

<sup>1</sup> Quantity in kilograms.

<sup>2</sup> Minimum percentage of plutonium-240 is 5 weight percent.

<sup>3</sup> 4.5 kilogram limitation of plutonium due to 10 watt decay heat limitation.

<sup>4</sup> For a mixture of uranium-235 and plutonium an equal amount of uranium-235 may be substituted for any portion of plutonium authorized.

<sup>5</sup> Maximum inside diameter of Specification 2R containment vessel not to exceed 12 centimeter (4.75 inch) (see par. (b)(2)(ii) of this section).

<sup>6</sup> Granulated or powdered metal with any particle less than 8 millimeter (0.25 inch) in the smallest dimension is not authorized.

<sup>7</sup> Maximum permitted uranium-235 enrichment is 93.5 percent.

<sup>8</sup> H/X is the ratio of hydrogen to fissile atoms in the inner containment.

(3) Type B, or Type B(U) or B(M) packaging that meets the standards for packaging of fissile materials in 10 CFR Part 71, and is approved by the U.S. Nuclear Regulatory Commission in accordance with § 173.471.

(4) Type B(U) or B(M) packaging that meets the applicable requirements for fissile radioactive materials in Section VI of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)" and for which the foreign competent authority certificate has been revalidated by the Director, OHMT in accordance with § 173.472. Authorized only for import and export shipments.

(5) DOT Specification 20PF-1, 20PF-2, or 20PF-3 (§ 178.120 of this subchapter) or Specification 21PF-1 or 21PF-2 (§ 178.121 of this subchapter) phenolic-foam insulated protective overpacks, with snugfitting inner metal cylinders meeting all of the applicable requirements of §§ 173.24, 173.411, and 173.412. Handling procedures and packaging criteria shall be in accordance with U.S. Department of Energy Report No. ORO-651 or ANSI Standard N-14.1-1982. Quantities of uranium hexafluoride are authorized as shown in Table 6, with each package to be shipped as Fissile Class II, and assigned a minimum transport index as also shown:

TABLE 6—AUTHORIZED QUANTITIES OF URANIUM HEXAFLUORIDE (UF<sub>6</sub>) AS FISSILE CLASS II

Protective overpack specification number	Maximum inner cylinder diameter		Maximum weight of UF <sub>6</sub> contents		Maximum U-235 enrichment (weight percent)	Fissile Class II transport index
	Centimeter	Inch	Kilograms	Pounds		
20PF-1	12.7	5	25	55	100.0	0.1
20PF-2	20.3	8	116	255	12.5	4.0
20PF-3	30.5	12	209	460	5.0	1.1
21PF-1 <sup>1</sup>	<sup>2</sup> 76	<sup>3</sup> 30	2,247	4,950	5.0	5.0
	<sup>2</sup> 76	<sup>3</sup> 30	2,278	5,020	5.0	5.0
21PF-2 <sup>1</sup>	<sup>2</sup> 76	<sup>3</sup> 30	2,247	4,950	5.0	5.0
	<sup>2</sup> 76	<sup>3</sup> 30	2,278	5,020	5.0	5.0

<sup>1</sup> For 76 centimeter cylinders, the maximum permitted H/U atomic ratio is 0.088.

<sup>2</sup> Model 30A inner cylinder (Reference: ORO-651).

<sup>3</sup> Model 30B inner cylinder (Reference: ORO-651).

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 13432, Mar. 31, 1983; 48 FR 31218, July 7, 1983; Amdt. 173-185, 50 FR 11055, Mar. 19, 1985; Amdt. 173-196, 51 FR 5973, Feb. 18, 1986]

§ 173.418 Authorized packaging-pyrophoric radioactive materials.

(a) Pyrophoric radioactive materials, as referenced in § 172.101 of this subchapter, in quantities not exceeding  $A_2$  per package shall be packaged in Type A packagings which are constructed of materials which will not react nor be decomposed by the contents. Contents must be:

(1) In solid form and must not be fissile unless excepted by § 173.453;

(2) Contained in sealed and corrosion resistant receptacles with positive closures (friction or slip-fit covers or stoppers are not authorized);

(3) Free of water and any contaminants which would increase the reactivity of the material; and

(4) Made inert to prevent self-ignition during transport by either:

(i) Mixing with large volumes of inerting materials such as graphite or dry sand, or other suitable inerting material, or blended into a matrix of hardened concrete; or

(ii) By filling the innermost receptacle with an appropriate inert gas.

(b) In addition to the applicable requirements of § 173.24 each package must be capable of passing the test conditions of § 173.465 without leakage of contents.

§ 173.419 Authorized packaging-oxidizing radioactive materials.

Certain oxidizing radioactive materials, as referenced in § 172.101 of this subchapter, and which are not fissile materials and not in quantities exceeding  $A_2$ , shall be packed in suitable inside packagings of glass, metal or compatible plastic and suitably cushioned with a material which will not react with the contents. Inner packaging and cushioning shall be enclosed within an outside packaging of wood, metal, or plastic. The package shall be capable of meeting the applicable test requirements of § 173.465 without leakage of contents. For shipment by air, the maximum quantity in any package may not exceed 11.3 kilograms (25 pounds).

§ 173.420 Uranium hexafluoride (fissile and low specific activity).

(a) In addition to any other applicable requirements of this subchapter, uranium hexafluoride, fissile or low specific activity, shall be packaged in conformance with the following requirements:

(1) Before initial filling and during periodic inspection and test, packagings shall be cleaned in accordance with American National Standard N14.1-1982.

(2) Packagings used for the transportation of uranium hexafluoride on or before June 30, 1987 are authorized for continued use until further notice. Packagings manufactured after June 30, 1987 shall be designed, fabricated, and marked in accordance with—

(i) American National Standard N14.1-1982; or

(ii) Specifications for DOT Class 106A multi-unit tank car tanks (§§ 179.300, 179.301, and 179.302 of this subchapter).

(3) Uranium hexafluoride must be in solid form when offered for transportation;

(4) The volume of the solid uranium hexafluoride at 70° F must not exceed 61% of the volumetric capacity of the packaging; and,

(5) The pressure in the package at 70° F must be less than 14.8 psia.

(b) Packagings of uranium hexafluoride must be periodically inspected, tested and marked in accordance with American National Standard N14.1-1982.

(c) Each repair to a packaging for uranium hexafluoride shall be performed in conformance with American National Standard N14.1-1982.

[Amdt. 173-198, 51 FR 41633, Nov. 18, 1986, as amended at Amdt. 173-199, 52 FR 7582, Mar. 12, 1987; Amdt. 173-198, 52 FR 25341, July 8, 1987]

§ 173.421 Limited quantities of radioactive materials.

Radioactive materials whose activity per package does not exceed the limits specified in § 173.423 are excepted

from the specification packaging, shipping paper and certification, marking, and labeling requirements of this subchapter and requirements of this subpart if:

(a) The materials are packaged in strong, tight packages that will not leak any of the radioactive materials during conditions normally incident to transportation;

(b) The radiation level at any point on the external surface of the package does not exceed 0.5 millirem per hour;

(c) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed the limits specified in § 173.443(a);

(d) The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive";

(e) Except as provided in § 173.424, the package does not contain more than 15 grams of uranium-235; and

(f) The material is otherwise prepared for shipment as specified in § 173.421-1.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended by Amdt. 173-187, 48 FR 30137, June 30, 1983]

**§ 173.421-1 Additional requirements for excepted radioactive materials.**

(a) Excepted radioactive materials prepared for shipment under the provisions of § 173.421, § 173.422, § 173.424, or § 173.427 must be certified as being acceptable for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. This notice must include the name of the consignor or consignee and the statement "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for excepted radioactive material, limited quantity, n.o.s., UN2910; 49 CFR 173.422 for excepted radioactive material, instruments and articles, UN2911; 49 CFR 173.424 for excepted radioactive material, articles manufactured from natural or depleted uranium or natural thorium, UN2909; or 49 CFR 173.427 for excepted radioactive material, empty packages, UN2908", as appropriate.

(b) An excepted radioactive material classed radioactive material and prepared for shipment under the provisions of § 173.421, § 173.422, § 173.424, § 173.427 or § 173.421-2 is not subject to the requirements of this subchapter, except for:

(1) Sections 171.15, 171.16, 174.750, 176.710 and 177.861 of this subchapter pertaining to the reporting of incidents and decontamination when transported by a mode other than air; or

(2) Sections 171.15, 171.16, 175.45, and 175.700(b) of this subchapter pertaining to the reporting of incidents and decontamination if transported by aircraft. After May 2, 1989, it is also necessary to comply with §§ 173.448(f) and 175.700(c) of this subchapter.

(Approved by the Office of Management and Budget under control number 2137-0039)

[Amdt. 173-167, 48 FR 30137, June 30, 1983, as amended by Amdt. 173-187, 50 FR 18667, May 2, 1985; Amdt. 173-198, 51 FR 5973, Feb. 18, 1986; Amdt. 173-202, 52 FR 15949, May 1, 1987; Amdt. 173-204, 52 FR 36672, Sept. 30, 1987]

**§ 173.421-2 Requirements for multiple hazard limited quantity radioactive materials.**

(a) Except as provided in paragraph (b) of this section or in § 173.4 of this subchapter, when a limited quantity radioactive material meets the definition of another hazard class, it shall be:

(1) Classed for the additional hazard;

(2) Packaged to conform with requirements specified in § 173.421(a) through (e) or § 173.422(a) through (g), as appropriate; and

(3) Offered for transportation in accordance with requirements applicable to the hazard for which it is classed.

(b) When a limited quantity radioactive material meets the definition of an ORM-A, B, or C, or is a combustible liquid in a packaging having a rated capacity of 110 gallons or less, it shall be:

(1) Classed radioactive material if:

(i) The material is not a hazardous waste or hazardous substance; and

(ii) The material is offered for transportation in a mode to which require-

ments of this subchapter pertaining to the specific material and hazard class do not apply;

(2) Classed combustible liquid or ORM-A, B, or C, as appropriate, if:

(i) The material is a hazardous waste or hazardous substance; or

(ii) The material is offered for transportation in a mode to which requirements of this subchapter pertaining to the specific material and hazard class do apply;

(3) Packaged to conform with requirements specified in §§173.421(a) through (e) or 173.422(a) through (g), as appropriate; and

(4) Offered for transportation in accordance with requirements applicable to the hazard for which it is classed.

(c) A limited quantity radioactive material which is classed other than radioactive material under provisions of paragraphs (a) or (b) of this section is excepted from requirements of §§ 173.421-1(a), 172.203(d), and 172.204(c)(4) of this subchapter if the entry "Limited quantity radioactive material" appears on the shipping paper in association with the basic description.

(d) After May 2, 1989, a limited quantity radioactive material classed other than radioactive material may not be offered for transportation aboard a passenger-carrying aircraft unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

[Amdt. 173-167, 48 FR 30138, June 30, 1983, as amended by Amdt. 173-187, 50 FR 18668, May 2, 1985; Amdt. 173-202, 52 FR 15949, May 1, 1987]

§ 173.422 Exceptions for instruments and articles.

Instruments and manufactured articles (including clocks, electronic tubes or apparatus) or similar devices having

radioactive materials in gaseous or non-dispersible solid form as a component part are excepted from the specification packaging, shipping paper and certification, marking and labeling requirements of this subchapter and requirements of this subpart, if:

(a) The activity of the instrument or article does not exceed the relevant limit listed in Table 7 in § 173.423;

(b) The total activity per package does not exceed the relevant limit listed in Table 7 in § 173.423;

(c) The radiation level at 10 centimeters (4 inches) from any point on the external surface of any unpackaged instrument or article does not exceed 10 millirem per hour;

(d) The radiation level at any point on the external surface of a package bearing the article or instrument does not exceed 0.5 millirem per hour, or, for exclusive use domestic shipments, 2 millirem per hour;

(e) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed the limits specified in § 173.443(a);

(f) Except as provided in § 173.424, the package does not contain more than 15 grams of uranium-235; and

(g) [Reserved]

(h) The instrument or article is otherwise prepared for shipment as specified in § 173.421-1.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended by Amdt. 173-167, 48 FR 30138, June 30, 1983; Amdt. 173-162, 48 FR 31218, July 7, 1983; Amdt. 173-16, 48 FR 50460, Nov. 1, 1983]

§ 173.423 Table of activity limits—excepted quantities and articles.

The limits applicable to instruments, articles, and limited quantities subject to exceptions under §§ 173.421 and 173.422 are shown in Table 7:

TABLE 7—ACTIVITY LIMITS FOR LIMITED QUANTITIES, INSTRUMENTS, AND ARTICLES

Nature of contents	Instruments and articles		Materials package limits
	Instrument and article limits <sup>1</sup>	Package limits	
Solids:			
Special form.....	10 <sup>-5</sup> A <sub>1</sub> .....	A <sub>1</sub> .....	10 <sup>-5</sup> A <sub>1</sub>
Other forms.....	10 <sup>-5</sup> A <sub>2</sub> .....	A <sub>2</sub> .....	10 <sup>-5</sup> A <sub>2</sub>

TABLE 7—ACTIVITY LIMITS FOR LIMITED QUANTITIES, INSTRUMENTS, AND ARTICLES—Continued

Nature of contents	Instruments and articles		Materials package limits
	Instrument and article limits <sup>1</sup>	Package limits	
<b>Liquids:</b>			
Trillated water:			
<0.1 Ci/liter.....			1000 Curies.
0.1 Ci to 1.0 Ci/l .....			100 Curies.
>1.0 Ci/liter.....			1 Curie.
Other liquids.....	10 <sup>-9</sup> A <sub>2</sub> .....	10 <sup>-9</sup> A <sub>2</sub> .....	10 <sup>-9</sup> A <sub>2</sub> .
<b>Gases:</b>			
Tritium <sup>2</sup> .....	20 Curies.....	200 Curies.....	20 Curies.
Special form.....	10 <sup>-9</sup> A <sub>1</sub> .....	10 <sup>-9</sup> A <sub>1</sub> .....	10 <sup>-9</sup> A <sub>1</sub> .
Other forms.....	10 <sup>-9</sup> A <sub>2</sub> .....	10 <sup>-9</sup> A <sub>2</sub> .....	10 <sup>-9</sup> A <sub>2</sub> .

<sup>1</sup> For mixture of radionuclides see § 173.433(b).

<sup>2</sup> These values also apply to tritium in activated luminous paint and tritium adsorbed on solid carriers.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 13432, Mar. 31, 1983; 48 FR 31218, July 7, 1983]

**§ 173.424 Excepted articles containing natural uranium or thorium.**

Manufactured articles in which the sole radioactive material content is natural or depleted uranium or natural thorium are excepted from the specification packaging, shipping paper and certification, marking and labeling requirements of this subchapter and requirements of this subpart if:

(a) The outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or other durable protective material;

(b) The conditions specified in § 173.421 (b), (c), and (d) are met; and

(c) The article is otherwise prepared for shipment as specified in § 173.421-1.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended by Amdt. 173-167, 48 FR 30138, June 30, 1983; Amdt. 173-162, 48 FR 31218, July 7, 1983]

**§ 173.425 Transport requirements for low specific activity (LSA) radioactive materials.**

In addition to other applicable requirements specified in this subchapter, low specific activity (LSA) materials shall be transported in accordance with paragraph (a) of this section, or if transported as exclusive-use may be transported in accordance with paragraph (b) or (c) of this section.

(a) DOT Specification 7A (§ 178.350 of this subchapter) Type A package.

The requirements of § 173.412 (a), (b), (d), and (n) do not apply.

(b) Packaged shipments of LSA material consigned as exclusive use shall either be in accordance with paragraph (a) of this section or shall comply with the following in which case they are excepted from specification packaging, marking and labeling:

(1) Materials must be packaged in strong, tight packages so that there will be no leakage of radioactive material under conditions normally incident to transportation.

(2) Packages must not have any significant removable surface contamination (see § 173.443).

(3) External radiation levels must comply with § 173.441.

(4) Shipments must be loaded by consignor and unloaded by consignee from the conveyance or freight contained in which originally loaded.

(5) There must be no loose radioactive material in the conveyance.

(6) Shipment must be braced so as to prevent shifting of lading under conditions normally incident to transportation.

(7) Except for shipments of unconcentrated uranium or thorium ores, the transport vehicle must be placarded with the placards prescribed in accordance with Subpart F of Part 172 of this subchapter, as appropriate.

(8) The exterior of each outside package must be stenciled or otherwise marked "Radioactive—LSA".

(9) Specific instructions for maintenance of exclusive use shipment controls must be provided by the shipper to the carrier. Such instructions must be included with the shipping paper information.

(10) Transportation by aircraft is prohibited.

(c) Unpackaged (bulk) shipments of LSA materials shall be transported only in exclusive use closed transport vehicles and shall comply with the following:

(1) Authorized materials are limited to the following:

(i) Uranium or thorium ores and physical or chemical concentrates of those ores.

(ii) Uranium metal or natural thorium metal, or alloys of these materials.

(iii) Materials of low radioactive concentration, if the average estimated radioactivity concentration does not exceed 0.001 millicurie per gram and the contribution from materials with an  $A_2$  value (see § 173.435) of less than 0.05 curie does not exceed one percent of the total radioactivity.

(iv) Objects of nonradioactive material externally contaminated with radioactive material, if the radioactive material is not readily dispersible and the surface contamination, when averaged over one square meter, does not exceed 0.0001 millicurie per square centimeter of radionuclides for which the  $A_2$  value is less than 0.05 or 0.001 millicurie per square centimeter of other radionuclides. Such objects must be suitably wrapped or enclosed.

(2) Bulk liquids must be transported in the following: (1) Specification 103CW, 111A60W7 (§§ 179.200, 179.201, 179.202 of this subchapter) tank cars. Bottom openings in tanks prohibited.

(1) Specification MC 310, MC 311, MC 312, or MC 331 (§ 178.343 or § 178.337 of this subchapter) cargo tanks. Authorized only where the radioactivity concentration does not exceed 10 percent of the specified low specific activity levels (see § 173.403(n)). The requirements of § 173.412(n) do not apply to these cargo tanks. Bottom fittings and valves are not authorized. Trailer-on-flat-car service is not authorized.

(3) External radiation levels must comply with § 173.441(b).

(4) Shipments must be loaded by the consignor, and unloaded by the consignee from the conveyance or freight container in which originally loaded.

(5) Except for shipments of unconcentrated uranium or thorium ores, the transport vehicle must be placarded with the placards prescribed in Subpart F of Part 172 of this subchapter, as appropriate.

(6) There must be no leakage of radioactive materials from the vehicle.

(7) Specific instructions for maintenance of exclusive use shipment controls must be provided by the shipper to the carrier. Such instructions must be included with the shipping paper information.

(8) Transportation by aircraft is prohibited.

(d) Except for transportation by aircraft, low specific activity material that conforms with the provisions specified in 10 CFR 20.306 is excepted from all requirements of this subchapter pertaining to radio-active materials when offered for transportation for disposal or recovery. A material which meets the definition of another hazard class is subject to the provisions of this subchapter relating to that hazard class.

(The information collection requirements contained in paragraph (b)(9) were approved by the Office of Management and Budget under control number 2137-0536. The information collection requirements contained in paragraph (c)(7) were approved by the Office of Management and Budget under control number 2137-0534)

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

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended by Amdt. 173-162, 48 FR 31218, July 7, 1983; Amdt. 173-178, 49 FR 38134, Sept. 27, 1984; Amdt. 173-188, 50 FR 23813, June 6, 1985]

§ 173.427 Empty radioactive materials packaging.

A packaging which previously contained radioactive materials and has been emptied of contents as far as practical, is excepted from the shipping paper and certification, marking and labeling requirements of this sub-

chapter, and from requirements of this subpart, provided that:

(a) It complies with the requirements of § 173.421 (b), (c), and (e);

(b) The packaging is in unimpaired condition and is securely closed so that there will be no leakage of radioactive material under conditions normally incident to transportation;

(c) Internal contamination does not exceed 100 times the limits in § 173.443;

(d) Any labels previously applied in conformance with Subpart E of Part 172 of this subchapter are removed, obliterated or covered and the "Empty" label prescribed in § 172.450 is affixed to the packaging; and

(e) The packaging is prepared for shipment as specified in § 173.421-1.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended by Amdt. 173-196, 51 FR 5973, Feb. 18, 1986; Amdt. 173-204, 52 FR 36672, Sept. 30, 1987]

§ 173.431 Activity limits for Type A and Type B packages.

(a) A Type A package shall not contain a quantity of radioactivity greater than  $A_1$  (for special form radioactive material) or  $A_2$  (for normal form radioactive material) as listed in § 173.435, or for radioactive materials not listed in § 173.435, as determined in accordance with § 173.433.

(b) The limits on activity contained in a Type B, Type B(U), or Type B(M) package are those prescribed in § 173.416 or in the applicable approval certificate under § 173.471 or § 173.473.

[Amdt. 173-162, 48 FR 31218, July 7, 1983]

§ 173.433 Requirements for determination of  $A_1$  and  $A_2$  values for radionuclides.

(a) *Single radionuclides.* (1) For single radionuclides of known identity, the values of  $A_1$  and  $A_2$  are those given in the table in § 173.435. The values of  $A_1$  and  $A_2$  are also applicable for radionuclides contained in ( $\alpha, n$ ) or ( $\gamma, n$ ) neutron sources.

(2) For any single radionuclide of known identity, which is not listed in § 173.435, the values of  $A_1$  and  $A_2$  shall be determined in accordance with the following:

(i) If the radionuclide emits only one type of radiation,  $A_1$  is determined in accordance with paragraphs (a)(2)(i)

(A), (B), (C), and (D) of this section. For radionuclides emitting different kinds of radiation,  $A_1$  is the most restrictive value of those determined for each kind of radiation. However, in both cases,  $A_1$  is restricted to a maximum of 1000 curies. If a parent nuclide decays into a shorter lived daughter, of a half-life not greater than 10 days,  $A_1$  is calculated for both the parent and the daughter, and the more limiting of the two values is assigned to the parent nuclide.

(A) For gamma emitters,  $A_1$  is determined by the expression:  $A_1 = 9/\Gamma$  curie

where  $\Gamma$  is the gamma-ray constant, corresponding to the dose in roentgens per hour at 1 meter per curie; the number 9 results from the choice of 1 rem per hour at a distance of 3 meters as the reference dose-equivalent rate.

(B) For x-ray emitters,  $A_1$  is determined by the atomic number (Z) of the nuclide:

$Z < 55 \quad A_1 = 1000$  curies  
for  $Z > 55 \quad A_1 = 200$  curies

(C) For beta emitters,  $A_1$  is determined by the maximum beta energy ( $E_{max}$ ) according to Table 8:

TABLE 8— $A_1$  FOR BETA EMITTERS

$E_{max}$ (MeV)	$A_1$ (curies)
<0.5	1000
0.5-<1.0	300
1.0-<1.5	100
1.5-<2.0	30
>2.0	10

(D) For alpha emitters,  $A_1$  is determined by the expression:

$A_1 = 1000 A_2$

where  $A_2$  is the value listed in Table 9:

TABLE 9— $A_2$  VALUES

$A_2$			
Atomic number	Half-life less than 1,000 days	Half-life 1,000 days to 10 <sup>5</sup> years	Half-life greater than 10 <sup>5</sup> years
1 to 81.....	3 curies .....	50 millicuries.....	3 curies.
82 and above.	2 millicuries.....	2 millicuries.....	3 curies.

(ii) For assignment of  $A_2$  values,  $A_2$  is the more restrictive of the following values:

- (A) The corresponding  $A_1$ .
- (B) The value  $A_2$  obtained from Table 9.

(3) For any single radionuclide whose identity is unknown, the value of  $A_1$  is 2 curies and the value of  $A_2$  is 0.002 curies. However, if the atomic number of the radionuclide is less than 82, the value of  $A_1$  is 10 curies and the value of  $A_2$  is 0.4 curies.

(b) *Mixture of radionuclides, including radioactive decay chains.* (1) For mixed fission products, where a detailed analysis of the mixture is not carried out, the following activity limits apply:

- (i)  $A_1=10$  curies.
- (ii)  $A_2=0.4$  curies.

(2) A single radioactive decay chain is considered to be a single radionuclide when the radionuclides are present in their naturally occurring portions and no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide. The activity to be taken into account and the  $A_1$  or  $A_2$  value to be applied are those corresponding to the parent nuclide of that chain. When calculating  $A_1$  or  $A_2$  values, radiation emitted by daughters must be taken into account. However, in the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and daughter nuclides are considered to be mixtures of different nuclides.

(3) In the case of a mixture of different radionuclides, where the identity and activity of each radionuclide is known, the permissible activity of each radionuclide  $R_1, R_2, \dots R_n$  must be such that  $F_1 + F_2 + \dots F_n$  is not greater than unity, when—

$$F_1 = \frac{\text{Total activity of } R_1}{A_1(R_1)}$$

$$F_2 = \frac{\text{Total activity of } R_2}{A_1(R_2)}$$

$$F_n = \frac{\text{Total activity of } R_n}{A_1(R_n)}$$

Where  $A_1 (R_1, R_2 \dots R_n)$  is the value of  $A_1$  or  $A_2$  as appropriate for the nuclide  $R_1, R_2 \dots R_n$ .

(4) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the formula given in subparagraph (3) of this paragraph must be applied to establish the values of  $A_1$  or  $A_2$  as appropriate. All the radionuclides whose individual activities are not known (but whose total activity is known) must be classed in a single group and the most restrictive value of  $A_1$  or  $A_2$  applicable to any one of them shall be used as the value of  $A_1$  and  $A_2$  in the denominator of the fraction.

(5) When the identity of each radionuclide is known but the individual activity of the radionuclides is not known, the most restrictive value of  $A_1$  or  $A_2$  applicable to any one of the radionuclides present is the applicable value.

(6) When the identity of the radionuclides is not known, the value of  $A_1$  is 2 curies and the value of  $A_2$  is 0.002 curies. However, if alpha emitters are known to be absent, the value of  $A_2$  is 0.4 curies.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983; 48 FR 13432, Mar. 31, 1983, as amended at 48 FR 31218, July 7, 1983; Amdt. 173-185, 50 FR 11055, Mar. 19, 1985]

§ 173.434 Activity-mass relationships for uranium and natural thorium.<sup>1</sup>

Radioactive material	Curies per gram	Grams per curie
Uranium—(Wt% <sup>235</sup> U present):		
0.45.....	$5.0 \times 10^{-7}$	$2.0 \times 10^6$
0.72 (natural).....	$7.08 \times 10^{-7}$	$1.42 \times 10^6$
1.0.....	$7.6 \times 10^{-7}$	$1.3 \times 10^6$
1.5.....	$1.0 \times 10^{-6}$	$1.0 \times 10^6$
5.0.....	$2.7 \times 10^{-6}$	$3.7 \times 10^5$
10.0.....	$4.8 \times 10^{-6}$	$2.1 \times 10^5$
20.0.....	$1.0 \times 10^{-5}$	$1.0 \times 10^5$
35.0.....	$2.0 \times 10^{-5}$	$5.0 \times 10^4$
50.0.....	$2.5 \times 10^{-5}$	$4.0 \times 10^4$
90.0.....	$5.8 \times 10^{-5}$	$1.7 \times 10^4$
93.0.....	$7.0 \times 10^{-5}$	$1.4 \times 10^4$
95.0.....	$9.1 \times 10^{-5}$	$1.1 \times 10^4$

Radioactive material	Curies per gram	Grams per curie
Natural thorium.....	$2.2 \times 10^{-7}$	$4.6 \times 10^6$

<sup>1</sup> The figures for uranium include representative values for the activity of uranium-234 which is concentrated during the enrichment process. The activity for thorium includes the equilibrium concentration of thorium-228.

§ 173.435 Table of A<sub>1</sub> and A<sub>2</sub> values for radionuclides.

Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (C <sub>1</sub> ) special form	A <sub>2</sub> (C <sub>2</sub> ) normal form	Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (C <sub>1</sub> ) special form	A <sub>2</sub> (C <sub>2</sub> ) normal form
227 <sub>Ac</sub> .....	Actinium (89).	1000	0.003	248 <sub>Cf</sub> .....	Californium (98).	2	0.002
228 <sub>Ac</sub> .....		10	4	250 <sub>Cf</sub> .....		7	0.007
105 <sub>Ag</sub> .....	Silver (47).....	40	40	252 <sub>Cf</sub> .....		2	0.009
110 <sub>mAg</sub> .....		7	7	36 <sub>Cl</sub> .....	Chlorine (17).	300	10
111 <sub>Ag</sub> .....		100	20	38 <sub>Cl</sub> .....		10	10
241 <sub>Am</sub> .....	Americium (95) <sup>1</sup> .	8	0.008	242 <sub>Cm</sub> .....	Curium (96).....	200	0.2
243 <sub>Am</sub> .....		8	0.008	243 <sub>Cm</sub> .....		9	0.009
37 <sub>Ar</sub> .....	Argon (18).....	1000	1000	244 <sub>Cm</sub> .....		10	0.01
(compressed or uncompressed).				245 <sub>Cm</sub> .....		6	0.006
41 <sub>Ar</sub> .....		20	20	246 <sub>Cm</sub> .....		6	0.006
(uncompressed).				58 <sub>Co</sub> .....	Cobalt (27).....	5	5
41 <sub>As</sub> .....		1	1	57 <sub>Co</sub> .....		80	80
(compressed).				58 <sub>mCo</sub> .....		1000	1000
73 <sub>As</sub> .....	Arsenic (33).....	1000	400	58 <sub>Co</sub> .....		20	20
74 <sub>As</sub> .....		20	20	60 <sub>Co</sub> .....		7	7
76 <sub>As</sub> .....		10	10	51 <sub>Cr</sub> .....	Chromium (24).	600	600
77 <sub>As</sub> .....		300	20	129 <sub>Cs</sub> .....	Cesium (55).....	40	40
211 <sub>At</sub> .....	Astatine (85).	200	7	131 <sub>Cs</sub> .....		1000	1000
193 <sub>Au</sub> .....	Gold (79).....	200	200	134 <sub>mCs</sub> .....		1000	10
196 <sub>Au</sub> .....		30	30	134 <sub>Cs</sub> .....		10	10
198 <sub>Au</sub> .....		40	20	135 <sub>Cs</sub> .....		1000	25
199 <sub>Au</sub> .....		200	25	136 <sub>Cs</sub> .....		7	7
131 <sub>Ba</sub> .....	Barium (56).....	40	40	137 <sub>Cs</sub> .....		30	10
133 <sub>Ba</sub> .....		40	10	64 <sub>Cu</sub> .....	Copper (29).....	80	25
140 <sub>Ba</sub> .....		20	20	67 <sub>Cu</sub> .....		200	25
7 <sub>Be</sub> .....	Beryllium (4).	300	300	165 <sub>Dy</sub> .....	Dysprosium (66).	100	20
206 <sub>Bi</sub> .....	Bismuth (83).	5	5	166 <sub>Dy</sub> .....		1000	200
207 <sub>Bi</sub> .....		10	10	169 <sub>Dy</sub> .....	Erbium (68).....	1000	25
210 <sub>Bi</sub> (m,β).....		100	4	171 <sub>Er</sub> .....		50	20
212 <sub>Bi</sub> .....		6	6	152 <sub>mEu</sub> .....	Europium (63).	30	30
249 <sub>Bk</sub> .....	Berkelium (97).	1000	1	152 <sub>Eu</sub> .....		20	10
77 <sub>Br</sub> .....	Bromine (35).	70	25	154 <sub>Eu</sub> .....		10	5
82 <sub>Br</sub> .....		6	6	155 <sub>Eu</sub> .....		400	60
11 <sub>C</sub> .....	Carbon (6).....	20	20	18 <sub>F</sub> .....	Fluorine (9).....	20	20
14 <sub>C</sub> .....		1000	60	52 <sub>Fe</sub> .....	Iron (26).....	5	5
45 <sub>Ca</sub> .....	Calcium (20).	1000	25	55 <sub>Fe</sub> .....		1000	1000
47 <sub>Ca</sub> .....		20	20	59 <sub>Fe</sub> .....		10	10
109 <sub>Cd</sub> .....	Cadmium (48).	1000	70	67 <sub>Ga</sub> .....	Gallium (31).....	100	100
115 <sub>mCd</sub> .....		30	30	69 <sub>Ga</sub> .....		20	20
115 <sub>Ca</sub> .....		80	20	72 <sub>Ga</sub> .....		7	7
139 <sub>Ce</sub> .....	Cerium (58).....	100	100	153 <sub>Gd</sub> .....	Gadolinium (64).	200	100
141 <sub>Ce</sub> .....		300	25	159 <sub>Gd</sub> .....		300	20
143 <sub>Ce</sub> .....		60	20	69 <sub>Ge</sub> .....	Germanium (32).	20	10
144 <sub>Ce</sub> .....		10	7	71 <sub>Ge</sub> .....		1000	1000
				3 <sub>H</sub> .....	Hydrogen (1) See T-Tritium.		
				181 <sub>Hf</sub> .....	Hafnium (72).	30	25
				197 <sub>mHg</sub> .....	Mercury (80).	200	200
				197 <sub>Hg</sub> .....		200	200

Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (C <sub>1</sub> ) special form	A <sub>2</sub> (C <sub>2</sub> ) normal form	Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (C <sub>1</sub> ) special form	A <sub>2</sub> (C <sub>2</sub> ) normal form
203 <sub>Hg</sub>		80	25	63 <sub>Mn</sub>		1000	100
166 <sub>Ba</sub>	Barium (56)	30	30	65 <sub>Mn</sub>		10	10
123 <sub>I</sub>	Iodine (53)	50	50	237 <sub>Np</sub>	Neptunium (93)	5	0.005
125 <sub>I</sub>		1000	70	239 <sub>Np</sub>		200	25
126 <sub>I</sub>		40	10	185 <sub>Os</sub>	Osmium (76)	20	20
128 <sub>I</sub>		1000	2	191 <sub>Os</sub>		600	200
131 <sub>I</sub>		40	10	191 <sub>Os</sub>		200	200
132 <sub>I</sub>		7	7	193 <sub>Os</sub>		100	20
133 <sub>I</sub>		30	10	32 <sub>P</sub>	Phosphorus (15)	30	30
134 <sub>I</sub>		8	8	230 <sub>Pa</sub>	Protactinium (91)	20	0.8
135 <sub>I</sub>		10	10	231 <sub>Pa</sub>		2	0.002
111 <sub>In</sub>	Indium (49)	30	25	233 <sub>Pa</sub>		100	100
113m <sub>In</sub>		60	60	201 <sub>Pb</sub>	Lead (82)	20	20
114m <sub>In</sub>		30	20	210 <sub>Pb</sub>		100	0.2
115m <sub>In</sub>		100	20	212 <sub>Pb</sub>		6	5
180 <sub>Ir</sub>	Iridium (77)	10	10	103 <sub>Pd</sub>	Palladium (46)	1000	700
192 <sub>Ir</sub>		20	10	109 <sub>Pd</sub>		100	20
194 <sub>Ir</sub>		10	10	147 <sub>Pm</sub>	Promethium (61)	1000	25
42 <sub>K</sub>	Potassium (19)	10	10	149 <sub>Pm</sub>		100	20
43 <sub>K</sub>		20	10	210 <sub>Po</sub>	Polonium (84)	200	0.2
85m <sub>Kr</sub> (uncompressed)	Krypton (36)	100	100	142 <sub>Pr</sub>	Praseodymium (59)	10	10
85m <sub>Kr</sub> (compressed)		3	3	143 <sub>Pr</sub>		300	20
85 <sub>Kr</sub> (uncompressed)		1000	1000	191 <sub>Pt</sub>	Platinum (78)	100	100
85 <sub>Kr</sub> (compressed)		5	5	193m <sub>Pt</sub>		200	200
87 <sub>Kr</sub> (uncompressed)		20	20	197m <sub>Pt</sub>		300	20
87 <sub>Kr</sub> (compressed)		0.6	0.6	197 <sub>Pt</sub>		300	20
140 <sub>La</sub>	Lanthanum (57)	30	30	238 <sub>Pu</sub>	Plutonium (84) <sup>1</sup>	3	0.003
L&A	Low specific activity material—see § 173.403.			239 <sub>Pu</sub>		2	0.002
177 <sub>La</sub>	Lutetium (71)	300	25	240 <sub>Pu</sub>		2	0.002
232 <sub>U</sub>	Mixed fission products	10	0.4	241 <sub>Pu</sub>		1000	0.1
28 <sub>Mg</sub>	Magnesium (12)	6	6	242 <sub>Pu</sub>		3	0.003
52 <sub>Mn</sub>	Manganese (25)	5	5	223 <sub>Ra</sub>	Radium (88)	50	0.2
54 <sub>Mn</sub>		20	20	224 <sub>Ra</sub>		6	0.6
56 <sub>Mn</sub>		5	5	226 <sub>Ra</sub>		10	0.05
89 <sub>Mo</sub>	Molybdenum (42)	100	20	228 <sub>Ra</sub>		10	0.05
13 <sub>N</sub>	Nitrogen (7)	20	10	81 <sub>Rb</sub>	Rubidium (37)	30	25
22 <sub>Na</sub>	Sodium (11)	8	8	86 <sub>Rb</sub>		30	30
24 <sub>Na</sub>		5	5	87 <sub>Rb</sub>		Unlimited	Unlimited
93m <sub>Nb</sub>	Niobium (41)	1000	200	186 <sub>Rb</sub>	Rhenium (75)	100	20
95 <sub>Nb</sub>		20	20	187 <sub>Rb</sub>		Unlimited	Unlimited
97 <sub>Nb</sub>		20	20	188 <sub>Rb</sub>		10	10
147 <sub>Nd</sub>	Neodymium (60)	100	20	103m <sub>Rh</sub>	Rhodium (45)	1000	1000
149 <sub>Nd</sub>		30	20	105 <sub>Rh</sub>		200	26
59 <sub>Ni</sub>	Nickel (28)	1000	800	222 <sub>Rn</sub>	Radon (86)	10	2
				97 <sub>Ru</sub>	Ruthenium (44)	80	80
				106 <sub>Ru</sub>		10	7
				35 <sub>S</sub>	Sulphur (16)	1000	60
				122 <sub>Sb</sub>	Antimony (51)	30	30
				124 <sub>Sb</sub>		5	5
				125 <sub>Sb</sub>		40	25
				46 <sub>Sc</sub>	Scandium (21)	8	8

Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (C <sub>1</sub> ) special form	A <sub>2</sub> (C <sub>2</sub> ) normal form	Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (C <sub>1</sub> ) special form	A <sub>2</sub> (C <sub>2</sub> ) normal form
47 <sub>Se</sub>		200	20	204 <sub>Pb</sub>		300	10
48 <sub>Se</sub>		5	5	170 <sub>Tm</sub>	Thulium (69)	300	10
75 <sub>Se</sub>	Selenium (34)	40	40	171 <sub>Tm</sub>		1000	100
31 <sub>Al</sub>	Silicon (14)	100	20	230 <sub>U</sub>	Uranium (92)	100	0.1
147 <sub>Sa</sub>	Samarium (62)	Unlimited	Unlimited	232 <sub>U</sub>		30	0.03
151 <sub>Sa</sub>		1000	90	233 <sub>U</sub>		100	0.1
153 <sub>Sa</sub>		300	20	234 <sub>U</sub>		100	0.1
113 <sub>Sa</sub>	Tin (50)	60	60	235 <sub>U</sub>		100	0.2
119 <sub>Sa</sub>		100	100	236 <sub>U</sub>		200	0.2
125 <sub>Sa</sub>		10	10	238 <sub>U</sub>		Unlimited	Unlimited
85 <sub>Str</sub>	Strontium (38)	60	80			Unlimited	Unlimited
85 <sub>Str</sub>		30	30	U (natural)			
87 <sub>Str</sub>		50	50	U (enriched)			
89 <sub>Str</sub>		100	10	< 20%		Unlimited	Unlimited
90 <sub>Str</sub>		10	0.4			100	0.1
91 <sub>Str</sub>		10	10	20% or greater			
92 <sub>Str</sub>		10	10	U (depleted)		Unlimited	Unlimited
T (uncompressed)	Tritium (1)	1000	1000	U (irradiated) <sup>2</sup>			
T (compressed)		1000	1000	46 <sub>V</sub>	Vanadium (23)	6	6
T (activated luminous paint)		1000	1000	181 <sub>W</sub>	Tungsten (74)	200	100
T (adsorbed on solid carrier)		1000	1000	185 <sub>W</sub>		1000	25
T (tritiated water)		1000	1000	187 <sub>W</sub>		40	20
T (other forms)		20	20	127 <sub>Xe</sub> (uncompressed)	Xenon (54)	70	70
182 <sub>Ta</sub>	Tantalum (73)	20	20	127 <sub>Xe</sub> (compressed)		5	5
160 <sub>Tb</sub>	Terbium (65)	20	10	131 <sub>MXe</sub> (compressed)		10	10
98 <sub>Tc</sub>	Technetium (43)	1000	1000	131 <sub>MXe</sub> (uncompressed)		100	100
96 <sub>Tc</sub>		6	6	133 <sub>Xe</sub> (uncompressed)		1000	1000
97 <sub>Tc</sub>		1000	200	133 <sub>Xe</sub> (compressed)		5	5
97 <sub>Tc</sub>		1000	400	135 <sub>Xe</sub> (uncompressed)		70	70
99 <sub>Tc</sub>		100	100	135 <sub>Xe</sub> (compressed)		2	2
99 <sub>Tc</sub>		1000	25	135 <sub>Xe</sub> (uncompressed)			
125 <sub>Te</sub>	Tellurium (52)	1000	100	87 <sub>Y</sub>	Yttrium (39)	20	20
127 <sub>Te</sub>		300	20	89 <sub>Y</sub>		10	10
127 <sub>Te</sub>		300	20	91 <sub>Y</sub>		30	30
128 <sub>Te</sub>		30	10	91 <sub>Y</sub>		30	30
129 <sub>Te</sub>		100	20	92 <sub>Y</sub>		10	10
131 <sub>Te</sub>		10	10	92 <sub>Y</sub>		10	10
132 <sub>Ta</sub>		7	7	93 <sub>Y</sub>		10	10
227 <sub>Th</sub>	Thorium (90)	200	0.2	169 <sub>Yb</sub>	Ytterbium (70)	80	80
228 <sub>Th</sub>		6	0.008	176 <sub>Yb</sub>		400	25
230 <sub>Th</sub>		3	0.003	65 <sub>Zn</sub>	Zinc (30)	30	30
231 <sub>Th</sub>		1000	25	68 <sub>Zn</sub>		40	20
232 <sub>Th</sub>		Unlimited	Unlimited	69 <sub>Zn</sub>		300	20
234 <sub>Th</sub>		10	10	83 <sub>Zr</sub>	Zirconium (40)	1000	200
<sup>Th</sup> (natural)		Unlimited	Unlimited	95 <sub>Zr</sub>		20	20
<sup>Th</sup> (irradiated) <sup>2</sup>							
201 <sub>Tl</sub>	Thallium (81)	20	20				
201 <sub>Tl</sub>		200	200				
202 <sub>Tl</sub>		40	40				

Symbol of radionuclide	Element and atomic number	A <sub>1</sub> (Ci) special form	A <sub>2</sub> (Ci) normal form
97 <sub>Zr</sub>		20	20

<sup>1</sup> For shipments solely within the United States the A<sub>1</sub> value is 20 curies for americium and plutonium contained in Am-Be or Pu-Be neutron sources or in nuclear-powered pacemakers.

<sup>2</sup> The values of A<sub>1</sub> and A<sub>2</sub> must be calculated in accordance with the procedure specified in § 173.433 of this subchapter, taking into account the activity of the fission products and of the uranium-233 in addition to that of the thorium.

<sup>3</sup> The values of A<sub>1</sub> and A<sub>2</sub> must be calculated in accordance with the procedure specified in § 173.433 of this subchapter, taking into account the activity of the fission products and plutonium isotopes in addition to that of the uranium.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983; 48 FR 13432, Mar. 31, 1983, as amended at 48 FR 31219, July 7, 1983]

§ 173.441 Radiation level limitations.

(a) Except as provided in paragraph (b) of this section, each package of radioactive materials offered for transportation shall be designed and prepared for shipment so that under conditions normally incident to transportation the radiation level does not exceed 200 millirem per hour at any point on the external surface of the package, and the transport index does not exceed 10.

(b) A package which exceeds the radiation level limits specified in paragraph (a) of this section shall be transported by exclusive use shipment only and the radiation levels for such shipment must not exceed the following during transportation:

(1) 200 millirem per hour (2 millisievert per hour) on the external surface of the package unless the following conditions are met, in which case the limit is 1000 millirem per hour (10 millisievert per hour).

(i) The shipment is made in a closed transport vehicle;

(ii) The package is secured within the vehicle so that its position remains fixed during transportation; and

(iii) There are no loading or unloading operations between the beginning and end of the transportation;

(2) 200 millirem per hour (2 millisievert per hour) at any point on the outer surfaces of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load (or enclosure is used), and on the lower external surface of the vehicle;

(3) 10 millirem per hour (0.1 millisievert per hour) at any point 2 meters (6.6 feet) from the outer lateral sur-

faces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point 2 meters (6.6 feet) from the vertical planes projected by the outer edges of the vehicle (excluding the top and underside of the vehicle); and

(4) 2 millirem per hour (0.02 millisievert per hour) in any normally occupied space, except that this provision does not apply to private carriers if exposed personnel under their control wear radiation dosimetry devices and operate under provisions of a State or Federally regulated radiation protection program.

(c) For shipments made under the provisions of paragraph (b) of this section, the shipper shall provide specific written instructions for maintenance of the exclusive use shipment controls to the carrier. The instructions shall be included with the shipping paper information.

(d) Packages exceeding the radiation level or transport index prescribed in paragraph (a) of this section shall not be transported by aircraft.

(e) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions which will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures.

(The information collection requirements contained in paragraph (c) were approved by the Office of Management and Budget under control number 2137-0536)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983; Amdt. 173-193, 50 FR 41898, Oct. 16, 1985]

§ 173.442 Thermal limitations.

Each package of radioactive material shall be designed, constructed, and loaded so that:

(a) The heat generated within the package because of the radioactive contents will not, at any time during transportation, affect the integrity of the package under conditions normally incident to transportation; and

(b) The temperature of the accessible external surfaces of the loaded package will not, assuming still air in the shade at an ambient temperature of 38° C (100° F), exceed either:

(1) 50° C (122° F) in other than an exclusive use shipment; or

(2) 82° C (180° F) in an exclusive use shipment.

§ 173.443 Contamination control.

(a) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for shipment shall be kept as low as practicable. The level of non-fixed radioactive contamination may be determined by wiping an area of 300 square centimeters of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements shall be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. Except as provided in paragraph (b) of this section, the amount of radioactivity measured on any single wiping material when averaged over the surface wiped shall not exceed the limits given in Table 10 at any time during transport. Other methods of assessment of equal or greater efficiency may be used. When other methods are used the detection efficiency of the method used shall be taken into account and in no case shall the non-fixed contamination on the external surfaces of the package exceed ten times the limits listed in Table 10.

TABLE 10—REMOVABLE EXTERNAL RADIOACTIVE CONTAMINATION—WIPE LIMITS

Contaminant	Maximum permissible limits	
	uCi/cm <sup>2</sup>	dpm/cm <sup>2</sup>
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than ten days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical concentrates.....	10 <sup>-5</sup>	22
All other alpha emitting radionuclides.....	10 <sup>-6</sup>	2.2

(b) Except as provided in paragraph (d) of this section, in the case of packages transported as exclusive use shipments by rail or public highway only, the removable (non-fixed) radioactive contamination on any package at any time during transport shall not exceed ten times the levels prescribed in paragraph (a) of this section. The levels at the beginning of transport shall not exceed the levels prescribed in paragraph (a) of this section.

(c) Except as provided in paragraph (d) of this section, each transport vehicle used for transporting radioactive materials as an exclusive use shipment which utilizes the provisions of paragraph (b) of this section shall be surveyed with appropriate radiation detection instruments after each use. A vehicle shall not be returned to service until the radiation dose rate at each accessible surface is 0.5 millirem per hour or less, and there is no significant removable (non-fixed) radioactive surface contamination as specified in paragraph (a) of this section.

(d) Paragraph (b) and (c) of this section do not apply to any closed transport vehicle used solely for the transportation by public highway of radioactive material packages with contamination levels that do not exceed 10 times the levels prescribed in paragraph (a) of this section if:

(1) A survey of the interior surfaces of the empty vehicle shows that the radiation dose rate at any point does not exceed 10 millirem per hour at the surface or 2 millirem per hour at 1 meter (3.3 feet) from the surface;

(2) Each vehicle is stenciled with the words "For Radioactive Materials Use

Only" in letters at least 76 millimeters (3 inches) high in a conspicuous place on both sides of the exterior of the vehicle; and

(3) Each vehicle is kept closed except for loading or unloading.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

§ 173.444 Labeling requirements.

Each package of radioactive materials, unless excepted by § 173.421, § 173.422, § 173.424, § 173.425(b), or § 173.427 shall be labeled as provided in Subpart E of Part 172 of this subchapter.

§ 173.446 Placarding requirements.

See Subpart F of Part 172 of this subchapter.

§ 173.447 Storage incident to transportation—general requirements.

The following requirements apply to temporary storage during the course of transportation but not to Nuclear Regulatory Commission or Agreement State licensed facilities or U.S. Government owned or contracted facilities.

(a) The number of packages bearing Radioactive Yellow II or Radioactive Yellow III labels stored in any one storage area, such as a transit area, terminal building, store-room, or assembly yard, shall be limited so that the sum of the transport indexes in any individual group of packages does not exceed 50. Groups of these packages must be stored so as to maintain a spacing of at least 6 meters (20 feet) from other groups of packages containing radioactive materials.

(b) Mixing of different kinds of packages, including Fissile Class I packages with Fissile Class II packages, is authorized in accordance with § 173.459 of this subchapter.

§ 173.448 General transportation requirements.

(a) Each shipment of radioactive materials shall be secured in order to prevent shifting during normal transportation conditions.

(b) Except as may be specifically required by the competent authority in the applicable certificate, a package of

radioactive materials may be carried among packaged general cargo without special stowage provisions, if:

(1) The heat output in watts does not exceed 0.1 times the minimum package dimension in centimeters; or

(2) The average surface heat flux of the package does not exceed 15 watts per square meter and the immediately surrounding cargo is not in sacks or bags or otherwise in a form that would seriously impede air circulation for heat removal.

(c) Packages bearing labels prescribed in § 172.403 of this subchapter may not be carried in compartments occupied by passengers, except in those compartments exclusively reserved for couriers accompanying those packages.

(d) Mixing of different kinds of packages, including Fissile Class I packages with Fissile Class II packages, is authorized in accordance with § 173.459.

(e) No person shall offer for transportation aboard a passenger-carrying aircraft any single package with a transport index greater than 3.0 or an overpack with a transport index greater than 3.0.

(f) No person shall offer for transportation aboard a passenger-carrying aircraft any radioactive material unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

(g) If an overpack is used to consolidate individual packages of radioactive materials, the packages shall comply with the packaging, marking, and labeling requirements of this subchapter, and the following:

(1) The overpack shall be labeled as prescribed in § 172.403 of this subchapter except as follows:

(i) the "contents" entry on the label may state "mixed" unless each inside package contains the same radionuclide(s).

(ii) The "activity" entry on the label must be determined by adding together the number of curies of the radioactive materials packages contained therein.

(iii) For a non-rigid overpack, the required label together with required package markings shall be affixed to the overpack by means of a securely

attached, durable tag. The transport index shall be determined by adding together the transport indexes of the radioactive materials packages contained therein.

(iv) For a rigid overpack, the transport index shall be determined by:

(A) Adding together the transport indexes of the radioactive materials packages contained in the overpack; or

(B) Except for fissile radioactive materials, direct measurements as prescribed in § 173.403(bb) which have been taken by the person initially offering the packages contained within the overpack for shipment.

(2) The overpack shall be marked as prescribed in Subpart D of Part 172 of this subchapter and § 173.25(a).

(3) The transport index of the overpack shall not exceed 3.0 for passenger-carrying aircraft shipments, or 10.0 for cargo-aircraft only shipments.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended by Amdt. 173-167, 48 FR 30138, June 30, 1983; Amdt. 173-162, 48 FR 31219, July 7, 1983; Amdt. 173-16, 48 FR 50461, Nov. 1, 1983; Amdt. 173-187, 50 FR 21051, May 22, 1985]

§ 173.451 Fissile materials—general requirements.

(a) Except as provided in § 173.453, each package containing fissile radioactive materials must comply with §§ 173.451 through 173.459.

§ 173.453 Fissile materials—exceptions.

The requirements of §§ 173.451 through 173.459 do not apply to:

(a) A package containing not more than 15 grams of fissile radionuclides. If the material is transported in bulk, the quantity limitation applies to the conveyance;

(b) A package containing irradiated natural or depleted uranium including the products of irradiation if the irradiation has taken place only in the thermal reactor;

(c) A package containing homogeneous solutions or mixtures where:

(1) The minimum ratio of the number of hydrogen atoms to the number of atoms of fissile radionuclides (H/X) is 5200;

(2) The maximum concentration of fissile radionuclides is 5 grams per liter; and

(3) The maximum mass of fissile radionuclides in the package is 500 grams, except for a mixture where the total mass of plutonium and uranium-233 does not exceed 1% of the mass of uranium-235 the limit is 800 grams. If the material is transported in bulk, the quantity limitations apply to the conveyance;

(d) A package containing uranium enriched in uranium-235 to a maximum of 1% by weight, and with a total plutonium and uranium-233 content of up to 1% of the mass of uranium-235, if the fissile radionuclides are distributed homogeneously throughout the package contents, and do not form a lattice arrangement within the package;

(e) A package containing any fissile material if it does not contain more than 5 grams of fissile radionuclides in any 10-liter volume, and if the material is packaged so as to maintain this limit of fissile radionuclide concentration during normal transport;

(f) A package containing not more than one kilogram of plutonium of which not more than 20% by mass may consist of plutonium-239, plutonium-241, or any combination of those radionuclides;

(g) A package containing liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2% by weight, with total plutonium and uranium-233 not more than 0.1% of the mass of uranium-235; or

(h) A package containing thorium or uranium with not more than 0.72% by weight of fissile material used for shipment solely within the United States.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

§ 173.455 Classification of fissile materials packages.

(a) Except as provided in § 173.453, each package of fissile materials shall be classified as follows:

(1) *Fissile Class I.* Packages that may be transported in unlimited number, and in any arrangement, and that require no nuclear criticality safety controls during transportation. A transport index is not assigned to Fissile Class I packages for the pur-

poses of nuclear criticality safety control, although, the external radiation levels may require a transport index number.

(2) *Fissile Class II*. Packages that may be transported together in any arrangement but in numbers that do not exceed an aggregate transport index of 50. For the purposes of nuclear criticality safety control, individual packages may have a transport index of not less than 0.1 and not more than 10. However, the external radiation levels may require a higher transport index number. These shipments require no nuclear criticality safety control by the shipper during transportation.

(3) *Fissile Class III*. Shipments of packages of fissile materials that do not meet the requirements of Fissile Class I or Fissile Class II and that are controlled in transportation as prescribed in § 173.457 by appropriate arrangements between the shipper and the carrier.

(b) The numerical values for package assignments as Fissile Class I, the transport indexes for Fissile Class II packages, and the conveyance and vehicle limitations for Fissile Class III shipments shall be determined in accordance with 10 CFR Part 71.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

#### § 173.457 Transportation of Fissile Class III shipments-specific requirements.

(a) Fissile Class III shipments shall incorporate transportation controls which are performed by the shipper or carrier, as appropriate, and which:

- (1) Provide nuclear criticality safety;
- (2) Protect against loading, storing, or transporting that shipment with any other fissile material; and
- (3) Include in the shipping papers the description required by § 172.203(d) of this subchapter.

(b) Fissile Class III shipments shall be transported:

(1) In a conveyance (transport vehicle if transported by public highway or rail) assigned to the exclusive use of the shipper with a specific restriction for the exclusive use to be provided in the appropriate arrangements between shipper and carrier and with instruc-

tions to that effect issued with the shipping papers;

(2) Except for shipments by aircraft, with an escort in a vehicle having the capability, equipment, authority, and instructions to provide administrative controls necessary to assure compliance with this section;

(3) In a conveyance (transport vehicle if transported by public highway or rail) containing no other packages of radioactive material that are required to bear one of the labels prescribed in § 172.403 of this subchapter. Specific arrangements must be made between the shipper and the carrier, with instructions to that effect issued with the shipping papers; or

(4) Under any other procedure specifically authorized by the Director, OHMT in accordance with Part 107 of this subchapter.

(The information collection requirements contained in paragraph (b) were approved by the Office of Management and Budget under control number 2137-0535)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

#### § 173.459 Mixing of fissile material packages.

Shipments of fissile materials packages and the commingling of fissile materials packages with other radioactive materials packages shall be in accordance with the provisions of this section.

(a) Mixing of fissile material packages with other types of radioactive materials, including Fissile Class I with Fissile Class II packages is authorized if the total transport index in any conveyance (transport vehicle if transported by public highway or rail) or storage location does not exceed 50.

(b) For Fissile Class II packages shipped under the exclusive use provisions of § 173.441(b), the transport index number which is calculated for nuclear criticality control purposes shall not exceed 10 for any single package nor a total of 50 for the conveyance (transport vehicle if transported by public highway or rail).

(c) Fissile Class II packages may be shipped with an external radiation level greater than 10 millirem per hour at 1 meter (3.3 feet), and com-

bined with other packages of the same or different designs in a Fissile Class III shipment, under the conditions prescribed in § 173.457, if:

(1) Each package in the shipment has been assigned a transport index for criticality control purposes in accordance with the Fissile Class II criteria;

(2) The transport index which has been assigned in the package approval for nuclear criticality control purposes does not exceed 10 for any single package;

(3) The total transport index for nuclear criticality control purposes does not exceed 100 for all packages in the shipment;

(4) The shipment complies with § 173.441(b); and

(5) The shipment is not transported by vessel.

(d) A Fissile Class III shipment of packages may be combined with other packages of the same or different design when each package has been assigned a transport index for nuclear criticality control purposes in accordance with Fissile Class II criteria, and may be combined with Fissile Class II packages into a Fissile Class III shipment under the conditions prescribed in § 173.457, if:

(1) The transport index which has been assigned in the package approval for nuclear criticality control purposes does not exceed 50 for any single package;

(2) The total transport index for nuclear criticality control purposes for all packages in the shipment does not exceed 100;

(3) The shipment satisfies the provisions of § 173.441(b) if any package has a radiation level exceeding 10 millirem per hour at 1 meter (3.3 feet) from any accessible external surface of the package; and

(4) The shipment is not transported by vessel.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

**§ 173.461 Demonstration of compliance with tests.**

(a) Compliance with the test requirements in §§ 173.463 through 173.469 shall be shown by any of the methods prescribed in this paragraph, or by a

combination of these methods appropriate for the particular feature being evaluated:

(1) By performance of tests with prototypes or samples of the packaging or special form material as normally presented for transportation, in which case the contents of the packaging for the test shall simulate as closely as practicable the expected normal radioactive contents. The use of non-radioactive substitute contents is encouraged provided that the results of the testing take into account the radioactive characteristics of the contents for which it is being tested;

(2) By reference to a previous, satisfactory demonstration of compliance of a sufficiently similar nature;

(3) By performance of tests with models of appropriate scale incorporating those features that are significant with respect to the item under investigation, when engineering experience has shown results of those tests to be suitable for design purposes. When a scale model is used, the need for adjusting certain test parameters, such as the penetrator diameter or the compressive load, must be taken into account; or

(4) By engineering evaluation or comparative data.

(b) With respect to the initial conditions for the tests under §§ 173.463 through 173.469, except for the water immersion tests, compliance shall be based upon the assumption that the package is in equilibrium at an ambient temperature of 38°C (100°F).

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

**§ 173.462 Preparation of specimens for testing.**

(a) Each specimen (i.e., sample, prototype or scale model) shall be examined before testing to identify and record faults or damage, including:

(1) Divergence from the specifications or drawings;

(2) Defects in construction;

(3) Corrosion or other deterioration; and

(4) Distortion of features.

(b) Any deviation found under paragraph (a) of this section from the specified design shall be corrected or

suitably taken into account in the subsequent evaluation.

(c) The containment system of the packaging shall be clearly specified.

(d) The external features of the specimen shall be clearly identified so that reference may be made to any part of it.

§ 173.463 Packaging and shielding—test-  
ing for integrity.

After each of the applicable tests specified in §§ 173.465 and 173.466, the integrity of the packaging, or of the packaging and its shielding, shall be retained to the extent required by § 173.412(m) for the packaging being tested.

§ 173.465 Type A packaging tests.

(a) The proposed packaging with proposed contents must be capable of withstanding the tests prescribed in this section. One prototype may be used for all tests if the requirements of paragraph (b) of this section are complied with.

(b) *Water spray test.* The water spray test must precede each test or test sequence prescribed in this section. The water spray test shall simulate exposure to rainfall of approximately 5 centimeters (2 inches) per hour for at least one hour. The time interval between the end of the water spray test and the beginning of the next test shall be such that the water has soaked-in to the maximum extent without appreciable drying of the exterior of the specimen. In the absence of evidence to the contrary, this interval may be assumed to be two hours if the water spray is applied from four different directions simultaneously. However, no time interval may elapse if the water spray is applied from each of the four directions consecutively.

(c) *Free drop test.* The free drop test consists of a fall onto the target in a manner that causes maximum damage to the safety features being tested, and:

(1) For packages weighing 5,000 kilograms (11,000) pounds) or less, the distance of the fall measured from the lowest point of the packaging to the upper surface of the target shall not be less than 1.2 meters (4 feet).

(2) For packages weighing more than 5,000 kilograms (11,000 pounds), the distance of the fall shall not be less than the distance specified in Table 11, for the applicable packaging weight:

TABLE 11—FREE-FALL DISTANCE FOR PACKAGINGS WEIGHING MORE THAN 5,000 KILOGRAMS

Packaging weight		Free-fall distance	
Kilograms	Pounds	Feet	Meters
>5,000 to 10,000 ....	>11,000 to 22,000 ..	3	0.9
>10,000 to 15,000 ..	>22,000 to 33,000 ..	2	0.6
More than 15,000 .....	More than 33,000 .....	1	0.3

(3) For Fissile Class II packagings, the free drop specified in subparagraph (1) or (2) of this paragraph shall be preceded by a free drop from a height of .3 meter (1 foot) on each corner. For cylindrical packagings, the .3 meter (1 foot) drop shall be onto each of the quarters of each rim.

(4) For fiberboard or wood rectangular packages not exceeding 50 kilograms (110 pounds) in weight, a separate specimen of the proposed packaging shall be subjected to a free drop onto each corner from a height of .3 meter (1 foot).

(5) For fiberboard cylindrical packages weighing not more than 100 kilograms (220 pounds) a separate specimen of the proposed packaging shall be subjected to a free drop onto each of the quarters of each rim from a height of .3 meter (1 foot).

(6) The target shall have a flat, horizontal surface of such mass and rigidity that any increase in its resistance to displacement or deformation upon impact by the specimen would not significantly increase the damage to the specimen.

(d) *Compression test.* The compression test shall last for a period of at least 24 hours and consists of a compressive load equivalent to the greater of the following:

(1) Five times the weight of the actual package; or

(2) 1300 kilograms per square meter (285 pounds per square foot) multiplied by the vertically projected area of the package. The compressive load

shall be applied uniformly to two opposite sides of the packaging specimen, one of which must be the base on which the package would normally stand.

(e) *Penetration test.* For the penetration test the packaging specimen shall be placed on a rigid, flat, horizontal surface that will not move while the test is being performed. The test shall consist of:

(1) A bar of 3.2 centimeters (1.25 inches) in diameter with a hemispherical end, weighing 6 kilograms (13.2 pounds) being dropped with its longitudinal axis vertical, onto the center of the weakest part of the packaging specimen, so that, if it penetrates far enough, it will hit the containment system. The bar must not be deformed by the test; and

(2) The distance of the fall of the bar measured from its lower end to the upper surface of the packaging specimen shall not be less than 1 meter (3.3 feet).

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983; Amdt. 173-16, 48 FR 50461, Nov. 1, 1983; Amdt. 173-196, 51 FR 5973, Feb. 18, 1986]

§ 173.466 Additional tests for Type A packagings designed for liquids and gases.

(a) In addition to the tests prescribed in § 173.465, Type A packagings designed for liquids and gases shall be capable of withstanding the following tests:

(1) *Free drop test.* The packaging specimen shall fall onto the target in a manner which will cause it to suffer the maximum damage to its containment. The distance of the fall measured from the lowest part of the packaging specimen to the upper surface of the target shall be not less than 9 meters (30 feet).

(2) *Penetration test.* The specimen must be subjected to the test specified in § 173.465(e) except that the distance of the fall shall be 1.7 meters (5.5 feet).

§ 173.467 Tests for demonstrating the ability of Type B and fissile radioactive materials packagings to withstand accident conditions in transportation.

Each Type B packaging or packaging for fissile material shall meet the test requirements prescribed in 10 CFR Part 71 for ability to withstand accident conditions in transportation.

§ 173.469 Tests for special form radioactive materials.

(a) Special form radioactive materials must meet the test requirements of paragraph (b) of this section. Each solid radioactive material or capsule specimen to be tested shall be manufactured or fabricated so that it is representative of the actual solid material or capsule which will be transported with the proposed radioactive content duplicated as closely as practicable. Any differences between the material to be transported and the test material such as the use of non-radioactive contents shall be taken into account. In addition:

(1) A different specimen may be used for each of the tests;

(2) The specimen must not break or shatter when subjected to the impact, percussion, or bending tests;

(3) The specimen must not melt or disperse when subjected to the heat test; and

(4) After each test, leaktightness or indispersibility of the specimen shall be determined by a method no less sensitive than the leaching assessment prescribed in paragraph (c) of this section. For a capsule resistant to corrosion by water, and which has an internal void volume greater than 0.1 milliliters, an alternative to the leaching assessment is a demonstration of leaktightness of  $10^{-4}$  torr-1/s ( $1.3 \times 10^{-4}$  atm-cm<sup>3</sup>/s) based on air at 25°C (77°F) and one atmosphere differential pressure for solid radioactive content, or  $10^{-6}$  torr-1/s ( $1.3 \times 10^{-6}$  atm-cm<sup>3</sup>/s) for liquid or gaseous radioactive content.

(b) Test methods. (1) Impact Test. The specimen must fall onto the target from a height of not less than 9 meter (30 feet). The target must be as specified in § 173.465(c)(6);

(2) Percussion Test. (1) The specimen shall be placed on a sheet of lead that

is supported by a smooth solid surface, and be struck by the flat face of a steel billet so as to produce an impact equivalent to that resulting from a free fall of 1.4 kilograms (3 pounds) through 1 meter (3.3 feet);

(ii) The flat face of the billet shall be 25 millimeters (1 inch) in diameter with the edges rounded off to a radius of 3 millimeters  $\pm 0.3$  millimeters (.12 inch  $\pm .012$  inch);

(iii) The lead shall be of a hardness within 3.5 to 4.5 on the Vickers scale, and not more than 25 millimeters (1 inch) thick, and shall cover an area greater than that covered by the specimen;

(iv) A fresh surface of lead shall be used for each impact; and

(v) The billet must strike the specimen in a manner that causes maximum damage.

(3) Bending test. (1) This test applies only to long, slender sources with a length of 10 centimeters (4 inches) or more and with a length at least 10 times the minimum width;

(ii) The specimen must be securely clamped in a horizontal position so that one half of its length protrudes from the face of the clamp;

(iii) The position of the specimen must be such that it will suffer maximum damage when its free end is struck by the flat face of a steel billet;

(iv) The billet must strike the specimen in a manner that produces an impact equivalent to that resulting from a free vertical fall of 1.4 kilograms (3 pounds) through 1 meter (3.3 feet); and

(v) The flat face of the billet must be 25 millimeters (1 inch) in diameter with the edges rounded off to a radius of 3 millimeters  $\pm 0.3$  millimeters (.12 inch  $\pm .012$  inch).

(4) Heat test. The specimen shall be heated in air to a temperature of not less than 800°C (1472°F), held at that temperature for a period of 10 minutes, and then allowed to cool.

(c) Leaching assessment methods. (1) For indispersible solid material—(i) The specimen shall be immersed for seven days in water at ambient temperature. The water must have a pH of 6–8 and a maximum conductivity of 10 micromho per centimeter at 20°C (68°F);

(ii) The water and specimen shall then be heated to a temperature of 50°C  $\pm 5^\circ$  (122°F  $\pm 9^\circ$ ) and maintained at this temperature for four hours;

(iii) The activity of the water shall then be determined;

(iv) The specimen shall then be stored for at least seven days in still air with humidity not less than 90 percent at 30°C (86°F);

(v) The specimen shall then be immersed in water with the same pH and maximum conductivity specifications as in subparagraph (1)(i) of this paragraph. The water and specimen must be heated to 50°C  $\pm 5^\circ$  (122°F  $\pm 9^\circ$ ) and maintained at that temperature for four hours;

(vi) The activity of the water shall then be determined. The activities determined in subparagraph (1)(iii) and this subparagraph shall not exceed 0.05 microcuries.

(2) For encapsulated material—(i) The specimen shall be immersed in water at ambient temperature. The water must have a pH of 6–8 and a maximum conductivity of 10 micromho per centimeter. The water and specimen shall be heated to a temperature of 50°C  $\pm 5^\circ$  (122°F  $\pm 9^\circ$ ) and maintained at this temperature for four hours;

(ii) The activity of the water shall then be determined;

(iii) The specimen shall then be stored for at least seven days in still air at a temperature not less than 30°C (86°F);

(iv) Step (i) shall be repeated; and

(v) The activity of the water shall be determined. The activities determined in paragraph (c)(2)(i) and this paragraph (c)(2)(v) shall not exceed 0.05 microcuries.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

§ 173.471 Requirements for U.S. Nuclear Regulatory Commission approved packages.

In addition to the applicable requirements of the U.S. Nuclear Regulatory Commission (USNRC) and Parts 171-177 of this subchapter, any shipper of a Type B, Type B(U), Type B(M), or fissile material package that has been approved by the USNRC in accord-

ance with 10 CFR Part 71 shall also comply with the following requirements:

(a) The shipper shall be registered with the USNRC as a party to the approval, and the shipment must be made in compliance with the terms of the approval;

(b) The outside of each package shall be durably and legibly marked with the package identification marking indicated in the USNRC approval;

(c) Each shipping paper related to the shipment of the package shall bear the package identification marking indicated in the USNRC approval;

(d) Before the first export shipment of the package, the shipper shall obtain a U.S. Competent Authority Certificate for that package design or if one has already been issued, the shipper shall register with the U.S. Competent Authority as a user of the certificate. Upon registration as a user of the certificate the shipper will be furnished with a copy of it. The shipper shall then submit a copy of the U.S. Competent Authority Certificate applying to that package design to the national competent authority of each country into or through which the package will be transported, unless a copy has already been furnished;

(e) The U.S. Competent Authority responsible for administering the requirements of Section VIII of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)," is the:

Research and Special Programs Administration, Office of Hazardous Materials Transportation (OHMT), U.S. Department of Transportation, Washington, D.C. 20590.

(f) Each request for a U.S. Competent Authority Certificate as required by the IAEA regulations shall be submitted in writing to the address set forth in paragraph (e) of this section. The request shall be in duplicate and include copies of the applicable USNRC approval and a reproducible drawing showing the make-up of the package. Each request is considered in the order in which it is received. To allow sufficient consideration by OHMT, requests should be received at least 45 days before the requested effective date; and

(g) Import and export shipments may be made in accordance with § 171.12 of this subchapter.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0512. The information collection requirements contained in paragraph (d) were approved under control number 2137-0515. The information collection requirements contained in paragraph (e) were approved under control number 2137-0514)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

#### § 173.472 Requirements for exporting DOT Specification Type B and fissile packages.

(a) Any shipper who exports a DOT Specification Type B or fissile material package authorized by § 173.416 or § 173.417 shall comply with paragraphs (b) through (f) of this section.

(b) The shipper shall register with the U.S. Competent Authority as a user of the appropriate U.S. Competent Authority Certificate and the shipment shall be made in accordance with the certificate;

(c) The outside of each package must be durably and legibly marked with the package identification marking indicated in the U.S. Competent Authority Certificate;

(d) Each shipping paper related to the shipment of the package must bear the package identification marking indicated in the U.S. Competent Authority Certificate;

(e) Before the first export shipment of the package, the shipper must submit a copy of the U.S. Competent Authority Certificate applying to that package design to the national competent authority of each country into or through which the package will be transported, unless a copy has already been furnished; and

(f) Import and export shipments may be made in accordance with § 171.12 of this subchapter.

(The information collection requirements contained in paragraphs (b) and (e) were approved by the Office of Management and Budget under control number 2137-0515)

**§ 173.473 Requirements for foreign-made packages.**

In addition to the applicable requirements of Parts 171 through 177 of this subchapter, each shipper of a foreign-made Type B, Type B(U), Type B(M), or fissile material package for which a competent authority certificate is required by the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)" shall also comply with the following requirements:

(a) Prior to the first shipment of such a package of radioactive materials into or from the U.S., the shipper shall:

(1) Have the foreign competent authority certificate revalidated by the U.S. Competent Authority, unless this has been done previously. The request must be in duplicate and contain all the information required by Section VIII of the IAEA regulations. Each request is considered in the order in which it is received. To allow sufficient consideration by OHMT, requests should be received at least 45 days before the requested effective date.

(2) Submit a copy in English of the foreign competent authority certificate with the request for revalidation;

(3) Register its identity in writing with the U.S. Competent Authority as a user of the package covered by the foreign competent authority certificate and its revalidation. If the shipper is requesting the revalidation, this is automatically done by OHMT; and

(4) Supply to the carrier, upon request, the applicable competent authority certificates. However, the competent authority certificates are not required to accompany the packages to which they apply.

(b) The outside of each package shall be durably and legibly marked with the same competent authority identification marking indicated on the competent authority certificate and revalidation;

(c) Each shipping paper for a shipment of radioactive materials shall bear a notation of the package identification marking indicated on the competent authority certificate or revalidation;

(d) All requirements of the foreign competent authority certificate and the U.S. Competent Authority revalidation shall be fulfilled; and

(e) Import and export shipments may be made in accordance with § 171.12 of this subchapter.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0517)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

**§ 173.474 Quality control for construction of packaging.**

(a) Prior to the first use of any packaging for the shipment of radioactive material, the shipper shall determine, that:

(1) The packaging meets the quality of design and construction requirements as specified in this subchapter; and

(2) The effectiveness of the shielding, containment, and, when required, the heat transfer characteristics of the package, are within the limits specified for the package design.

**§ 173.475 Quality control requirements prior to each shipment of radioactive materials.**

Before each shipment of any radioactive materials package, the shipper shall ensure by examination or appropriate tests, that:

(a) The packaging is proper for the contents to be shipped;

(b) The packaging is in unimpaired physical condition, except for superficial marks;

(c) Each closure device of the packaging, including any required gasket, is properly installed, secured, and free of defects;

(d) For fissile material, each moderator and neutron absorber, if required, is present and in proper condition;

(e) Each special instruction for filling, closing, and preparation of the packaging for shipment has been followed;

(f) Each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed;

(g) Each packaging containing liquid in excess of an  $A_2$  quantity and intended for air shipment has been tested to show that it will not leak under an ambient atmospheric pressure of not more than 0.25 atmosphere, absolute, (0.25 kilograms per square centimeter or 3.6 psia). The test must be conducted on the entire containment system, or on any receptacle or vessel within the containment system, to determine compliance with this requirement;

(h) The internal pressure of the containment system will not exceed the design pressure during transportation; and

(i) External radiation and contamination levels are within the allowable limits specified in this subchapter.

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

§ 173.476 Approval of special form radioactive materials.

(a) Each shipper of special form radioactive materials shall maintain on file for at least one year after the latest shipment, and provide to the RSPA on request, a complete safety analysis, including documentation of any tests, demonstrating that the special form material meets the requirements of § 173.469. An IAEA Certificate of Competent Authority issued for the special form material may be used to satisfy this requirement.

(b) Prior to the first export shipment of a special form radioactive material from the United States, each shipper shall obtain a Competent Authority Certificate for the specific material. For special form material manufactured outside the United States an IAEA Certificate of Component Authority from the country of origin may be used to meet this requirement. For special form materials manufactured in the United States each shipper shall obtain a U.S. Competent Authority Certificate for the specific material. Each petition for a U.S. Competent Authority Certificate shall be submitted in accordance with § 173.471(e) and must include the following information:

(1) A detailed description of the material or if a capsule, a detailed description of the contents. Particular

reference must be made to both physical and chemical states;

(2) If a capsule is to be used, a detailed statement of its design and dimensions, including complete engineering drawings and schedules of material, and methods of construction; and

(3) A statement of the tests that have been made and their results; evidence based on calculative methods to show that the material is able to pass the tests; or other evidence that the special form radioactive material complies with § 173.469.

(c) Paragraphs (a) and (b) of this section do not apply in those cases where  $A_1$  equals  $A_2$  and the material is not described on the shipping papers as "Radioactive Material, Special Form, n.o.s."

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0516. The information collection requirements contained in paragraph (b) were approved under control number 2137-0518)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31219, July 7, 1983]

§ 173.477 Approval for export shipments.

(a) Each export shipment of a package for which an IAEA certificate of competent authority has been issued or revalidated in accordance with §§ 173.471, 173.472, or 173.473 shall have multilateral approval, if the shipment includes:

- (1) A vented Type B(M) package;
- (2) A Type B(M) packaging containing radioactive materials with an activity greater than  $3 \times 10^3 A_1$ , or  $3 \times 10^3 A_2$ , as appropriate, or  $3 \times 10^4$  curies, whichever is less;
- (3) A Fissile Class III shipment; or
- (4) Transportation by special arrangement.

(b) Each application for shipment approval shall contain:

- (1) The period of time for which the approval is sought;
- (2) A description of the contents, the expected modes of transportation, the type of conveyance to be used, and the proposed route; and
- (3) An explanation of how the special precautions and special administrative and operational controls re-

ferred to in the package design certificates are to be put into effect.

(c) The packaging and shipment approvals may be combined into a single approval issued in accordance with §§ 173.471, 173.472 or 173.473.

(d) Approval by competent authorities is not required for packagings designed for materials covered by §§ 173.421 through 173.427 nor for Type A packagings designed for non-fissile radioactive materials.

(The information collection requirements contained in paragraph (b) were approved by the Office of Management and Budget under control number 2137-0532)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31220, July 7, 1983]

§ 173.478 Notification to competent authorities for export shipments.

(a) Before the first export shipment of any packaging with contents exceeding  $A_1$  or  $A_2$ , the shipper shall ensure that copies of each applicable competent authority certificate issued in accordance with § 173.471, § 173.472, or § 173.473 have been submitted to the competent authority of each country through which or into which it is to be transported. The shipper is not required to await an acknowledgment from the competent authority prior to shipping the radioactive material, nor is the competent authority required to acknowledge receipt of the certificate.

(b) For each of the shipments described in this paragraph, the shipper shall notify the competent authority of each country through which or into which the shipment is to be transported. This notification must be received by each competent authority at least 15 days before the shipment starts for the following:

(1) Type B(U) packagings containing radioactive materials with an activity greater than  $3 \times 10^3 A_1$ ,  $3 \times 10^3 A_2$ , as appropriate, or  $3 \times 10^4$  curies, whichever is the least;

(2) Type B(M) packages;

(3) Fissile Class III shipments under Section VIII of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1973 Revised Edition (as amended)"; or

(4) Transportation by special arrangements.

(c) The shipper notification must include:

(1) Sufficient information to enable the packaging to be identified, including all applicable certificate numbers and identification marks; and

(2) Information as to the date of shipment, the expected date of arrival, and the proposed routing.

(d) The shipper is not required to send a separate notification if the required information has been included in the application for shipment approval.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2137-0515. The information collection requirements contained in paragraphs (b) and (c) were approved under control number 2137-0532)

[Amdt. 173-162, 48 FR 10226, Mar. 10, 1983, as amended at 48 FR 31220, July 7, 1983]

**Subpart J—Other Regulated Material; Definition and Preparation**

SOURCE: Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, unless otherwise noted.

§ 173.500 Definitions.

(a) An Other Regulated Material (ORM) is a material that:

(1) May pose an unreasonable risk to health and safety or property when transported in commerce; and

(2) Does not meet any of the definitions of the other hazard classes specified in this subchapter, or

(3) Has been reclassified an ORM (specifically or permissively) according to this subchapter.

NOTE: There is no change in the applicability of Subparts K, L, and M of this Part for materials classed as ORM-A, B, or C when they are hazardous substances or hazardous wastes (see § 172.101(g)(1)).

(b) ORM's are divided into classes as follows:

(1) An ORM-A material is a material which has an anesthetic, irritating, noxious, toxic, or other similar property and which can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation.

(2) An ORM-B material is a material (including a solid when wet with

water) capable of causing significant damage to a transport vehicle from leakage during transportation. Materials meeting one or both of the following criteria are ORM-B materials:

(1) A liquid substance that has a corrosion rate exceeding 0.250 inch per year (IPY) on aluminum (nonclad 7075-T6) at a test temperature of 130° F. An acceptable test is described in NACE Standard TM-01-69.

(ii) Specifically designated by name in § 172.101 of this subchapter.

(3) An ORM-C material is a material which has other inherent characteristics not described as an ORM-A or ORM-B but which make it unsuitable for shipment, unless properly identified and prepared for transportation. Each ORM-C material is specifically named in § 172.101 of this subchapter.

(4) An ORM-D material is a material such as a consumer commodity which, though otherwise subject to the regulations of this subchapter, presents a limited hazard during transportation due to its form, quantity and packaging. They must be materials for which exceptions are provided in § 172.101 of this subchapter. A shipping description applicable to each ORM-D material or category of ORM-D materials is found in § 172.101 of this subchapter.

(5) An ORM-E is a material that is not included in any other hazard class, but is subject to the requirements of this subchapter. Materials in this class include:

(i) Hazardous waste.

(ii) Hazardous substances as defined in § 171.8 of this subchapter.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-137, 45 FR 34704, May 22, 1980; Amdt. 173-137, 45 FR 74669, Nov. 10, 1980; Amdt. 73-149, 46 FR 49905, Oct. 8, 1981]

#### § 173.505 Exceptions for Other Regulated Material (ORM).

(a) The following ORM's, unless otherwise provided by § 172.101 of this subchapter, are not subject to the requirements of this subchapter, except §§ 173.6, 173.21 and 173.24, and Subparts C and D of Part 172 of this subchapter when packaged as follows:

(1) ORM—A, B, or C liquid, not over one pint in one packaging;

(2) ORM—A or B solid, not over five pounds in one packaging;

(3) ORM—C solid, not over twenty-five pounds in one packaging.

(b) Strong outside packaging as specified in § 173.1200 and marking requirements specified in § 172.316 of this subchapter are not required for materials classed as ORM-D when utilized in cages, carts, or similar over-packs and when shipped by a private or contract motor carrier from a distribution center to a retail outlet.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-137, 45 FR 34704, May 22, 1980; Amdt. 173-165, 48 FR 28102, June 20, 1983]

#### § 173.510 General packaging requirements.

(a) Except as provided in § 173.505, ORM materials must be prepared for shipment in compliance with the following:

(1) Each material must be offered for transportation and transported in compliance with Subparts B, C, and D of Part 172 of this subchapter and Subparts A and B of Part 173. [Note: Packaging for certain PCB's for disposal, and for storage for disposal is prescribed by EPA in 40 CFR 761.60 and 761.65.]

(2) For packagings of 110 gallon capacity or less, sufficient outage (ullage) must be provided so the packaging will not be liquid full at 130° F. (55° C.).

(3) When a liquid or solid has an absolute vapor pressure exceeding 16 p.s.i. at 100° F. (38° C.), the primary packaging must be capable of withstanding the inside vapor pressure at 130° F. without leakage.

(4) Any material classed as an ORM material, which may cause a hazard in transportation due to its reaction with water, must be packaged with either an inner or outer water proof packaging.

(5) Portable tanks, tank cars, cargo tanks, hopper and dump type transport vehicles must be free from leaks and all discharge openings must be securely closed during transportation.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-137, 45 FR 34704, May 22, 1980; Amdt. 173-16, 48 FR 50461, Nov. 1, 1983]

### Subpart K—Other Regulated Material; ORM-A

SOURCE: Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, unless otherwise noted.

§ 173.605 Ammonium hydrosulfide solution, ammonium polysulfide solution, bromochloromethane, dibromodifluoro-methane, dichlorodifluoroethylene; dichloromethane, 1,1,1-trichloroethane, perfluoro-2-butene, tetrachloroethylene, and trichloroethylene.

(a) Ammonium hydrosulfide solution, ammonium polysulfide solution, bromochloromethane, dibromodifluoro-methane, dichlorodifluoroethylene, dichloromethane, 1,1,1-trichloroethane, perfluoro-2-butene, tetrachloroethylene, and trichloroethylene, when offered for transportation on a passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) Wooden box with inside earthenware, glass, metal, or plastic packagings of not more than 2 gallons capacity each, with sufficient cushioning and absorbent material to prevent breakage and leakage.

(2) Fiberboard box with inside earthenware, glass, metal, or plastic packagings of not more than 1 gallon capacity each, with sufficient cushioning and absorbent material to prevent breakage and leakage.

(3) Metal drum of not more than 10 gallons capacity.

(4) Outside packaging with inside earthenware, glass, plastic, or metal packagings of not more than 4 fluid ounces capacity each, with sufficient cushioning and absorbent material to prevent breakage and leakage. The maximum amount that may be shipped in any one outside packaging is 5 gallons.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-16, 49 FR 50461, Nov. 1, 1983]

§ 173.610 Camphene.

(a) Camphene, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a

wooden, metal, or rigid plastic packaging.

(b) Camphene, when offered for transportation by air, must be prepared for shipment in compliance with § 173.510 and must be packaged as prescribed in § 173.154.

[Amdt. 173-94A, 41 FR 40684, Sept. 20, 1976]

§ 173.615 Carbon dioxide, solid (dry ice).

(a) Solid carbon dioxide, when offered for transportation by aircraft or water, must be packed in packaging designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the packaging. For each shipment by air exceeding five pounds per package, advance arrangements between the shipper and each carrier must be made.

(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, when accepted for transportation on board ocean vessels, must be marked "CARBON DIOXIDE. SOLID—DO NOT STOW BELOW DECKS."

(d) Not more than 440 pounds of solid carbon dioxide may be transported in any one cargo pit or bin on any aircraft except by specific and special 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).

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-103, 42 FR 5059, Jan. 27, 1977; Amdt. 173-135, 45 FR 13090, Feb. 28, 1980]

§ 173.620 Carbon tetrachloride, ethylene dibromide (1,2-dibromoethane), and tetrachloroethane.

(a) Carbon tetrachloride, ethylene dibromide, and tetrachloroethane, when offered for shipment by cargo aircraft only and water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) As prescribed in §§ 173.344, 173.345 or § 173.346, meeting the packaging requirements applicable to Poison B liquids.

(2) Uniform Freight Classification (UFC), Rule 40, Section 5. Metal barrel or drum, not over 55 gallons capacity. Not authorized for transportation by air.

(3) Wooden box with inside containers, not over 200 pounds gross weight. Not authorized for transportation by air.

(4) Uniform Freight Classification (UFC), Rule 41, Sections 2 and 3. Fiberboard box, with inside containers, not over 90 pounds gross weight. Not authorized for transportation by air.

(5) Tank cars or motor vehicle tank trucks. Not authorized for transportation by air.

(6) Specification 51 (§ 178.245 of this subchapter). Portable tanks. Not authorized for transportation by air.

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

(b) Carbon tetrachloride, ethylene dibromide, and tetrachloroethane, when offered for shipment by passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged to meet the packaging requirements of § 173.345.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-94A, 41 FR 40684, Sept. 20, 1976; Amdt. 173-144, 46 FR 9894, Jan. 29, 1981; Amdt. 173-16, 48 FR 50481, Nov. 1, 1983]

§ 173.630 Chloroform.

(a) Chloroform, when offered for transportation by aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) Wooden box with inside earthenware, glass, metal, or plastic packaging of not more than 2 gallons capacity each.

(2) Fiberboard box with inside earthenware, glass, metal, or plastic packaging of not more than 1 gallon capacity each.

(3) Metal drum, not over 55 gallons capacity.

(4) Outer packaging with inside earthenware, glass, metal, or plastic packaging of not more than 4 fluid ounces capacity each, not exceeding 5 gallons total content.

(b) Chloroform, when offered for shipment by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) As prescribed in §§ 173.344, 173.345 or § 173.346 meeting the packaging requirements applicable to Poison B liquids.

(2) Uniform Freight Classification (UFC), Rule 40, Section 5. Metal barrel or drum, not over 55 gallons capacity.

(3) Wooden box with inside containers, not over 200 pounds gross weight.

(4) Uniform Freight Classification (UFC), Rule 41, Section 2 and 3. Fiberboard box with inside containers, not over 90 pounds gross weight.

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

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-144, 46 FR 9894, Jan. 29, 1981]

§ 173.635 Ferrophosphorus.

(a) Ferrophosphorus, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) Steel barrel or drum;

(2) Wooden barrel or keg;

(3) Wooden box with inside container; or

(4) Sift-proof railroad freight car.

(5) Fiber drums having an aluminum foil barrier.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-102, 41 FR 55878, Dec. 23, 1976]

§ 173.645 Ferrosilicon.

(a) Ferrosilicon, containing 30 percent or more but not more than 70 percent silicon, when offered for shipment by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Steel barrel or drum;
- (2) Wooden barrel or keg; or
- (3) Wooden box, not over 500 pounds gross weight.

(b) Ferrosilicon, containing 30 percent or more but not more than 70 percent silicon, when offered for shipment by cargo aircraft only must be prepared for shipment in compliance with §§ 173.510 and 173.154.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-16, 48 FR 50461, Nov. 1, 1983]

§ 173.650 Hexachloroethane.

(a) Hexachloroethane, when offered for shipment by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) As prescribed in §§ 173.363, 173.364 and 173.365, meeting the packaging requirements applicable to Poison B solids.

(2) Uniform Freight Classification (UFC), Rule 40, Section 5. Metal barrel or drum, not over 55 gallons capacity each.

(3) Wooden box with inside containers, not over 200 pounds gross weight.

(4) Uniform Freight Classification (UFC), Rule 41, Sections 2 and 3. Fiberboard box with inside containers, not over 90 pounds gross weight.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-94A, 41 FR 40684, Sept. 20, 1976]

§ 173.655 Naphthalene or naphthalin.

(a) Naphthalene or naphthalin, when offered for shipment by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Wooden barrel or keg;
- (2) Wooden box;
- (3) Fiberboard box;
- (4) Metal barrel or drum; or
- (5) Burlap (jute) bag, not over 224 pounds net weight. Authorized only

when the melting point is 167° F. or higher.

(b) Naphthalene or naphthalin, when offered for shipment by cargo aircraft only, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) As prescribed for passenger-carrying aircraft in paragraph (c) of this section, or
- (2) As prescribed in § 173.154.

(c) Naphthalene or naphthalin, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Earthenware, glass, metal, or plastic inside packagings of not more than 5 pounds capacity each, in strong outside packaging not over 25 pounds net weight.

[Amdt. 173-94, 41 FR 16087, Apr. 15, 1976, as amended by Amdt. 173-16, 48 FR 50461, Nov. 1, 1983]

**Subpart L—Other Regulated Material;  
ORM-B**

§ 173.800 Ammonium hydrogen sulfate, ammonium fluoride, barium oxide, chloroplatinic acid, copper chloride, ferric chloride, lead chloride, molybdenum pentachloride, potassium hydrogen sulfate, sodium aluminate, sodium hydrogen sulfate, and/or sodium hydrogen sulfite, (each in solid form).

(a) Ammonium hydrogen sulfate, ammonium fluoride, barium oxide, chloroplatinic acid, copper, chloride, ferric chloride, lead chloride, molybdenum pentachloride, potassium hydrogen sulfate, sodium aluminate, sodium hydrogen sulfate, or sodium hydrogen sulfite, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Earthenware, glass, metal, or plastic inside packagings of not more than 5 pounds net capacity each. Inside packagings must be packed in strong outside packaging, containing not more than 25 pounds net weight.

## § 173.850

[Amdt. 173-94, 41 FR 16088, Apr. 15, 1976, as amended by Amdt. 173-94B, 41 FR 57070, Dec. 30, 1976]

§ 173.850 Lime, unslaked; quicklime; and calcium oxide.

(a) Unslaked lime, quicklime, or calcium oxide when offered for transportation by cargo aircraft only or water, must be prepared for shipment in compliance with § 173.510 and must be packed in waterproof packaging as follows:

- (1) Steel barrel or drum;
- (2) Wooden barrel or keg;
- (3) Wooden box;
- (4) Multi-wall paper bag, not over 100 pounds net weight;
- (5) Paper-lined burlap bag, not over 100 pounds net weight; or
- (6) Sift-proof railroad freight car.
- (7) Sift-proof bulk freight container with net weight not over 40,000 pounds.
- (8) Portable tank with gross weight not over 7,000 pounds.

(b) Unslaked lime, quicklime, or calcium oxide, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) Earthenware, glass, metal, or plastic inside packagings, of not more than 5 pounds net capacity each. Inside packagings must be packed in strong outside packaging, containing not more than 25 pounds net weight.

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

[Amdt. 173-94, 41 FR 16088, Apr. 15, 1976, as amended by Amdt. 173-110, 42 FR 57967, Nov. 7, 1977; Amdt. 173-125, 43 FR 57897, Dec. 11, 1978; Amdt. 173-16, 48 FR 50461, Nov. 1, 1983]

§ 173.860 Mercury, metallic.

(a) Except as limited by paragraphs (b) and (c) of this section, metallic mercury, when offered for transportation by aircraft, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) Earthenware, glass, or plastic inside packagings of not more than 5 pounds capacity each packed in strong outside packagings. Either the inside or the outside packaging must have complete enveloping inner linings or

## 49 CFR Ch. I (10-1-87 Edition)

bags of strong, leak-tight, and puncture resistant material impervious to mercury.

(2) Iron or steel flasks packed in outside packagings. Either the inside or the outside packaging must have completely enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury.

(b) Manufactured devices of which mercury is a component part (except tubes as described in paragraph (c) of this section) packed in outside packagings having completely enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury, may be transported by aircraft if prepared for shipment in compliance with § 173.510.

(c) Electron tubes, vapor tubes, and similar tubes of which mercury is a component part, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

(1) In outside packaging with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the outside packagings; authorized only if the item contains not over one pound (454 grams) of mercury.

(2) In outside packaging having completely enveloping inner linings or bags of strong, leak-tight, and puncture resistant material impervious to mercury.

(3) In manufacturer's original packaging if each item does not contain more than 0.18-ounce (5 grams) of mercury per tube, and if the outside package does not contain more than 1.1 ounces (30 grams) total net quantity.

(4) In the manufacturer's original packagings if tubes are completely jacketed in sealed leak-tight metal cases.

(5) In manufacturer's original packaging if each item does not contain more than 100 milligrams of mercury per tube and if the outside package does not contain more than one gram total net quantity. Packages conforming to these quantity limitations are not subject to any other requirements of this subchapter.

[Amdt. 173-94, 41 FR 16088, Apr. 15, 1976, as amended by Amdt. 173-181, 49 FR 45750, Nov. 20, 1984; Amdt. 173-185, 50 FR 11055, Mar. 19, 1985]

§ 173.861 Gallium metal, liquid.

Gallium metal, liquid, when offered for transportation, must be packaged in earthenware, glass, or plastic inside packagings of not more than 5 pounds net capacity each packed in strong outside packagings. Either the inside or outside packagings must have complete enveloping linings or bags of strong, leak-tight, and puncture-resistant material impervious to liquid gallium metal.

[Amdt. 173-99, 41 FR 37115, Sept. 2, 1976]

§ 173.862 Gallium metal, solid.

Gallium metal, solid, when offered for transportation, must be packaged in glass or rigid plastic inside packagings of not more than 5 pounds net capacity each, enclosed in a sealed bag of strong, leak-tight, and puncture-resistant material impervious to liquid gallium. The sealed bag must be placed in a packaging constructed of wood, fiberboard, or plastic which is lined with a strong, leak-tight, and puncture-resistant material impervious to liquid gallium. This packaging must be enclosed in an outer packaging which contains dry ice or other means of refrigeration sufficient to maintain the gallium in a completely solid state during the entire anticipated time the gallium will be in transportation to its destination.

[Amdt. 173-99, 41 FR 37115, Sept. 2, 1976]

**Subpart M—Other Regulated Material; ORM-C**

Source: Amdt. 173-94, 41 FR 16089, Apr. 15, 1976, unless otherwise noted.

§ 173.906 Inflatable life rafts, escape slides, and evacuation slides.

An inflatable life raft, escape slide or evacuation slide, serviced and ready for use as a life-saving appliance aboard a vessel or aircraft, containing small quantities of hazardous materials which are required as part of the life-saving appliance, including non-flammable compressed gas packaged

in cylinders in accordance with this subchapter, Class C explosives that are pyrotechnic signal devices, and flammable liquids in repair kits, must be packed in a strong outside packaging.

[Amdt. 173-135, 45 FR 13090, Feb. 28, 1980]

§ 173.910 Ammonium sulfate nitrate.

(a) Ammonium sulfate nitrate, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Steel barrel or drum;
- (2) Wooden barrel or keg;
- (3) Wooden box with inside packagings;
- (4) Fiberboard box with inside packagings, not over 90 pounds gross weight;
- (5) Fiber drum, not over 150 pounds gross weight; or
- (6) Paper bag, not over 200 pounds net weight, moisture, and sift-proof, of strength not less than the equivalent of bags made of 8-ounce burlap.

§ 173.915 Battery parts.

Battery parts, when exhausted and unwashed, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packed in a metal or wooden barrel with sufficient absorbent material to absorb any liquid present in the parts.

§ 173.920 Bleaching powder.

(a) Bleaching powder (or chlorinated lime) containing less than 39 percent available chlorine, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Steel barrel or drum;
- (2) Wooden barrel or keg;
- (3) Wooden or fiberboard box, with inside containers; or
- (4) Fiber drum with inside metallic or polyethylene liner, not over 275 pounds gross weight.

§ 173.945 Calcium cyanamide, not hydrated.

(a) Calcium cyanamide, not hydrated, when offered for transportation by

**§ 173.952**

water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Steel barrel or drum; or
- (2) Wooden barrel or keg;

(b) Calcium cyanamide, not hydrated, when offered for transportation by cargo aircraft only, must be prepared for shipment in compliance with §§ 173.510 and 173.154.

(c) Calcium cyanamide, not hydrated, when offered for transportation by passenger-carrying aircraft, must be prepared for shipment in compliance with § 173.510 and must be packed in earthenware, glass, metal, or plastic inside packagings of not over 1 pound each, adequately cushioned to prevent breakage and leakage. Inside packagings must be packed in a strong outside package containing not more than 25 pounds each.

[Amdt. 173-94, 41 FR 16089, Apr. 15, 1976, as amended by Amdt. 173-16, 48 FR 50461, Nov. 1, 1983]

**§ 173.952 Castor beans and castor pomace.**

(a) Castor beans and castor pomace, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Sift-proof, five-ply paper bag, not over 100 pounds net weight.
- (2) Sift-proof, paper or plastic lined burlap bag, not over 100 pounds net weight.
- (3) Sift-proof, paper or plastic lined cotton bag, not over 100 pounds net weight.

**§ 173.955 Coconut meal pellets.**

(a) Coconut meal pellets which contain at least 6 percent water, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Burlap (jute) bag;
- (2) Multi-wall paper bag; or
- (3) Polyethylene-lined burlap or paper bag.

**§ 173.960 Copra.**

Copra, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a burlap bag.

**49 CFR Ch. I (10-1-87 Edition)**

**§ 173.965 Cotton and other fibers.**

Cotton and the fibers jute, hemp, flax, sisal, coir, kapok, or similar vegetable fibers, when offered for transportation by water, must be packaged in bales, securely and tightly bound with rope, wire, or other similar means.

[Amdt. 173-201, 52 FR 13043, Apr. 20, 1987]

**§ 173.985 Exothermic ferrochrome, ferromanganese, and silicon-chrome.**

Exothermic ferrochrome, ferromanganese, and silicon-chrome, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a steel barrel or drum, not over 750 pounds gross weight.

**§ 173.995 Fish scrap and fish meal.**

(a) Except as provided in paragraph (b) of this section, fish scrap and fish meal, containing at least 6 percent but not more than 12 percent water, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

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

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

(c) When fish scrap or fish meal is offered for transportation by vessel in bulk in freight containers the following additional requirements must be met:

- (1) The fish meal must contain at least 100 PPM antioxidant (ethoxyquin) at the time of shipment.
- (2) Each shipment must be accompanied by a statement in which the shipper certifies:
  - (i) The moisture content of the fish meal;
  - (ii) The concentration of antioxidant (ethoxyquin) in the material in PPM at the time of loading into the freight container;
  - (iii) The fat content of the fish meal;

(iv) Date and place of production of the fish meal; and

(v) The physical state of the material (ground, pelletized, or mixture).

[Amdt. 173-94, 41 FR 16089, Apr. 15, 1976, as amended by Amdt. 173-116, 43 FR 17945, Apr. 27, 1978]

**§ 173.1010 Lead dross or scrap containing 3 percent or more free acid.**

Lead dross or scrap containing 3 percent or more free acid, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in steel barrels or drums or wooden barrels, boxes, or kegs.

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

[Amdt. 173-130, 44 FR 23228, Apr. 19, 1979]

**§ 173.1015 Lithium batteries, for disposal.**

(a) Lithium batteries, for disposal, comprised of one or more cells, may be offered for transportation to a permitted storage facility and disposal site by motor vehicle only, if the battery:

(1) When new, contained not more than 12 grams of lithium per cell;

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

(3) Is classified and offered for transportation as an ORM-C; and

(4) Is overpacked in a strong fiberboard box, or metal or fiber drum which complies with § 173.24.

(b) Paragraph (a) does not apply to lithium batteries which, when new, were excepted from regulation under § 173.206(f).

[Amdt. 173-160, 47 FR 54827, Dec. 6, 1982; 48 FR 655, Jan. 6, 1983]

**§ 173.1025 Ferrous metal borings, shavings, turnings, or cuttings (excluding stainless steel).**

Ferrous metal borings, shavings, turnings, or cuttings, other than stainless steel, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a metal barrel or drum.

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

[Amdt. 173-130, 44 FR 23228, Apr. 19, 1979]

**§ 173.1040 Pesticide, water-reactive.**

Water reactive pesticide not otherwise subject to this subchapter, and including fungicides, herbicides, etc., which contain manganese ethylene bis-dithio carbamate, when offered for transportation by water, must be packaged in water resistant packaging in compliance with § 173.510.

**§ 173.1045 Petroleum coke, uncalcined.**

Uncalcined petroleum coke, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in metal barrels or drums.

**§ 173.1065 Rubber curing compound, solid.**

(a) Solid rubber curing compounds, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Metal barrel or drum;
- (2) Fiber drum;
- (3) Wooden barrel or keg;
- (4) Wooden or fiberboard box;
- (5) Sift-proof multi-wall paper bag;

or

- (6) Sift-proof lined burlap bag.

**§ 173.1070 Sawdust or wood shavings.**

(a) Sawdust or wood shavings, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Steel barrel or drum;
- (2) Wooden barrel or keg;
- (3) Wooden or fiberboard box;
- (4) Bag; or
- (5) Bales, slatted and compactly bound with wire or metal bands.

**§ 173.1080 Sulfur.**

(a) Sulfur, flowers of sulfur (sulfur flower), when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Metal barrel or drum;
- (2) Wooden barrel or keg;
- (3) Wooden or fiberboard box;
- (4) Sift-proof multi-wall paper bag;
- (5) Sift-proof paper-lined burlap bag;
- (6) Sift-proof rail car; or
- (7) Sift-proof or lined freight container.

## § 173.1090

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

[Amdt. 173-94, 41 FR 16089, Apr. 15, 1976, as amended by Amdt. 173-131, 44 FR 49458, Aug. 23, 1979; Amdt. 173-142, 45 FR 81572, Dec. 11, 1980]

### § 173.1090 Asbestos.

(a) Asbestos includes any of the following hydrated mineral silicates: chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, actinolite asbestos, and every product containing any of these minerals.

(b) Commercial asbestos is any material or product containing asbestos that has commercial value because of its asbestos content.

(c) 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 or any materials or products whose commercial value is not dependent on their asbestos content, are not subject to the requirements of this subchapter.

(d) Commercial asbestos must be offered for transportation and transported in:

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

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

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

## 49 CFR Ch. I (10-1-87 Edition)

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

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

[Amdt. 173-123, 43 FR 56668, Dec. 4, 1978, as amended at 44 FR 18674, Mar. 29, 1979; 44 FR 47938, Aug. 16, 1979; Amdt. 173-158, 47 FR 43066, Sept. 30, 1982]

### Subpart N—Other Regulated Material; ORM-D

#### § 173.1200 Consumer Commodity.

(a) In order to be transported under the proper shipping name of "Consumer commodity," a material must meet that definition. It may be reclassified and offered for shipment as ORM-D material (see § 173.500) provided that an ORM-D exception is authorized in specific sections applicable to the material, and that it is prepared in accordance with the following paragraphs. (The gross weight of each package must not exceed 65 pounds and each package offered for transportation aboard aircraft must meet the requirements of § 173.6.)

(1) *Flammable Liquids must be:* (i) In inside metal containers, each having a rated capacity of 1 quart or less, packed in strong outside packagings.

(ii) In inside containers, each having a rated capacity of 1 pint or less, packed in strong outside packagings.

(iii) In inside containers, each having a rated capacity of one gallon or less, packed in strong outside packagings. The provisions of this exception apply only if the flash point of the material is 73° F. or higher.

(2) *Corrosive liquids must be:* (i) In bottles, each having a rated capacity of 1 pint or less, each enclosed in a metal can, packed in strong outside packagings.

(ii) In metal or plastic containers, each having a rated capacity of 1 pint or less, packed in strong outside packagings.

(iii) In metal or plastic inside containers, each having a rated capacity of not over 1 quart, packed in strong outside packaging provided the liquid mixture contains 15 percent or less

corrosive material and the remainder of the mixture does not meet the definition of a hazardous material as defined in this subchapter. Not authorized for transportation by air.

(3) *Corrosive solids* must be: (i) In earthenware, glass, plastic or paper containers each having a net weight of 5 pounds or less, packed in strong metal, wooden, or fiberboard outside packagings, each having a net weight of 25 pounds or less.

(ii) In metal, rigid fiber, or composition cans or cartons or rigid plastic containers each having a net weight of 10 pounds or less, packed in strong outside packagings each having a net weight of 25 pounds or less.

(iii) In metal, rigid fiber, or composition cans or cartons or rigid plastic containers, each having a rated capacity of not over 20 pounds, overpacked in metal, wooden or fiberboard outside containers not exceeding 50 pounds net weight provided the solid mixture contains 10 percent or less corrosive material and the remainder of the mixture does not meet the definition of a hazardous material as defined in this subchapter.

(4) *Flammable solids* except for charcoal briquettes must be in inside containers each having a net weight of 1 pound or less, packed in strong outside packagings each having a net weight of 25 pounds or less. Charcoal briquettes may be shipped in packagings having a net weight of 65 pounds or less.

(5) *Oxidizers* must be in inside containers each having a rated capacity of 1 pint or less for liquids or a net weight of 1 pound or less for solids, packed in strong outside packaging each having a net weight of 25 pounds or less.

(6) *Organic peroxides* must be: (i) In inside containers which must be securely packed and cushioned with noncombustible cushioning material in strong outside packagings containing not over 1 pint or 1 pound net quantity of the materials. Cushioning is not required when the liquid is contained in strong, securely closed, plastic packagings, not over 1 ounce capacity each, properly packed to prevent leakage or breakage.

(ii) In strong outside packagings of 24 or less inside fiberboard containers, each having 70 or less securely closed tubes having a maximum fluid capacity of  $\frac{1}{2}$ -ounce each and securely packed in noncombustible cushioning material. Each fiberboard container may not contain more than 1 pint of liquid.

(7) *Poison B liquids or solids* must be in inside containers, each having a rated capacity of 8 ounces or less by volume for liquids or of 8-ounces or less net weight for solids packed in strong outside packagings.

(8) *Compressed gases* must be: (i) In inside containers, each having a water capacity of 4-fluid ounces or less (7.22 cubic inches or less), packed in strong outside packagings.

(ii) In inside metal container charged with a solution of materials and compressed gas or gases which is nonpoisonous, meeting all of the following:

(A) Capacity may not exceed 50 cubic inches (27.7 fluid ounces);

(B) Pressure in the container may not exceed 180 p.s.i.g. at 130° F. (55° C.). If the pressure exceeds 140 p.s.i.g. at 130° F., (55° C.) but does not exceed 160 p.s.i.g. at 130° F., (55° C.) a specification DOT 2P (§ 178.33 of this subchapter) inside metal container must be used; if the pressure exceeds 160 p.s.i.g. at 130° F., (55° C.), a specification DOT 2Q (§ 178.33a of this subchapter) inside metal container must be used. In any event the metal container must be capable of withstanding, without bursting, a pressure of one and one-half times the equilibrium pressure of the contents at 130° F. (55° C.);

(C) Liquid content of the material and gas not completely fill the container at 130° F. (55° C.);

(D) The containers must be packed in strong outside packagings; and

(E) Each completed container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the content at 130° F. (55° C.) without evidence of leakage, distortion, or other defect.

(iii) In a non-refillable inside metal container of 50 cubic-inch capacity or less (27.7 fluid ounces), with foodstuffs

or soaps and with soluble or emulsified compressed gas, provided the pressure in the container does not exceed 140 p.s.i.g. at 130° F. (55° C.). The metal container must be capable of withstanding, without bursting, a pressure of one and one-half times the equilibrium pressure of the contents at 130° F. (55° C.) and must comply with the following provisions:

(A) Containers must be packed in strong outside packagings, and

(B) Liquid content of the material and gas may not completely fill the container at 130° F. (55° C.).

(iv) In refillable inside metal containers with cream and soluble or emulsified compressed gas packed in strong outside packagings. Containers must be of such design that they will hold pressure without permanent deformation up to 375 p.s.i.g. and must be equipped with a device designed so as to release pressure without bursting of the container or dangerous projection of its parts at higher pressures.

(v) In non-refillable inside metal containers charged with a solution, containing biological products or a medical preparation which could be deteriorated by heat, and compressed gas or gases which is nonpoisonous and nonflammable. The capacity of each container may not exceed 35 cubic inches (19.3 fluid ounces). The pressure in the container may not exceed 140 p.s.i.g. at 130° F. (55° C.), and the liquid content of the product and gas may not completely fill the container at 130° F. (55° C.). One completed container out of each lot of 500 or less, filled for shipment, must be heated, until the pressure in the container is equivalent to the equilibrium pressure of the content at 130° F. (55° C.). There may be no evidence of leakage, distortion, or other defect. Container must be packed in strong outside packagings.

(vi) In electronic tubes, each having a volume of not more than 30 cubic inches and charged with 'as to a pressure of not more than 35 p.s.i.g. and packed in strong outside packagings.

(vii) In an inside metal container as a component of an audible fire alarm system powered by a compressed gas meeting the following provisions:

(A) Each inside container must have contents which are not flammable, poisonous, or corrosive as defined under this part;

(B) Each inside container may not have a capacity exceeding 35 cubic inches (19.3 fluid ounces);

(C) Each inside container may not have a pressure exceeding 70 p.s.i.g. at 70° F. (21° C.) and the liquid portion of the gas may not completely fill the inside container at 130° F. (55° C.);

(D) Each inside container must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 130° F. (55° C.); and

(E) Each fire alarm system must be packed in a strong outside packaging.

[Amdt. 173-94, 41 FR 16091, Apr. 15, 1976, as amended by Amdt. 173-94A, 41 FR 40684, Sept. 20, 1976; Amdt. 173-94B, 41 FR 57070, Dec. 30, 1976]

#### § 173.1201 Small arms ammunition.

(a) Small arms ammunition which has been classed as a Class C explosive may be re-classed and offered for transportation as ORM-D material (See § 173.500 of this part) if it is packaged in accordance with paragraph (b) of this section. Small arms ammunition that may be shipped as ORM-D is limited to:

(1) Ammunition for rifle, pistol, or shotgun;

(2) Ammunition with inert projectiles or blank ammunition;

(3) Ammunition having no tear gas, incendiary, or detonating explosive projectiles; and

(4) Ammunition not exceeding 50 caliber for rifle or pistol cartridges or 8 gauge for shotshells.

(b) Packaging for small arms ammunition as ORM-D must be as follows:

(1) Ammunition must be packed in inside boxes, or in partitions which fit snugly in the outside packaging or in metal clips;

(2) Primers must be protected from accidental initiation;

(3) Inside boxes, partitions or metal clips must be packed in securely closed strong outside packagings; and

(4) Maximum gross weight is limited to 65 pounds per package.

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

[Amdt. 173-175, 49 FR 21936, May 24, 1984]

### Subpart O—Other Regulated Material; ORM-E

§ 173.1300 Hazardous waste, liquid or solid, n.o.s.; hazardous substance, liquid or solid, n.o.s.

Hazardous waste, liquid or solid, n.o.s., or Hazardous substance, liquid or solid, n.o.s., may not be offered for transportation unless packaged in accordance with § 173.510.

[Amdt. 173-137, 45 FR 34704, May 22, 1980]

#### APPENDIX A—METHOD OF TESTING CORROSION TO SKIN

1. Corrosion to the skin is measured by patch-test technique on the intact skin of the albino rabbit, clipped free of hair. A minimum of six subjects are to be used in this test.

2. Introduce under a square cloth patch, such as surgical gauze measuring not less than 1 inch by 1 inch and two single layers thick, 0.5 milliliter (in the case of liquids) or 0.5 gram (in the case of solids and semisolids) of the substance to be tested.

3. Immobilize the animals with patches secured in place by adhesive tape.

4. Wrap the entire trunk of each animal with an impervious material, such as rubberized cloth, for the 4 hour period of exposure. This material is to aid in maintaining the test patches in position and retards the evaporation of volatile substances. It is not applied for the purpose of occlusion.

5. After 4 hours of exposure, the patches are to be removed and the resulting reactions are to be evaluated for corrosion.

6. Following this initial reading, all test sites are washed with an appropriate solvent to prevent further exposure.

7. Readings are again to be made at least at the end of a total of 48 hours (44 hours after the first reading).

8. Corrosion will be considered to have resulted if the substances in contact with the rabbit skin have caused destruction or irreversible alteration of the tissue on at least two out of each six rabbits tested. Tissue destruction is considered to have occurred if, at any of the readings, there is ulceration or necrosis. Tissue destruction does not include merely sloughing of the epidermis, or erythema, edema, or fissuring.

[Amdt. 173-94, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 173-94A, 41 FR 40684, Sept. 20, 1976; Amdt. 173-94B, 41 FR 57070,

Dec. 30, 1976; Amdt. 173-149, 46 FR 49906, Oct. 8, 1981]

#### APPENDIX B—PROCEDURE FOR TESTING CHEMICAL COMPATIBILITY AND RATE OF PERMEATION IN POLYETHYLENE PACKAGING AND RECEPTACLES

1. The purpose of this procedure is to determine the chemical compatibility and permeability of liquid hazardous materials packaged in polyethylene packaging and receptacles. Alternatives for this procedure are permitted as specified in § 173.24(d)(3) of this subchapter.

2. Compatibility and rate of permeation are determined by subjecting full size polyethylene containers (or smaller containers as permitted in paragraph 4 of this Appendix) and hazardous material lading to one of the following combinations of time and temperature:

a. Test Method 1: 180 days at a temperature no lower than 18°C. (64°F.)

b. Test Method 2: 28 days at a temperature no lower than 50°C. (122°F.)

c. Test Method 3: 14 days at a temperature no lower than 60°C. (140°F.)

3. Regardless of which test method is used, at least three sample containers shall be tested for each combination of hazardous material and size and design of container. Fill containers to rated capacity with the specific hazardous material (at the concentration to be transported) and close as for shipment. For the first and last 24 hours of storage under the selected test method, place the containers with closures downward, except that containers fitted with a vent are so placed on each occasion for five minutes only.

4. For testing under Test Method 2 or 3 in those instances where it is not practicable to use full size containers, smaller containers may be used. The small container shall be manufactured by the same process as the larger container (for example, using the same method of molding and processing temperatures) and be made of identical resins, pigments and additives.

5. Determine filled container weight or net weight of contents both before and after storage under the selected test method. Rate of permeation is determined from loss of hazardous materials contents, during the conduct of the test, expressed as a percentage of the original weight.

6. After storage under the selected test method, the container shall be drained, rinsed, filled to rated capacity with water and, with filled container at ambient temperature, dropped from a height of 1.2 meters (3.94 feet) onto solid concrete.

7. Each of the following constitute test failure:

a. Visible evidence of permanent deformation due to vapor pressure build-up or collapse of walls, deterioration, swelling, crazing, cracking, excessive corrosion, oxidation, embrittlement, leakage, rupture or other defects likely to cause premature failure or a hazardous condition.

b. For materials meeting the definition of a poison according to this subchapter, a rate of permeation in excess of 0.5% determined over the test period. For all other hazardous materials, a rate of permeation in excess of 2.0% determined over the test period.

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

[Amdt. 173-176, 49 FR 24691, June 14, 1984]

## PART 174—CARRIAGE BY RAIL

### Subpart A—General Requirements

#### Sec.

- 174.1 Purpose and scope.
- 174.3 Unacceptable hazardous materials shipments.
- 174.5 Carrier's materials and supplies.
- 174.7 Responsibility for compliance.
- 174.8 Inspection.
- 174.9 Inspection of tank cars.
- 174.10 Inspection of cars at interchange.
- 174.11 Canadian shipments and packages.
- 174.12 Intermediate shippers and carriers.
- 174.14 Movements to be expedited.
- 174.16 Removal and disposition of hazardous materials at destination.
- 174.18 Astray shipments.
- 174.20 Local or carrier restrictions.

### Subpart B—General Operating Requirements

- 174.24 Shipping papers.
- 174.25 Additional information on waybills, switching orders and other billings.
- 174.26 Notice to train crews of placarded cars.
- 174.33 Lost or destroyed labels and placards.
- 174.45 Reporting hazardous materials incidents.
- 174.47 Correction of violations.
- 174.48 Leaking packages other than tank cars.
- 174.49 Flammable vapors.
- 174.50 Leaking tank cars.

### Subpart C—General Handling and Loading Requirements

- 174.55 General requirements.
- 174.57 Cleaning cars.
- 174.59 Marking and placarding of rail cars.
- 174.61 Truck bodies, trailers or freight containers on flatcars.

#### Sec.

- 174.63 Freight containers, portable tanks and IM portable tanks.
- 174.67 Tank car unloading.
- 174.69 Removal of placards and car certificates after unloading.
- 174.81 Segregation and separation requirements for hazardous materials in rail cars.

### Subpart D—Handling of Placarded Cars

- 174.83 Switching of cars containing hazardous materials.
- 174.84 Switching of flatcars carrying placarded trailers, freight containers, portable tanks or IM portable tanks.
- 174.85 Placement of freight cars placarded "EXPLOSIVES A" in yards, on sidings, or side tracks.
- 174.86 Position in train of cars placarded "EXPLOSIVES A" or "POISON GAS" when accompanied by cars carrying guards or technical escorts.
- 174.87 Placarded cars prohibited in passenger trains, limited in mixed trains.
- 174.88 Position in train of cars placarded "EXPLOSIVES A".
- 174.89 Position in train of cars placarded "RADIOACTIVE".
- 174.90 Separating cars placarded "EXPLOSIVES A" or "POISON GAS" from other cars in trains.
- 174.91 Position in train of loaded placarded tank car other than car placarded "COMBUSTIBLE".
- 174.92 Separating loaded placarded tank cars other than cars placarded "COMBUSTIBLE" from other cars in trains.
- 174.93 Position in train of empty placarded tank cars.

### Subpart E—Detailed Requirements for Explosives

- 174.100 Forbidden explosives.
- 174.101 Loading explosives.
- 174.102 Forbidden mixed loading and storage.
- 174.103 Disposition of damaged or astray shipments.
- 174.104 Class A explosives; car selection, preparation, inspection, and certification.
- 174.105 Routing shipments, Class A explosives.
- 174.106 "Order-Notify" or "C.O.D." shipments, Class A explosives.
- 174.107 Shipping days for Class A explosives.
- 174.109 Non-agency shipments.
- 174.110 Car magazine.
- 174.112 Loading Class B explosives (Also see § 174.101).
- 174.114 Record to be made of change of seals on "Explosives A" laden cars.

Sec.

174.115 Loading Class C explosives.

**Subpart F—Detailed Requirements for Gases**

- 174.200 Special handling requirements.
- 174.201 Compressed gas cylinders.
- 174.204 Tank car delivery of gases, including cryogenic liquids.
- 174.208 Rail cars, truck bodies, or trailers with fumigated or treated lading.
- 174.280 Poison gases with foodstuffs.
- 174.290 Poison A shipped by, for, or to the Department of Defense.

**Subpart G—Detailed Requirements for Flammable Liquids**

- 174.300 Special handling requirements.
- 174.304 Flammable liquids in tank cars.
- 174.380 Poisonous flammable liquids with foodstuffs.

**Subpart H—Detailed Requirements for Flammable Solids**

- 174.410 Special handling requirements for matches.
- 174.450 Fires.
- 174.480 Poisonous flammable solids with foodstuffs.

**Subpart I—Detailed Requirements for Oxidizers**

- 174.510 Special handling requirements for nitrates.
- 174.515 Cleaning cars; potassium permanganate.
- 174.580 Poisonous oxidizers with foodstuffs.

**Subpart J—Detailed Requirements for Poisonous Materials**

- 174.600 Special handling requirements for Poison A materials.
- 174.615 Cleaning cars.
- 174.680 Poisons with foodstuffs.

**Subpart K—Detailed Requirements for Radioactive Materials**

- 174.700 Special handling requirements for radioactive materials.
- 174.715 Cleanliness of cars after use.
- 174.750 Incidents involving leakage.

**Subpart L—Detailed Requirements for Corrosive Materials**

- 174.800 Special handling requirements for corrosive materials.
- 174.810 Special handling requirements for wet electric storage batteries.
- 174.812 Special handling requirements for nitric acid.

Sec.

**Subpart M—Detailed Requirements for Other Regulated Materials**

174.840 Special loading and handling requirements for asbestos.

**AUTHORITY:** 49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53(e), 1.53, App. A to Part 1.

**SOURCE:** Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, unless otherwise noted.

**EDITORIAL NOTE:** For nomenclature changes to Part 174, see 50 FR 45731, Nov. 1, 1985.

**Subpart A—General Requirements**

§ 174.1 Purpose and scope.

This part prescribes requirements in addition to those contained in Parts 171, 172, 173, and 179 of this subchapter, to to be observed with respect to the transportation of hazardous materials in or on rail cars.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40885, Sept. 20, 1976]

§ 174.3 Unacceptable hazardous materials shipments.

A shipment of a hazardous material that is not prepared for transportation in accordance with Parts 171, 172 and 173 of this subchapter may not be accepted for transportation or transported by rail except as provided in § 174.47(b).

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40885, Sept. 20, 1976]

§ 174.5 Carrier's materials and supplies.

This subchapter applies to the transportation of a carrier's materials and supplies moving by rail, except that the shipper's certification is not required when these materials and supplies are being transported by the carrier who owns them. The requirements of this subchapter do not apply to railway torpedoes or fuses when carried in engines or rail cars. Railway torpedoes must be in closed metal boxes when not in use.

[Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

## § 174.7 Responsibility for compliance.

Unless this subchapter specifically provides that another person is to perform a particular duty, each carrier, including a connecting carrier, shall perform the duties specified and comply with each applicable requirement of this part, and shall instruct its employees in relation thereto.

## § 174.8 Inspection.

(a) Methods of manufacture, packing, and storage of hazardous material, insofar as they affect safety in transportation by rail, must be open to inspection by a duly authorized representative of the Department, an initial carrier, and the Bureau of Explosives.

(b) At any point where a train is required to be inspected, each loaded placarded rail car and each rail car immediately adjacent thereto must be inspected. The cars may continue in transit only when the inspection indicates that the cars are in a safe condition for transportation. (See §§ 174.9 and 174.10.) The inspection of a rail car other than a tank car or a rail car containing Class A explosives must include a visual inspection for obvious defects of the running gear and any leakage of contents from the car and to determine whether all required placards are in place and conform to the information given on the train consist or other shipping document as required by § 174.26(b).

(c) For inspection requirements applicable to rail cars containing Class A explosives, see §§ 174.10 and 174.104.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40885, Sept. 20, 1976; Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

## § 174.9 Inspection of tank cars.

(a) Each loaded placarded tank car must be inspected by the carrier before acceptance at the originating point and when received in interchange to see that it is not leaking and that the air and hand brakes, journal boxes, and trucks are in proper condition for service.

(b) An empty tank car which previously contained a hazardous material and which is tendered for movement or received in interchange must have all manhole covers, outlet valve reduc-

ers, outlet valve caps, outlet valve cap plugs, end plugs, and plugs or caps or other openings securely in their proper places, except that heater coil inlet and outlet pipes must be left open for drainage.

(c) The safety valves on a tank car may not be tested while the car is loaded. Whenever a test of the safety valves or tank becomes due while a loaded car is in transit, unless the car is leaking or in a manifestly insecure condition, it must be forwarded to its destination, carded on each side with a card exhibiting the following notice:

Safety valves overdue for test:

Tank overdue for test:

Moving under authority of 49 CFR 174.9(c).

A prompt report of each such movement, showing the identifying initials and number of each car, must be made to the Bureau of Explosives by the carrier carding the cars.

## § 174.10 Inspection of cars at interchange.

(a) Each rail car containing explosives requiring EXPLOSIVES A placards (see § 174.104) which is offered by a connecting line must be visually inspected externally by the receiving line. If practicable, the receiving carrier should also inspect the lading. The car may not be forwarded until all discovered violations have been corrected.

(b) If the car shows evidence of or if there is any reason to suspect that it has received rough treatment, the lading must be inspected and placed in proper condition before the car is permitted to proceed. When interchange occurs and the inspection is performed after daylight hours, electric flashlights should be used and naked lights may not be used.

(c) A shipment of hazardous materials offered by a connecting carrier must comply with this subchapter, and the revenue waybill, freight bill, manifest of lading, card waybill, switching order, transfer slip ticket, or other billing, must bear the placard notation and endorsement prescribed by § 174.25 of this subpart.

(d) A car containing packages of hazardous materials other than explosives may not be offered in interchange if

the packages are in a leaking condition.

(e) In the case of a tank car which has developed small leaks in the course of its movement to an interchange point and which requires a short movement to effect delivery for unloading by the consignee, the movement may be made if it can be made safely adhering to the precautions prescribed by § 174.50.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

#### § 174.11 Canadian shipments and packagings.

A Canadian shipment or package may be transported by rail car within the United States if it is in compliance with the requirements of this subchapter or the TDG Regulations and the regulations of the Canadian Transport Commission as provided in § 171.12a of this subchapter.

[Amdt. 174-48, 50 FR 41521, Oct. 11, 1985]

#### § 174.12 Intermediate shippers and carriers.

(a) Each origin carrier, including a freight forwarder, must have on file a copy of the shipper's certified shipping paper, as prescribed in Part 172 of this subchapter, for each shipment of hazardous materials it handles. An intermediate shipper or carrier may not forward or transport a shipment of hazardous materials if it does not meet the requirements of this subchapter.

(b) An intermediate carrier offering or delivering for transportation any loaded motor vehicle, trailer, semitrailer, or container containing any hazardous material must show on the shipping paper the information required by § 172.201 of this subchapter and a description of the type vehicle or container.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

#### § 174.14 Movements to be expedited.

(a) A carrier must forward each shipment of hazardous materials promptly and within 48 hours (Saturdays, Sundays, and holidays excluded),

after acceptance at the originating point or receipt at any yard, transfer station, or interchange point, except that where biweekly or weekly service only is performed, a shipment of hazardous materials must be forwarded on the first available train.

(b) A tank car loaded with any flammable liquid or gas, or a poison gas, may not be received and held at any point, subject to forwarding orders, so as to defeat the purpose of this section or of § 174.204 of this subchapter.

#### § 174.16 Removal and disposition of hazardous materials at destination.

(a) *Delivery at non-agency stations.* A shipment of explosives may not be unloaded at non-agency stations unless the consignee is there to receive it or unless properly locked and secure storage facilities are provided at that point for its protection. If delivery cannot be so made, the shipment must be taken to next or nearest agency station for delivery.

(b) *Delivery at agency stations.* A carrier shall require the consignee of each shipment of hazardous materials to remove the shipment from carrier's property within 48 hours (exclusive of Saturdays, Sundays, and holidays) after notice of arrival has been sent or given. If not so removed, the carrier shall immediately dispose of the shipments as follows:

(1) *Class A explosives:* If safe storage is available, by storage at the owner's expense; if safe storage is not available, by return to the shipper, sale, or destruction under supervision of a competent person; or if safety requires, by destruction under supervision of a competent person.

(2) *Hazardous materials, except Class A explosives, in carload shipments:* By storage on the carrier's property; by storage on other than the carrier's property, if safe storage on the carrier's property is not available; or by sale at expiration of 15 calendar days after notice of arrival has been sent or given to the consignee, provided the consignor has been notified of the non-delivery at the expiration of a 48-hour period and orders for disposition have not been received.

(3) *Hazardous materials, except Class A explosives, in less-than-carload shipments:* By return to the shipper if notice of non-delivery was requested and given the consignor as prescribed by the carrier's tariff, and orders for return to shipper have been received; by storage on the carrier's property; by storage on other than the carrier's property, if safe storage on carrier's property is not available; or by sale at expiration of 15 calendar days after notice of arrival has been sent or given to the consignee, provided the consignor has been notified of non-delivery at expiration of a 48-hour period and orders for disposition have not been received.

#### § 174.18 Astray shipments.

An astray package of hazardous materials other than explosives, of known destination and in proper condition for safe transportation, must be forwarded immediately on an "astray bill", showing the information required by Subpart C of Part 172 of this subchapter. When necessary to replace a label and doubt exists as to the kind, the **FLAMMABLE LIQUID** label must be applied. For astray shipments of explosives, see § 174.103.

#### § 174.20 Local or carrier restrictions.

(a) When local conditions make the acceptance, transportation, or delivery of hazardous materials unusually hazardous, local restrictions may be imposed by the carrier.

(b) Each carrier must report to the Bureau of Explosives for publication the full information as to any restrictions which it imposes against the acceptance, delivery, or transportation of hazardous materials, over any portion of its lines under this section.

### Subpart B—General Operating Requirements

#### § 174.24 Shipping papers.

(a) Except as provided in paragraph (b) of this section, no person may accept for transportation by rail any

hazardous material which is subject to this subchapter unless he has received a shipping paper prepared in the manner specified in Subpart C of Part 172 of this subchapter. In addition, the shipping paper must include a certificate, if required by § 172.204 of this subchapter. However, no member of the train crew of a train transporting the hazardous material is required to have a shipper's certificate on the shipping paper in his possession if the original shipping paper containing the certificate is in the originating carrier's possession.

(b) This subpart does not apply to a material classed as an ORM-A, B, C, or D unless it is a:

- (1) Hazardous substance, or
- (2) Hazardous waste.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-137, 45 FR 34704, May 22, 1980]

#### § 174.25 Additional information on waybills, switching orders and other billings.

(a) Each waybill, switching ticket, switching order or other billing used in place thereof, prepared by the carrier from bills-of-lading, shipping orders or other shipping papers, and each shipping order used as a waybill for a rail car required to be placarded by Subpart F of Part 172 of this subchapter must, in addition to containing the information required by §§ 172.202 and 172.203 of this subchapter, be plainly marked by the carrier with:

(1) In the case of a flatcar carrying trailers or containers, an indication of which trailers or containers contain the hazardous materials; and

(2) The placard endorsement specified in the following table for the hazardous material or class concerned near the space on the face of the billing provided for the car number:

(i) In letters not less than  $\frac{3}{16}$  of an inch, or

(ii) In bold, uppercase letters not less than  $\frac{1}{16}$  of an inch high inside a rectangle made with any symbol such as asterisk (\*), dollar sign (\$), capital (X), or the symbol for number (#).

Hazardous material or class	Placard notation	Placard endorsement
Explosives, class A.....	Placarded EXPLOSIVES A.....	Explosives.
Explosive chemical ammunition containing class A poison.....	Placarded EXPLOSIVES A and POISON GAS.....	Explosives and poison gas.
Explosives, class B.....	Placarded EXPLOSIVES B.....	Dangerous.
Explosives, class C.....	Placarded DANGEROUS.....	Do.
Blasting agent.....	Placard BLASTING AGENTS.....	Do.
Flammable liquids.....	Placarded FLAMMABLE.....	Do.
Flammable solids.....	Placarded FLAMMABLE SOLID.....	Do.
Oxidizer.....	Placarded OXIDIZER.....	Do.
Corrosive material.....	Placarded CORROSIVE.....	Do.
Nonflammable gases.....	Placarded NON-FLAMMABLE GAS.....	Do.
Flammable gases.....	Placarded FLAMMABLE GAS.....	Do.
Poisonous gases or liquids, class A.....	Placarded POISON GAS.....	Poison gas.
Poison, class B.....	Placarded POISON.....	Dangerous.
Radioactive material (Yellow-III label only).....	Placarded RADIOACTIVE.....	Radioactive material.
Organic peroxides.....	Placarded ORGANIC PEROXIDE.....	Dangerous.
Irritating material.....	Placarded DANGEROUS.....	Do.
Combustible liquid.....	Placarded COMBUSTIBLE.....	None.
Chlorine.....	Placarded CHLORINE.....	Dangerous.
Fluorine.....	Placarded POISON.....	Do.
Oxygen, cryogenic liquid.....	Placarded OXYGEN.....	Do.
Tank cars which contain a residue of a hazardous material other than a combustible liquid.....	See Sec. 174.25(c).....	Do.
Tank cars which contain a residue of a combustible liquid.....	See Sec. 174.25(c).....	None.

(b) When the initial movement of a loaded rail car required to be placarded is a switching operation, the switching order, switching receipt, or switching ticket, and all copies thereof, prepared by the shipper, or by the carrier under the shipper's written authority, must contain the following:

(1) The shipping description consisting of:

(i) The proper shipping name specified for the material in § 172.101 or § 172.102 (when authorized) of this subchapter;

(ii) The hazardous class specified for the material in the same Table;

(iii) The identification number (preceded by "UN" or "NA" as appropriate) prescribed for the material in the same Table; and

(iv) The total quantity (by weight, volume, or as otherwise appropriate) of the hazardous material covered by the description.

(2) Except when a certified bill of lading is tendered to the carrier, the shipper's certification and signature specified in § 172.204 of this subchapter.

(3) The placard notation specified in the Table in § 174.25(a).

(4) For any entry for a material that is a hazardous substance, the letters "RQ" entered either before or after the basic description.

(c) The shipping paper for a tank car that contains only the residue of a hazardous material must contain the words "RESIDUE: Last Contained \* \* \*", followed by the basic description of the hazardous material last contained in the tank car and the placard notation specified in the second column of the table in paragraph (a)(2) of this section followed by the word "RESIDUE". For example, "RESIDUE: Last Contained Petroleum Naptha, Combustible liquid, UN 1255, Placarded: COMBUSTIBLE—RESIDUE". For a tank car that contains a residue that is a hazardous substance, the letters "RQ" must also be entered on the shipping paper either before or after the basic description.

(d) At each station, or other point, where any other shipment of material is loaded into a properly certified and placarded rail car containing a shipment of Explosives A, and when a shipment of Explosives A, is transferred or reloaded, or a carload shipment of Explosives A, is reconsigned, the carrier must make a record of the car, originating point, carrier's name and date of car certificate. In addition, the blocking and bracing must be inspected as required in § 174.104 and certified as being in compliance with the requirements of this part by the

person making the inspection who shall sign the car certificates immediately below the signature which appears on Certificate Number 2 of the original car certificates attached to the car.

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

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976]

EDITORIAL NOTE: For Federal Register citations affecting § 174.25, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

#### § 174.26 Notice to train crews of placarded cars.

(a) At each terminal or other place where trains are made up or switched by crews other than train crews accompanying the outbound movement of cars, the carrier shall execute consecutively numbered notices showing the location in each train of each rail car placarded **EXPLOSIVE A** or **POISON GAS**. A copy of each notice must be delivered to the train and engine crew concerned, and a copy thereof showing delivery to the train and engine crew must be kept on file by the carrier at each point where the notice is given. At points where train or engine crews are changed, the notice must be transferred from crew to crew. See paragraph (b) of this section for other placarded cars.

(b) The train crew must have a document indicating the position in the train of each loaded placarded car containing hazardous materials, except when the position is changed or the placarded car is placed in the train by a member of the train crew. A train consist may be used to meet this requirement.

(c) A member of the train crew of a train transporting hazardous materials must have in his possession a copy of the shipping papers for the shipment of hazardous materials being transported showing the information required by §§ 172.202 and 172.203 of this subchapter.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

#### § 174.33 Lost or destroyed labels and placards.

Each carrier shall maintain an adequate supply of the labels and placards specified in Subparts E and F of Part 172 of this subchapter on hand to replace those that become lost or destroyed. The carrier shall replace each lost or destroyed label or placard, as the case may be, based on the information on the shipping papers.

#### § 174.45 Reporting hazardous materials incidents.

When any incident occurs during transportation in which a hazardous material is involved, a report may be required (see §§ 171.15 and 171.16 of this subchapter).

[Amdt. 174-62, 52 FR 8592, Mar. 19, 1987]

#### § 174.47 Correction of violations.

(a) A shipment of explosives discovered to be in violation of any of the requirements of this subchapter may not be forwarded until all discovered violations have been corrected.

(b) Unless leaking, or in a manifestly insecure condition, each package of hazardous materials other than explosives in transit must be forwarded to its destination and a report made of any violation observed.

[Amdt. 174-306, 43 FR 17945, Apr. 27, 1978]

#### § 174.48 Leaking packages other than tank cars.

(a) Leaking packages other than tank cars may not be forwarded until repaired or reconditioned. Leaking or defective packages may be overpacked as required by paragraph (b) of this section. (See §§ 171.15 and 171.16 of this subchapter for reporting requirements.)

(b) Packages of hazardous materials that are damaged or found leaking during transportation, and hazardous materials that have spilled or leaked during transportation, may be forwarded to destination or returned to the shipper in a salvage drum in accordance with the requirements of § 173.3(c) of this subchapter.

[Amdt. 174-306, 43 FR 17945, Apr. 27, 1978, as amended by Amdt. 174-35, 44 FR 60102, Oct. 18, 1979]

## § 174.49 Flammable vapors.

A placarded box car, trailer-on-flat-car container-on-flatcar or car known to contain flammable liquids, gases, or vapors may not be entered with a lighted open-flame lantern, torch, or other fire, until all car doors are opened and sufficient time has been allowed for ventilation and escape of any vapors.

## § 174.50 Leaking tank cars.

(a) A tank car discovered in a leaking condition in transit may not be unnecessarily moved until the unsafe condition has been corrected. In the case of a small leak, short movements may be made if a receptacle is attached under the leak to prevent the spread of the liquid over tracks.

(b) Each leaking tank car must be protected against ignition of the liquid or vapor by flame from sources such as lanterns, torches, flares, fuses, switch lights, switch-thawing flames, fires on sides of tracks, hot coals, lighted pipes, cigars, or cigarettes. All spectators should be kept at a safe distance.

(c) Highly volatile liquids can not be transferred by a vacuum pump unless the pump is placed so that the liquid flows to it from the tank by gravity.

(d) Whenever the leaking condition of a tank car requires the transfer of lading or makes the tank unfit for reloading, the car must be stenciled on both sides in letters three inches in size, adjacent to the car number, "LEAKY TANK. DO NOT LOAD UNTIL REPAIRED". The location of the leak must be indicated and marked with the symbol "X". The owner must be immediately notified by telegram and advised of the exact location of the leak. The stenciling may not be removed until the tank is repaired.

(e) Open-flame lights may not be brought near a placarded tank car that is leaking.

(f) A leaking tank car containing any hazardous material may be switched to a location distant from habitation and highways if the move can be safely made.

**Subpart C—General Handling and Loading Requirements**

## § 174.55 General requirements.

(a) Except as otherwise specifically provided, each package of hazardous materials being transported by rail car must be loaded and blocked and braced as prescribed in this subchapter. For recommended methods of blocking and bracing in cars, truck bodies, or trailers, see Bureau of Explosives Pamphlet Nos. 6 and 6C. See loading and storage chart (§ 174.81) before loading labeled materials together.

(b) Packages of hazardous materials must be loaded and securely blocked and braced to prevent the packages from changing position, falling to the floor, or sliding into each other under shocks normally incident to transportation. This requirement does not preclude the use of loading methods that are designed to permit limited movement of the load and that are approved by the Department.

(c) Each package of hazardous materials bearing markings "THIS SIDE UP" or "THIS END UP" must be handled and loaded, blocked and braced, in the car to remain in the position indicated by the markings during transportation.

(d) A heavy package or container of hazardous materials may be trucked, rolled or moved by skid, fork truck, or other handling devices. It may not be dropped from any truck, platform, or rail car. Planks for rolling trucks from platforms to cars must have beveled edges.

(e) A carrier shall store hazardous materials in a secure location while they are being held for loading or delivery. The carrier shall insure that persons not having business with the carrier do not have access to these hazardous materials.

## § 174.57 Cleaning cars.

All hazardous material which has leaked from a package in any rail car or on other railroad property must be carefully removed.

## § 174.59

### § 174.59 Marking and placarding of rail cars.

No person may transport a rail car carrying hazardous materials unless it is marked and placarded as required by this subchapter. Placards and car certificates lost in transit must be replaced at the next inspection point, and those not required must be removed at the next terminal where the train is classified. For Canadian shipments, required placards lost in transit, must be replaced either by those required by Part 172 of this subchapter or by those authorized under § 171.12a.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-48, 50 FR 41521, Oct. 11, 1985]

### § 174.61 Truck bodies, trailers or freight containers on flatcars.

(a) A truck body, trailer or freight container containing a hazardous material must be designed and loaded so that it will not rupture or become seriously damaged under conditions normally incident to transportation. Each unit must be secured on a flatcar so that it cannot permanently change position during transit. Packages of hazardous materials contained therein must be loaded and braced as provided by §§ 174.101, 174.112, 174.115 and 174.55. Placards must be applied when prescribed by Part 172 of this subchapter and Part 174.

(b) Except as specified in § 173.21, a truck body, trailer, or freight container equipped with heating or refrigerating equipment which has fuel or any article classed as a hazardous material may be loaded and transported on a flat car as part of a joint rail highway movement. The heating or refrigerating equipment is considered to be a part of the truck body or trailer and is not subject to any other requirements of this subchapter. The truck body, trailer, or freight container must be secured on the flatcar so that it cannot change position during transit.

(c) A cargo tank or multi-unit tank car tank containing hazardous materials may not be transported in trailer-on-flatcar, or container-on-flatcar service except under conditions approved by the Federal Railroad Administrator.

## 49 CFR Ch. I (10-1-87 Edition)

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-38, 45 FR 32698, May 19, 1980; Amdt. 174-39, 45 FR 81572, Dec. 11, 1980; Amdt. 174-59, 51 FR 5974, Feb. 18, 1986]

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

(a) A freight container or portable tank containing a hazardous material must be designed and loaded so that it will not rupture, or become seriously damaged under conditions normally incident to transportation. Each unit must be secured in a closed or gondola car, on a flatcar, or in a truck body on a flatcar so that it cannot permanently change position during transit. The ends, sidewalls, or doors of a truck body or trailer may not be relied upon to prevent the shifting of a freight container or portable tank.

(b) A Specification 51, 52, 53, 56 or 57 portable tank may not be transported on flatcars or on flat trailers on flatcars, except under conditions approved by the Federal Railroad Administrator. For cargo tanks and multi-unit tank car tanks, see § 174.61(c).

(c) A Specification 51, 52, 53, 56 or 57 portable tank may be shipped only in a rail car that provides specific facilities for bracing and tie-down of these tanks. If TOFC or COFC service is utilized, the tank should be secured in its trailer body in compliance with Bureau of Explosives Pamphlet 6C.

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

(1) May not be transported in container-on-flat car service (COFC) except under conditions approved by the Associate Administrator for Safety, FRA; and,

(2) May not be transported in trailer-on-flatcar (TOFC) service except under conditions approved by the Associate Administrator for Safety, FRA.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976; Amdt. 174-40, 46 FR 9894, Jan. 29, 1981; Amdt. 174-40A, 46 FR 24186, Apr. 30, 1981]

## § 174.67 Tank car unloading.

(a) In unloading tank cars, the following rules must be observed (see Subpart F of this part for gases):

(1) Unloading operations must be performed only by reliable persons properly instructed in unloading hazardous materials and made responsible for careful compliance with this part.

(2) Brakes must be set and wheels blocked on all cars being unloaded.

(3) Caution signs must be so placed on the track or cars to give necessary warning to persons approaching the cars from the open end of a siding and must be left up until after the cars are unloaded and disconnected from the discharge connection. The signs must be of metal or other comparable material, at least 12 inches high by 15 inches wide in size, and bear the words, "STOP—Tank Car Connected", or "STOP—Men at Work", the word "STOP" being in letters at least 4 inches high and the other words in letters at least 2 inches high. The letters must be white on a blue background.

(4) Before a manhole cover or outlet valve cap is removed from a tank car, the car must be relieved of all interior pressure by cooling the tank with water or by venting the tank by raising the safety valve or opening the dome vent at short intervals. However, if venting to relieve pressure will cause a dangerous amount of vapor to collect outside the car, venting and unloading must be deferred until the pressure is reduced by allowing the car to stand overnight or otherwise cooling the contents. These precautions are not necessary when the car is equipped with a manhole cover which hinges inward or with an inner manhole cover which does not have to be removed to unload the car, and when pressure is relieved by piping vapor into a condenser or storage tank.

(b) After the pressure is released, the seal must be broken and the manhole cover removed as follows:

(1) *Screw type.* The cover must be loosened by placing a bar between the manhole cover lug and knob. After two complete turns, so that vent openings are exposed, the operation must be stopped, and if there is any sound of escaping vapor, the cover must be screwed down tightly and the interior

pressure relieved as prescribed in paragraph (a)(4) of this section, before again attempting to remove the cover.

(2) *Hinged and bolted type.* All nuts must be unscrewed one complete turn, after which same precautions as prescribed for screw type cover must be observed.

(3) *Interior type.* All dirt and cinders must be carefully removed from around the cover before the yoke is unscrewed.

(c) When the car is unloaded through a bottom outlet valve, the manhole cover must be adjusted as follows:

(1) *Screw type.* The cover must be put in place, but not entirely screwed down, so that air may enter the tank through the vent holes in threaded flange of the cover.

(2) *Hinged and bolted type.* A non-metallic block must be placed under one edge of the cover.

(3) *Interior type.* The screw must be tightened up in the yoke so that the cover is brought up within one-half inch of the closed position.

(d) When unloading through the bottom outlet of a car equipped with an interior manhole type cover, and in each case where unloading is done through the manhole (unless a special cover with a safety vent opening and a tight connection for the discharge outlet is used), the manhole must be protected by asbestos or metal covers against the entrance of sparks or other sources of ignition of vapor, or by being covered and surrounded with wet burlap or similar cloth material. The burlap or other cloth must be kept damp by the replacement or the application of water as needed.

(e) Seals or other substances must not be thrown into the tank and the contents may not be spilled over the car or tank.

(f) The valve rod handle or control in the dome must be operated several times to see that outlet valve in bottom of tank is on its seat before valve cap is removed.

(g) The valve cap, or the reducer when a large outlet is to be used, must be removed with a suitable wrench after the set screws are loosened and a pall must be placed in position to catch any liquid that may be in the

outlet chamber. If the valve cap or reducer does not unscrew easily, it may be tapped lightly with a mallet or wooden block in an upward direction. If leakage shows upon starting the removal, the cap or reducer may not be entirely unscrewed. Sufficient threads must be left engaged and sufficient time allowed to permit controlled escape of any accumulation of liquid in the outlet chamber. If the leakage stops or the rate of leakage diminishes materially, the cap or reducer may be entirely removed. If the initial rate of leakage continues, further efforts must be made to seat the outlet valve (see paragraph (f) of this section). If this fails, the cap or reducer must be screwed up tight and the tank must be unloaded through the dome. If upon removal of the outlet cap the outlet chamber is found to be blocked with frozen liquid or any other matter, the cap must be replaced immediately and a careful examination must be made to determine whether the outlet casting has been cracked. If the obstruction is not frozen liquid, the car must be unloaded through the dome. If the obstruction is frozen liquid and no crack has been found in the outlet casting, the car may, if circumstances require it, be unloaded from the bottom by removing the cap and attaching unloading connections immediately. Before opening the valve inside the tank car, steam must be applied to the outside of the outlet casting or wrap casting with burlap or other rags and hot water must be applied to melt the frozen liquid.

(h) Unloading connections must be securely attached to unloading pipes on the dome or to the bottom discharge outlets before any discharge valves are opened.

(i) Tank cars may not be allowed to stand with unloading connections attached after unloading is completed. Throughout the entire period of unloading, and while car is connected to unloading device, the car must be attended by the unloader.

(j) If necessary to discontinue unloading a tank car for any reason, all unloading connections must be disconnected. All valves must first be tightly closed, and the closures of all other openings securely applied.

(k) As soon as a tank car is completely unloaded, all valves must be made tight, the unloading connections must be removed and all other closures made tight, except that heater coil inlet and outlet pipes must be left open for drainage. The manhole cover must be reapplied by the use of a bar or wrench, the outlet valve reducer and outlet valve cap replaced by the use of a wrench having a handle at least 36 inches long, and the outlet valve cap plug, end plug, and all other closures of openings and of their protective housings must be closed by the use of a suitable tool.

(l) Railroad defect cards may not be removed.

(m) If oil or gasoline has been spilled on the ground around connections, it must be covered with fresh, dry sand or dirt.

(n) All tools and implements used in connection with unloading must be kept free of oil, dirt, and grit.

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

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-43, 48 FR 27699, June 16, 1983; 48 FR 50440, Nov. 1, 1983]

#### § 174.69 Removal of placards and car certifications after unloading.

When lading requiring placards or car certificates is removed from a rail car other than a tank car, each placard and car certificate must be removed by the person unloading the car. For a tank car which contained a hazardous material, the person responsible for removing the lading must assure, in accordance with the provisions of § 172.510(c) of this subchapter, that the tank car is properly placarded for any residue which remains in the tank car.

[50 FR 39008, Sept. 26, 1985]

#### § 174.81 Segregation and separation requirements for hazardous materials in rail cars.

(a) Charged electric storage batteries must not be loaded in the same car nor stored with any Class A explosive.

(b) Cyanides or cyanide mixtures must not be loaded or stored with acids or corrosive liquids.

(c) Gas identification sets may be loaded and transported with all articles named in the segregation and separation chart, except those in column c.

(d) Nitric acid, when loaded in the same car with other acids or other corrosive liquids in carboys, must be separated from the other carboys. A 2 by 6 inch plank, set on edge, should be nailed across the floor at least 12 inches from the nitric acid carboys, and the space between the plank and the carboys of nitric acid should be

filled with sand, sifted ashes, or other incombustible absorbent material.

(e) Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one car shall be classed as flammable solid for purposes of transportation when examined for this classification by the Bureau of Explosives and approved by the Director, OHMT.

(f) Hazardous materials may not be loaded, transported, or stored together, except as provided in the following table:



### Subpart D—Handling of Placarded Cars

#### § 174.83 Switching of cars containing hazardous materials.

(a) In switching operations where the use of hand brakes is necessary, a loaded placarded tank car, or a draft which includes a loaded placarded tank car, may not be cut off until the preceding car or cars clear the ladder track and the draft containing the loaded placarded tank car, or a loaded placarded tank car, shall in turn clear the ladder before another car is allowed to follow. In switching operations where hand brakes are used, it must be determined by trial whether a loaded placarded car, or a car occupied by a rider in a draft containing a placarded car, has its hand brakes in proper working condition before it is cut off.

(b) Any car placarded "EXPLOSIVE A" or "POISON GAS" and any Class DOT-113 tank car placarded "FLAMMABLE GAS" may not be:

- (1) Cut off while in motion,
- (2) Coupled into with more force than is necessary to complete the coupling, or
- (3) Struck by any car moving under its own momentum.

(c) When transporting a car placarded "EXPLOSIVES A" in a terminal, yard, or on a side track, or siding, it must be separated from the engine by at least one non-placarded car.

(d) The doors of each closed car placarded "EXPLOSIVES A" must be closed, securely fastened, and the lading securely braced before it is moved.

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

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 74-43, 48 FR 27699, June 16, 1983; 48 FR 50440, 50442, Nov. 1, 1983]

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

(a) A placarded flatcar or a flatcar carrying a placarded trailer, freight container, portable tank or IM porta-

ble tank under this subchapter may not be cut off while in motion.

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

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

[Amdt. 174-40, 46 FR 9894, Jan. 29, 1981]

#### § 174.85 Placement of freight cars placarded "EXPLOSIVES A" in yards, on sidings, or side tracks.

A rail car placarded "EXPLOSIVES A" while in a yard or on a siding or side track must be placed so that it will be safe from all probable danger of fire. A car so placarded may not be placed under a bridge or overhead highway crossing, not in or alongside a passenger shed or station except for loading or unloading purposes.

#### § 174.86 Position in train of cars placarded "EXPLOSIVES A" or "POISON GAS" when accompanied by cars carrying guards or technical escorts.

A rail car placarded "EXPLOSIVES A" or "POISON GAS" in a moving or standing train must be next to and ahead of any car occupied by the guards or technical escorts accompanying this car. However, if a car occupied by guards or technical escorts is equipped with a lighted heater or stove, it must be the fourth car behind any car requiring "EXPLOSIVES A" placards.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976]

#### § 174.87 Placarded cars prohibited in passenger trains, limited in mixed trains.

(a) A placarded rail car may not be transported in a passenger train. However, it may be transported in a mixed train, but only at such times and between such points that freight train service is not in operation and subject to the following limitations:

(1) A placarded car (other than one placarded "COMBUSTIBLE") may not be transported next to an occupied caboose or a car carrying passengers in mixed trains, except as provided in § 174.86.

(2) When a car containing hazardous materials requiring labels is moved in a mixed train and it is not occupied by an employee of the carrier, placards must be applied to the car as required by Subpart F of Part 172 of this subchapter.

**§ 174.88 Position in train of cars placarded "EXPLOSIVES A".**

In a moving or standing train, a car placarded "EXPLOSIVES A" may not be placed nearer than the sixth car from the engine or an occupied caboose. However, when the length of the train will not permit this car to be so placed, it must be placed as near the middle of the train as possible, but not less than the second car from the engine or occupied caboose.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

**§ 174.89 Position in train of cars placarded "RADIOACTIVE".**

In a moving or standing train, a car placarded "RADIOACTIVE" may not be placed next to any other loaded placarded car (other than one placarded "COMBUSTIBLE"), an engine, occupied caboose, or carload of undeveloped film. Cars placarded "RADIOACTIVE" may be placed next to each other.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976]

**§ 174.90 Separating cars placarded "EXPLOSIVES A" or "POISON GAS" from other cars in trains.**

(a) In a moving or standing train, a car placarded "EXPLOSIVES A" or "POISON GAS" may not be placed next to:

(1) A passenger car or combination car that may be occupied except as provided in § 174.86;

(2) Any loaded placarded car other than a car placarded with the same

placard or one placarded "COMBUSTIBLE".

(3) An engine;

(4) A wooden underframe car (except on narrow gauge railroads);

(5) A loaded flatcar, except that loaded cars placarded "EXPLOSIVES A" may be placed next to each other. A flatcar equipped with permanently attached ends of rigid construction is considered to be an open-top car. (See paragraph (a)(6) of this section.)

(6) An open-top car when any of the lading protrudes beyond the car ends or when any of the lading extending above the car ends is liable to shift so as to protrude beyond the car ends;

(7) A car with automatic refrigeration or heating apparatus in operation, or a car with open-flame apparatus in service, or with an internal combustion engine in operation;

(8) A car containing lighted heaters, stoves, or lanterns;

(9) A car occupied by any person, including any attendant for the cargo contained therein; or

(10) An occupied caboose, except as provided in § 174.86.

(b) In a moving or standing train, a car placarded "EXPLOSIVES A" may not be placed next to a car placarded "POISON GAS".

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976]

**§ 174.91 Position in train of loaded placarded tank car other than car placarded "COMBUSTIBLE".**

Except for a tank car placarded "COMBUSTIBLE", a loaded placarded tank car in a moving or standing train may not be nearer than the sixth car from the engine, occupied caboose, or passenger car. However, when the length of the train will not permit a loaded placarded tank car to be so placed, it must be placed as near the middle of the train as possible and not nearer than the second car from the engine, occupied caboose, or passenger car.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976]

§ 174.92 Separating loaded placarded tank cars other than cars placarded "COMBUSTIBLE" from other cars in trains.

(a) In a moving or standing train a loaded placarded tank car, other than one placarded "COMBUSTIBLE", may not be placed next to:

(1) A passenger car or combination car, other than a car occupied by technical escorts and authorized personnel accompanying shipments;

(2) Any car placarded "EXPLOSIVES A", "RADIOACTIVE", or "POISON GAS";

(3) An engine or occupied caboose;

(4) A wooden underframe car (except on narrow gauge railroads);

(5) A loaded flatcar, other than a specially equipped car in trailer-on-flatcar or container-on-flatcar service or a flatcar loaded with vehicles secured by means of a device designed for that purpose and permanently installed on the flatcar, and of a type generally accepted for handling in interchange between railroads subject to the following:

(1) A flatcar equipped with permanently attached ends of rigid construction is considered to be an open-top car (see paragraph (a)(6) of this section); and

(2) This exception for cars in trailer-on-flatcar service does not apply to loaded flatbed trucks, loaded flatbed trailers, loaded open-top trailers, or loaded trucks or trailers without securely closed doors;

(3) An open-top car when any of the lading protrudes beyond the car ends or when any of the lading extending above the car ends is liable to shift so as to protrude beyond the car ends;

(4) A car with automatic refrigeration or heating apparatus in operation or a car with open-flame apparatus in service or with an internal combustion engine in operation;

(5) A car occupied by any person, including any attendant for the cargo contained therein.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976]

§ 174.93 Position in train of a tank car displaying RESIDUE placards.

Except for a tank car placarded COMBUSTIBLE-RESIDUE, a tank

car displaying RESIDUE placards in a moving or standing train may not be placed nearer than the second car from an engine or occupied caboose.

[Amdt. 174-80, 51 FR 23079, June 25, 1986]

### Subpart E—Detailed Requirements for Explosives

§ 174.100 Forbidden explosives.

(a) Explosives described in § 173.51 of this subchapter and initiating explosives, dry, may not be accepted for transportation by rail.

(b) Leaking or damaged packages of explosives may not be accepted for transportation by rail. Unless the carrier has knowledge or the shipper has substantiated to the carrier that a stain is due to contact with material other than a liquid explosive ingredient, the carrier shall refuse any package that shows excessive dampness, mold, or other outward sign of any oily stain, or other indication that absorption of the explosive is not perfect, or that the amount of the liquid part is greater than the absorbent can carry.

§ 174.101 Loading explosives.

(a) Boxes containing Class A explosives must be loaded so that the ends of wooden boxes will not bear against sides of any fiberboard boxes and so that the ends of any box will not cause a pressure point on a small area of another box.

(b) Explosive bombs, unfuzed projectiles, rocket ammunition and rocket motors, Class A or Class B explosives, which are not packed in wooden boxes, or large metal packages of incendiary bombs, each weighing 500 pounds or more, may be loaded in stock cars or in flat bottom gondola cars only if they are adequately braced. Boxed bombs, rocket ammunition and rocket motors, Class A or Class B explosives, which due to their size cannot be loaded in closed cars, may be loaded in open-top cars or on flatcars, provided they are protected from the weather and accidental ignition.

(c) Boxes of high explosives, low explosives or black powder packed in long cartridges, bags, or sift-proof

liners, and containing no liquid explosive ingredient, may be loaded on their sides or ends.

(d) Class A explosives may not be loaded higher than any permanent car lining unless additional lining is provided as high as the lading.

(e) When the lading of a car includes any explosives, the weight of the lading must be distributed insofar as possible to equalize the weight on each side of the car and over the trucks.

(f) Except when boxed, metal kegs containing explosives must be loaded on their sides with their ends toward the ends of the car. Packages of explosives may not be placed in the space opposite the doors unless the doorways are boarded on the inside as high as the lading. This paragraph does not apply to palletized packages if they are braced so they cannot fall or slide into the doorways during transportation.

(g) Wooden kegs, fiber kegs, barrels, and drums must be loaded on their sides or ends, to best suit the conditions.

(h) Packages containing any Class A explosives for (see § 174.104), detonators or detonating primers must be securely blocked and braced to prevent the packages from changing position, falling to the floor, or sliding into each other, under conditions normally incident to transportation. Explosives must be loaded so as to avoid transfer at stations. For recommended methods of blocking and bracing, see Bureau of Explosives Pamphlets No. 6 and 6A. Heavy packages or containers must be trucked, rolled, or moved by skids, fork trucks, or other handling devices and may not be dropped from trucks, platforms, or cars. Planks for rolling trucks from platforms to cars must have beveled ends. Loading platforms and the shoes of each workman must be free from grit. All possible precautions must be taken against fire. Explosives must be kept in a safe place and inaccessible to unauthorized persons while being held by a carrier for loading or delivery.

(i) To prevent delays of local freight trains, when there are shipments of explosives for different destinations loaded in a "peddler car" or "way car"

the shipment for each destination must be stayed separately.

(j) Forwarding and transfer stations for explosives must be provided with the necessary materials for staying.

(k) Shippers must furnish the material for staying packages of explosives loaded by them.

(l) Class A explosives may not be loaded, transported, or stored in a rail car equipped with any type of lighted heater or open-flame device, or electric devices having exposed heating coils, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(m) [Reserved]

(n) A container car or freight container on a flatcar or a gondola car other than a drop-bottom car, when properly loaded, blocked, and braced to prevent change of position under conditions normally incident to transportation, may be used to transport any Class A explosive except black powder packed in metal containers. A freight container must be designed, constructed, and maintained so as to be weather tight and capable of preventing the entrance of sparks. In addition:

(1) A freight container must be of such design and so braced as to show no evidence of failure of the container or the bracing when subjected to impact from each end of at least 8 miles per hour. Its efficiency shall be determined by actual test, using dummy loads equal in weight and general character to material to be shipped.

(2) A container car or car which is loaded with freight containers must be placarded with the explosives placards as required by Subpart F of Part 172 of this subchapter and with properly executed car certificates as required by § 174.104.

(3) Lading must be so loaded, blocked, and braced within the freight container that it will not change position under impact from each end of at least 8 miles per hour.

(o) Class A or Class B explosives may be loaded and transported in a tight closed truck body or trailer on a flat-car car. Wooden boxed bombs, rocket ammunition, and rocket motors, Class

A or Class B explosives, which due to their size cannot be loaded in tight, closed truck bodies or trailers, may be loaded in or on open-top truck bodies or trailers. However, they must be protected against accidental ignition. In addition:

(1) Each truck body or trailer must meet the requirements of Part 177 of this subchapter, applicable to shipments of explosives by motor vehicle.

(2) Each truck body or trailer must be so secured on the rail car so that it will not permanently change position or show evidence of failure or impending failure of the method of securing the truck body or trailer under impact from each end of at least 8 miles per hour. Its efficiency shall be determined by actual test, using dummy loads equal in weight and general character to the material to be shipped. For recommended methods of blocking and bracing, see Bureau of Explosives Pamphlet 6C.

(3) Lading must be so loaded, blocked, and braced within or on the truck body or trailer that it will not change position under impact from each end of at least 8 miles per hour. For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet 6C.

(4) Each rail car containing explosives and each rail car loaded with truck bodies, trailers or containers containing explosives must be placarded with explosives placards as required by Subpart F of Part 172 of this subchapter and with properly executed car certificates as required by § 174.104.

(5) Each fuel tank of a heater or refrigerating machinery on the truck bodies or trailers must be drained and all automatic heating or refrigerating machinery must be made inoperative by disconnection of the automatic controls or the source of power for their operations.

[Amdt. 174-26, 41 FR 18092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-26B, 41 FR 57071, Dec. 30, 1976; Amdt. 174-36, 44 FR 70732, Dec. 10, 1979; Amdt. 174-59, 51 FR 5974, Feb. 18, 1986]

§ 174.102 Forbidden mixed loading and storage.

(a) Class A explosives and initiating or priming explosives may not be transported together in the same rail car. Additionally, they may not be transported or loaded in the same rail car or stored on carrier property with charged electric storage batteries or with any hazardous material for which a NONFLAMMABLE GAS, FLAMMABLE GAS, FLAMMABLE LIQUID, FLAMMABLE SOLID, OXIDIZER, ORGANIC PEROXIDE, RADIOACTIVE or CORROSIVE label is required.

(b) Explosives may not be loaded together or with other hazardous materials, except as provided in § 174.81. See § 174.104 for loading shipments of explosives or any other material in a placarded and certified car containing a shipment of Class A explosives.

§ 174.103 Disposition of damaged or astray shipments.

(a) Packages of explosives found damaged or broken in transit may be repaired when practicable and not dangerous. A broken box of high explosives that cannot be repaired must be reinforced by stout wrapping paper and twine, placed in another strong box and surrounded by dry, fine sawdust or dry and clean cotton waste or elastic wads made from dry newspapers. A ruptured can or keg must be sealed and enclosed in a strong cloth bag of good quality and boxed. Damaged packages thus protected and properly marked may be forwarded. The box and waybill must be marked to indicate that it has been repacked.

(b) Care must be exercised in repacking damaged containers so that no spark is produced by contact of metal or other hard surfaces which could ignite loose particles of explosive compositions that may be strewn on car floors or freight. In addition, the car floors must be thoroughly swept, and washed with a plentiful supply of water. Iron-wheel trucks, metal hammers, or other metal tools that may produce sparks may not be used. Metal tools must be limited to those made of brass, bronze, or copper.

(c) Each package of explosives showing evidence of leakage of liquid ingredients must:

(1) Be refused if leakage is discovered before acceptance;

(2) Be disposed of to a person who is competent and willing to remove them from the carrier's property, if the leakage is discovered while the shipment is in transit; or

(3) Be removed immediately by consignee, if the leakage is discovered at the shipment's destination.

(d) When the disposition required by paragraph (c) of this section cannot be made, the leaking package must be packed in other boxes large enough to permit enclosure and the leaking boxes must be surrounded by at least 2 inches of dry, fine sawdust or dry and clean cotton waste, and be stored in a station magazine or other safe place until the arrival of an inspector of the Bureau of Explosives, or other authorized person, to superintend the destruction or disposition of the condemned material.

(e) If careful inspection shows that an astray shipment of explosives is in proper condition for safe transportation, it must be forwarded immediately to its destination if known, or returned to the shipper by the most practicable route.

(f) When a package in an astray shipment is not in proper condition for safe transportation (see paragraphs (a), (c), and (d) of this section), or when the name and address of the consignee and the shipper are unknown, disposition must be made as prescribed by paragraphs (c) and (d) of this section.

**§ 174.104 Class A explosives; car selection, preparation, inspection, and certification.**

(a) Except as provided in § 174.101 (b), (n), and (o), Class A explosives being transported by rail may be transported only in a certified and properly placarded closed car of not less than 80,000 pounds capacity, with steel underframes and friction draft gear or cushioned underframe, except that on a narrow-gauge railroad they may be transported in a car of less capacity as long as the car of greatest capacity and strength available is used.

(b) Each rail car used for transporting Class A explosives must meet the following requirements as applicable:

(1) The car must be equipped with air brakes, hand brakes, and roller bearings which are in condition for service.

(2) The car may not have any holes or cracks in the roof, sides, ends, or doors through which sparks may enter, or unprotected decayed spots which may hold sparks and start a fire.

(3) The roof of the car must be carefully inspected from the outside for decayed spots, especially under or near the running board, and such spots must be covered or repaired to prevent their holding fire from sparks. A car with a roof generally decayed, even if tight, may not be used.

(4) The doors must close tightly so that sparks cannot get in at the joints, and, if necessary to achieve this degree of tightness, the doors must be stripped. The stripping should be placed on the inside and fastened to the door frames where it will form a shoulder against which the closed doors are pressed by means of wedges or cleats in door shoes or keepers. The openings under the doors should be similarly closed. The hasp fastenings must be examined when the doors closed and fastened, and the doors must be cleated when necessary to prevent them from shifting. When the car is opened for any reason, the wedges or cleats must be replaced before car containing explosives is permitted to proceed.

(5) The roller bearings and the trucks must be carefully examined and put in such condition as to reduce to a minimum the danger of hotboxes or other failure necessitating the setting out of the car before reaching its destination.

(6) The car must be carefully swept out before it is loaded. For less-than-carload shipments the space in which the packages are to be loaded must be carefully swept. If evidence of a potential hazardous residue is apparent after the floor has been swept, the carrier must either decontaminate the car or provide a suitable substitute car.

(7) Any holes in the floor or lining must be repaired and special care

taken that there are no projecting nails or bolts or exposed pieces of metal which may work loose or produce holes in packages of explosives during transit. Protruding nails in the floor or lining which have worked loose must be drawn, and if necessary for the purpose of fastening the floor or lining, new nails must be driven through other parts thereof.

(8) Metal floor plates must be completely covered with wood, plywood, or fiber or composition sheets of adequate thickness and strength to prevent contact of the floor plates with the packages of explosives under conditions incident to transportation, except that the covering of metal floor plates is not necessary for carload shipments loaded by the Department of Defense provided the explosives are of such nature that they are not liable to leakage of dust, powder, or vapor which might become the cause of an explosion.

(9) If the car is equipped with automobile loading devices, it may not be used unless the loading device is securely attached to the roof of the car with fastenings supplementing those already provided and so fixed that it cannot fall.

(10) The car must be equipped with high-friction composition brake shoes (except metal deck flat cars used for COFC/TOFC service may be equipped with high phosphorus cast iron brake-shoes) and brake rigging designed for this type of brake shoe. Each brake shoe on the car must be at least three-eighths inch thick, and in safe and suitable condition for service.

(11) The car must have either a metal subfloor with no combustible material exposed beneath the car, or metal spark shields extending from center sill to side sills and from end sills to at least 12 inches beyond the extreme treads of the inside wheels of each truck, which are tightly fitted against the subfloor so that there is no vacant space or combustible material exposed. The metal subfloor or spark shields may not have an accumulation of oil, grease, or other debris which could support combustion.

(c) Before Class A explosives may be loaded into a rail car, the car must have been inspected and certified to be

in compliance with the requirements of paragraph (b) of this section by a qualified person designated under § 215.15 of this title. The certification shall be made in Car Certificate No. 1 on the form prescribed in paragraph (f) of this section.

(d) If the carrier furnishes the car to a shipper for loading Class A explosives, the shipper or his authorized employee shall, before commencing the loading of the car, inspect the interior thereof, and after loading certify to the proper condition of the car and the loading. This certification shall be made on the first signature line in Car Certificate No. 2 on the form prescribed in paragraph (f) of this section. In addition, the finished load must be inspected and certified to be in compliance with the requirements of this part by a qualified person designated under § 215.15 of this title before the car goes forward. This certification shall be made on the second signature line in Car Certificate No. 2 on the form prescribed in paragraph (f) of this section. If the loading is performed by the carrier, Car Certificate No. 2 may only be signed by a qualified person designated under § 215.15 of this title.

(e) If a trailer or container containing Class A explosives is loaded on a flatcar, the loading and securing of the load on the car must be supervised by a representative of the shipper or carrier. The certification shall be made in Car Certificate No. 3 on the form prescribed in paragraph (f) of this section.

(f) Each car certificate for use in connection with the inspection of rail cars for the carriage of Class A explosives shall be printed on strong tag board measuring 7 by 7 inches, or 6 by 8 inches. It must be duly executed in triplicate by the carrier, and by the shipper if he loads the shipments. The original must be filed by the carrier at the forwarding station in a separate file and the other two must be attached to the car, one to each outer side on a fixed placard board or as otherwise provided.

\_\_\_\_\_  
Railroad

CAR CERTIFICATE

No. 1 \_\_\_\_\_ Station \_\_\_\_\_

## § 174.105

19—.

I hereby certify that I have this day personally examined Car Number \_\_\_\_\_ and that the car is in condition for service and complies with the FRA Freight Car Safety Standards (49 CFR Part 215) and with the requirements for freight cars used to transport explosives prescribed by the DOT Hazardous Materials Regulation (49 CFR Part 174).

---

Qualified Person Designated Under  
49 CFR 215.15

No. 2 \_\_\_\_\_ Station \_\_\_\_\_  
19—.

I have this day personally examined the above car and hereby certify that the explosives in or on this car, or in or on vehicles or in containers have been loaded and braced; that placards have been applied, according to the regulations prescribed by the Department of Transportation; and that the doors of cars so equipped fit or have been stripped so that sparks cannot enter.

---

Shipper or his authorized agent

---

Qualified Person Designated Under  
49 CFR 215.15

No. 3 \_\_\_\_\_ Station \_\_\_\_\_  
19—.

I hereby certify that I have this day personally supervised the loading of the vehicles or containers on and their securement to the above car.

---

Shipper or railway employee inspecting  
loading and securement

NOTE 1: A shipper must decline to use a car not in proper condition.

NOTE 2: All certificates, where applicable, must be signed.

NOTE 3: Car certificates remaining on hand as of the effective date of these regulations may be used until stocks are exhausted but not after July 1, 1977.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976]

EDITORIAL NOTE: For Federal Register citations affecting § 174.104, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

## § 174.105 Routing shipments, Class A explosives.

Before a shipment of Class A explosives destined to a point beyond the lines of the initial carrier is accepted from the shipper, the initial carrier shall ascertain that the shipment can go forward by the route designated.

## 49 CFR Ch. I (10-1-87 Edition)

To avoid delays en route, the initial carrier must be in possession of full rate information before forwarding the shipment.

## § 174.106 "Order-Notify" or "C.O.D." shipments, Class A explosives.

(a) A carrier may not accept for transportation Class A explosives, detonators, or detonating primers in any quantity when consigned to "order-notify" or "C.O.D.," except on a through bill of lading to a place outside the United States.

(b) A carrier may not accept for transportation Class A explosives, detonators, or detonating primers which the shipper consigns to himself unless the shipper has a resident representative to receive them at the delivery point.

(c) A carrier may not accept Class A explosives for transportation subject to "stop-off privileges en route for partial loading or unloading."

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-36, 44 FR 70732, Dec. 10, 1979]

## § 174.107 Shipping days for Class A explosives.

(a) When practicable, each carrier should designate regular days for receiving from shippers less-than-carload lots of Class A explosives for each station where the carrier accepts such shipments.

(b) To enable the carrier to provide proper cars at stations where less-than-carload shipments of Class A explosives are accepted for loading by the carrier, the shipper shall give to the carrier not less than 24-hours' notice of his intention to offer such shipments, and state their destinations. When a regular day to receive all explosives shipments offered at such a station has been designated, this notice may be waived by the carrier, but the explosives shipments must be delivered on such days in time to permit proper inspection, billing, and loading on that day.

## § 174.109 Non-agency shipments.

If a shipment of explosives is accepted by a carrier at a non-agency station, the shipper shall make provision for

proper certification and placarding of cars, examination of shipments, and the loading and staying of packages in cars. Way-bills, switching orders, switching tickets, or other shipping papers must be prepared as prescribed in Part 172 of this subchapter.

§ 174.110 Car magazine.

When specially authorized by the carrier, Class A explosives in quantity not exceeding 150 pounds may be carried in construction or repair cars if the packages of explosives are placed in a "magazine" box made of sound lumber not less than 1 inch thick, covered on the exterior with metal, and provided with strong handles. The box must be plainly stenciled on the top, sides, and ends, in letters not less than 2 inches high, "EXPLOSIVES--DANGEROUS--HANDLE CAREFULLY". The box must be provided with strong hinges and with a lock for keeping it securely closed. Vacant space in the box must be filled with a cushioning material such as sawdust or excelsior, and the box must be properly stayed to prevent movement within the car. The car must be placarded with EXPLOSIVES A placards when the magazine contains Explosives A.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976]

§ 174.112 Loading Class B explosives (Also see § 174.101).

(a) Class B explosives may not be loaded, transported or stored in a rail car equipped with any type of lighted heater or open-flame device, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(b) Except as provided in § 174.101(b), (n), or (o) Class B explosives must be transported in a closed car or container car which is in good condition, and into which sparks cannot enter. The car does not require the car certificates prescribed in § 174.104(c)-(f). If the doors are not tight, they must be stripped to prevent the entrance of sparks. Wood floored cars must be equipped with spark shields (see § 174.104). Packages of Class B explosives must be blocked and braced to prevent their movement

and possible damage due to movement of other freight during transportation. For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet No. 6.

(c) Class B explosives may not be transported in a truck body, trailer, or container on a flatcar unless:

(1) The truck body, trailer, or container is closed and tight;

(2) All automatic heating or refrigerating machinery with which the truck body, trailer, or container is equipped is inoperative; and

(3) Packages of Class B explosives are blocked and braced within the truck body, trailer, or container to prevent their movement and possible damage due to movement of other freight during transportation (ends, sidewalls, or doors of the truck body, trailer, or container may not be relied on to prevent the shifting of heavy loads). For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet No. 6C. See § 174.101(o).

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26B, 41 FR 57072, Dec. 30, 1976]

§ 174.114 Record to be made of change of seals on "EXPLOSIVES A" laden cars.

(a) When a car seal is changed on a car requiring "EXPLOSIVES A" placards while en route or before delivery to a consignee, a record of the change showing the following information must be made on or attached to the waybill or other form of memorandum which must accompany the car to its destination:

Railroad	Place	Date
Car Initials Car Number Number or description of seal broken		
Number or description of seal used to reseal car		
Reasons for opening car		
Condition of load		

Name and occupation of person opening car

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976]

#### § 174.115 Loading Class C explosives.

(a) Class C explosives may be loaded into any closed car in good condition, or into any container car in good condition. Car certificates are not required. Packages of Class C explosives must be blocked and braced to prevent their movement and possible damage due to movement of other freight during transportation. For methods of recommended loading and bracing see Bureau of Explosives Pamphlet No. 6.

(b) Class C explosives may not be transported in a truck body, trailer, or container on a flatcar unless:

(1) The truck body, trailer, or container is closed and tight;

(2) All automatic heating or refrigerating machinery with which the truck body, trailer, or container is equipped is inoperative; and

(3) Packages of Class C explosives are blocked and braced within the truck body, trailer, or container to prevent their movement and possible damage due to movement of other freight during transportation. Ends, side walls, or doors of the truck body, trailer, or container may not be relied on to prevent shifting of heavy loads. For recommended methods of blocking and bracing see Bureau of Explosives Pamphlet No. 6C.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-38, 44 FR 70732, Dec. 10, 1979]

#### Subpart F—Detailed Requirements for Gases

##### § 174.200 Special handling requirements.

(a) Flammable gases may not be loaded, transported, or stored in a rail car equipped with any type of lighted heater or open-flame device, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(b) Flammable gases may not be loaded in a truck body or trailer equipped with any type of lighted

heater or any automatic heating or refrigerating apparatus when such truck bodies or trailers are loaded on flatcars except as provided in paragraph (c) of this section.

(c) Heating or refrigeration apparatus may be operated on a motor vehicle loaded on a flatcar when the motor vehicle is loaded with flammable gases only if:

(1) The lading space is not equipped with any electrical apparatus that is not non-sparking or explosion-proof;

(2) There is no combustion apparatus in the lading space;

(3) There is no connection for the return of air from the lading space to any combustion apparatus; and

(4) The heating system conforms to § 393.77 of this title and does not heat any part of the lading over 130 degrees F.

##### § 174.201 Compressed gas cylinders.

(a) Except as provided in paragraphs (b) and (c) of this section, cylinders containing compressed gases being transported in a rail car must be:

(1) Securely lashed in an upright position so as to prevent their overturning;

(2) Loaded into racks securely attached to the car;

(3) Packed in boxes or crates of such dimensions as to prevent their overturning; or

(4) Loaded in a horizontal position.

(b) Specification DOT-4L (§ 178.57 of this subchapter) cylinders being transported in a rail car must be loaded in an upright position and be securely braced.

(c) Cylinders containing compressed gases may be transported in stock cars, gondola cars and flat cars. However, they may not be transported in hopper bottom cars.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-32, 43 FR 48644, Oct. 19, 1978]

##### § 174.204 Tank car delivery of gases, including cryogenic liquids.

(a) A tank car containing compressed gas may not be unloaded unless it is consigned for delivery and unloaded on a private track (see

§ 171.8 of this subchapter). However, if a private track is not available, it may be delivered and unloaded on carrier tracks subject to the following conditions:

(1) A tank car of DOT-106A or 110A type (§ 179.300 or § 179.301 of this subchapter) may not be delivered and the loaded unit tanks may not be removed from the car frame on carrier tracks. However, a carrier may give permission for the unloading of these containers on carrier tracks only if a private siding is not available within a reasonable trucking distance of the final destination. In addition, before the car is accepted for transportation, the shipper must obtain from the delivering carrier and file with the originating carrier, written permission for the removal and the consignee must furnish an adequately strong mechanical hoist by which the tanks can be lifted from the car and deposited directly upon vehicles furnished by the consignee for immediate removal from carrier property.

(2) The following tank cars may not be delivered and unloaded on carrier tracks unless the lading is piped directly from the car to permanent storage tanks of sufficient capacity to receive the entire contents of the car; however, such cars may be stored on a private track (see § 171.8 of this subchapter) or on carrier tracks designated by the carrier for such storage:

(i) A tank car containing flammable cryogenic liquid; or

(ii) A tank car, except for a DOT-106A or 110A multi-unit tank car tank (§ 179.300 or § 179.301 of this subchapter), containing anhydrous ammonia; hydrogen chloride, refrigerated liquid; hydrocarbon gas, liquefied; or liquefied petroleum gas; and having interior pipes for liquid and gas discharge valves equipped with check valves.

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

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40685, Sept. 20, 1976; Amdt. 174-32, 43 FR 48644, Oct. 19, 1978; Amdt. 174-43, 48 FR 27699, June 16, 1983; 48 FR 50440, 50441, Nov. 1, 1983]

§ 174.208 Rail cars, truck bodies, or trailers with fumigated or treated lading.

(a) A carrier may not accept or transport a rail car or a rail car loaded with a truck body or trailer, containing lading which has been fumigated or treated with a flammable liquid or gas within the preceding 48 hours, unless the truck body or trailer and the car, in the case of a closed car, has been ventilated to remove any danger of fire or explosion due to the presence of flammable vapor.

(b) A rail car or a rail car loaded with a truck body or trailer containing lading which has been fumigated or treated with a poisonous liquid, gas, or solid, must be placarded on each door (or as close as possible to the door if it is not possible to placard the door) with the placard described in § 173.9 of this subchapter.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-42, 48 FR 10244, Mar. 10, 1983]

§ 174.280 Poison gases with foodstuffs.

A carrier may not transport any package of gaseous material bearing a poison label in the same car with material which is marked as or known to be foodstuff, feed, or any other edible material intended for consumption by humans or animals.

§ 174.290 Poison A shipped by, for, or to the Department of Defense.

(a) Poison A shipped by, for, or to the Department of Defense may be transported by rail only if it is loaded and handled in accordance with the requirements of this section.

(b) Poison A may be transported in:

(1) DOT-5A or WD-5A<sup>1</sup> metal drums, by boxcar, gondola car (flat bottom), or stock car in carload lots. See § 174.55(a)(1) through (4) and § 174.600 for blocking, bracing, and stowage requirements;

(2) Tanks which are authorized under this subchapter for Poison A, Specification DOT 106A (§§ 179.300 and 179.301 of this subchapter), mounted on or secured to a multi-unit

<sup>1</sup> War Department specification container.

car or gondola car (flat bottom) in carload lots only;

(3) Bombs, by boxcar, or gondola car (flat bottom) in carload lots only; or

(4) Projectiles or ammunition for cannon with gas filled projectiles, by boxcar in carload or less-than-carload lots.

(c) Each shipment of one or more carloads of Poison A, as described in paragraph (b) of this section, must be accompanied by a Department of Defense qualified escort supplied with equipment to handle leaks and other packaging failures which could result in escape of the gas. The escort shall remain with the shipment during the entire time that it is in the custody of the carrier and in the event of leakage or escape of gas, shall make repairs and perform decontamination as necessary.

(d) When Poison A is transported in a tank, the tank must be securely mounted on a rail car especially provided for it or on a gondola car prepared with substantial wooden frames and blocks.

(e) Bombs, projectiles, and cannon ammunition being transported by rail must be loaded, blocked and braced as shown in Bureau of Explosives Pamphlet No. 6A, or Department of Defense specifications. When a shipment is loaded in a gondola car it must be securely blocked and braced and not loaded higher than the sides of the car.

(f) When Poison A is transported in drums with filling holes in the heads, they must be loaded on their bottoms. They may be loaded in rows, lengthwise of the car and any space between the sides of the car and the nearest row of drums must be "filled in" with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of drums, or they may be loaded across the car in staggered stacks of which the number of drums in alternate stacks is reduced by one drum. All drums in stacks following the first stack loaded in the end of the car must be placed tightly into the angle of the space formed by the sidewalls of the drum in the preceding stack. Any space between the sides of the car and the drums in stacks having the

greater number of drums must be filled in with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of the drums.

(g) When Poison A is transported in drums with filling holes in the sides, they must be loaded on their sides with the filling holes up. They must be loaded lengthwise of the car in rows and any space between the sides of the car and the nearest row of drums must be filled in with wooden boards or lumber nailed to sides of the car sufficient in length and width to contact both hoops of the drums.

(h) When Poison A is transported in drums in a boxcar, they must be loaded from ends of the car toward the space between the car doors, and there braced by center gates and wedges. See Sketch 1, Bureau of Explosives Pamphlet No. 6.

(i) The doorways of a boxcar in which Poison A is being transported must be protected by one of the methods prescribed in Sketch 1, Bureau of Explosives Pamphlet No. 6A.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976]

### Subpart G—Detailed Requirements for Flammable Liquids

#### § 174.300 Special handling requirements.

(a) Flammable liquids may not be loaded, transported, or stored in a rail car equipped with any type of lighted heater or open-flame device, or in a rail car equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

(b) A truck body or trailer which is loaded with a flammable liquid and equipped with a lighted heater or any automatic heating or refrigerating apparatus may not be loaded on a flatcar except as provided in paragraph (c) of this section.

(c) Heating or refrigeration apparatus on a motor vehicle loaded with flammable liquids may be operated while the motor vehicle is loaded on a flatcar only if:

(1) The lading space is not equipped with any electrical apparatus that is not non-sparking or explosion-proof;

(2) There is no combustion apparatus in the lading space;

(3) There is no connection for the return of air from the lading space to any combustion apparatus; and

(4) The heating system conforms to § 393.77 of this title and does not heat any part of the lading over 130 degrees F.

(d) Cylinders containing pyrophoric liquids, unless packed in strong box or case and secured therein to protect valves, must be loaded with all valves and safety relief devices in the vapor space. All cylinders must be secured so that no shifting may occur in transit.

(e) Metal barrels or drums containing flammable liquids may be transported in a steel gondola or flatcar or in a stock car. However, they may not be transported in a hopper bottom car.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-31, 43 FR 31143, July 20, 1978]

#### § 174.304 Flammable liquids in tank cars.

A tank car containing a flammable liquid, other than liquid road asphalt or tar, may not be transported by rail unless it is originally consigned or subsequently reconsigned to a party having a private track on which it is to be delivered and unloaded (see § 171.8 of this subchapter) or to a party using railroad siding facilities which are equipped for piping the liquid from the tank car to permanent storage tanks of sufficient capacity to receive the entire contents of the car.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-32, 43 FR 48644, Oct. 19, 1978]

#### § 174.380 Poisonous flammable liquids with foodstuffs.

A carrier may not transport any package of flammable liquid bearing a poison label in the same car with material which is marked as or known to be food-stuffs, feed, or any other edible material intended for consumption by humans or animals.

### Subpart H—Detailed Requirements for Flammable Solids

#### § 174.410 Special handling requirements for matches.

(a) Each carload lot of strike-anywhere (friction) matches must be loaded as compactly as possible to avoid motion within the car, especially lengthwise of the car. Protruding nails, metal band anchors or other projections on sidewalls, ends, door posts, studding, or car floors likely to puncture packages must be removed or adequately covered to prevent damage to the containers of matches. Car doorways must be boarded on the inside to keep the packages from contacting the doors, and the inside lining of the car must be supplemented when necessary by strips nailed to the car and close enough together to keep the boxes from being jammed against the studding and broken by high pressures on small areas. The strongest dimension of the box must be loaded lengthwise of the car. Partial layers of boxes must be interlocked with the lower layers. The cars used must be made secure against the entrance of sparks or rain.

(b) Each carload lot of strike-anywhere matches handled subject to stop-off privileges must be loaded in accordance with paragraph (a) of this section and when necessary the load must be rearranged or blocked and braced by each consignee before forwarding.

(c) Each less-than-carload lot of strike-anywhere matches must be loaded so that it cannot fall and so that other packages of freight cannot fall on or injure it. Whenever practicable the packages of matches must be placed so as to facilitate ready removal in case of fire.

(d) A carload or less-than-carload lot of strike-anywhere matches which has been damaged by fire, or by water in extinguishing a fire, in transit or on a carrier's property must be reloaded in properly prepared cars, and braced or blocked before being forwarded to destination, to a freight claim department or claim adjuster, or to the original shipper or other party for salvage. Care must be taken to examine and

repair damaged outside packages before reloading into car. All loose matches must first be destroyed. Individual interior boxes and paper-wrapped cartons or packages, must then be carefully placed in tight outside packages complying, as nearly as practical, with container specifications, but under no condition shall the outside package be of less strength than required by Specification 15A or 12C (§§ 178.168, 178.206 of this subchapter), nor of greater capacity than authorized. Charred cases may not be used. Boards used in repairing wooden cases must be so nailed that they will not allow any interior boxes, cartons, or packages to fall out. If the individual boxes or paper-wrapped packages do not fit snugly in the outside package, the vacant spaces must be filled tightly with dry and clean cotton waste, or elastic wads of dry newspapers or dry waste paper.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976]

#### § 174.450 Fires.

(a) *Cotton*. When fire occurs in a rail shipment of cotton in transit at a point where it cannot be reconditioned and where arrangements cannot be made with the originating carrier to sell it, all burnt cotton in the shipment must be stored under observation in as safe a place as practicable where it shall be held for not less than 10 days after all evidence of fire has been extinguished before forwarding. The billing must be changed to read "Burnt Cotton" and the cotton must be forwarded as a hazardous material. (See § 173.159 of this subchapter.)

(b) *Charcoal*. When fire occurs in a rail shipment of charcoal in transit, water should not be used if it is practicable to locate and remove the burning charcoal. Any charcoal which has become wet in extinguishing a fire must be removed from the car and not reshipped and the remainder of the charcoal must be held under observation in a dry place for at least five days before forwarding.

#### § 174.480 Poisonous flammable solids with foodstuffs.

A carrier may not transport any package of flammable solid material bearing a poison label in the same car with material which is marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26B, 41 FR 57072, Dec. 30, 1976]

### Subpart I—Detailed Requirements for Oxidizers

#### § 174.510 Special handling requirements for nitrates.

A nitrate listed in § 173.182(b) of this subchapter being transported by rail may only be transported in a clean closed car, which is free of loose boards, cracks, holes, and exposed decayed spots. The interior of the car must be swept clean and be free of any projections capable of damaging bags when the nitrate is so packaged. The doors of the car must have tight closures. Ammonium nitrate (no organic coating), ammonium nitrate fertilizer (materials tested in accordance with and meeting the definition in the Fertilizer Institute's publication "Definition and Test Procedures for Ammonium Nitrate Fertilizer", dated May 7, 1971), ammonium nitrate mixed fertilizer, or ammonium nitrate phosphate may be transported in bulk in a clean covered hopper car having journals and boxes in good condition.

#### § 174.515 Cleaning cars; potassium permanganate.

After potassium permanganate is unloaded from a rail car, the car must be thoroughly cleaned unless the car is used exclusively in the carriage of potassium permanganate.

#### § 174.580 Poisonous oxidizers with foodstuffs.

A carrier may not transport any package of oxidizer material bearing a poison label in the same car with material which is marked as or known to be foodstuff, feed, or any other edible

material intended for consumption by humans or animals.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976]

**Subpart J—Detailed Requirements for Poisonous Materials**

**§ 174.600 Special handling requirements for Poison A materials.**

A tank car containing Poison A may not be transported by rail unless it is originally consigned or subsequently reconsigned to a party having a private track on which it is to be delivered and unloaded (see § 171.8 of this subchapter) or to a party using railroad siding facilities which are equipped for piping the liquid or gas from the tank car to permanent storage tanks or sufficient capacity to receive the entire contents of the car.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-39, 45 FR 81572, Dec. 11, 1980]

**§ 174.615 Cleaning cars.**

(a) A rail car which has contained arsenic, arsenate of lead, sodium arsenate, calcium arsenate, Paris green, calcium cyanide, potassium cyanide, sodium cyanide, or other poisonous materials which show any evidence of leakage from packages, must be thoroughly cleaned after unloading before the car is returned to service.

(b) After poisonous materials are unloaded from a rail car, that car must be thoroughly cleaned unless the car is used exclusively in the carriage of poisonous materials.

**§ 174.680 Poisons with foodstuffs.**

A carrier may not transport any package of material bearing a poison label in the same car with material which is marked as or known to be foodstuffs, feed, or any other edible material intended for consumption by humans or animals.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976]

**Subpart K—Detailed Requirements for Radioactive Materials**

**§ 174.700 Special handling requirements for radioactive materials.**

(a) Each rail shipment of low specific activity materials as defined in § 173.403 of this subchapter must be loaded so as to avoid spillage and scattering of loose material. Loading restrictions are prescribed in § 173.425 of this subchapter.

(b) The number of packages of radioactive materials that may be transported in any rail car or stored at any single location is limited to that number which does not make a total transport index number (as defined in § 173.403(bb) of this subchapter, and determined by adding together the transport index numbers on the labels of the individual packages) of more than 50. This provision does not apply to exclusive use shipments as described in §§ 173.403, 173.425, 173.441, and 173.457.

(c) Each package of radioactive material bearing RADIOACTIVE YELLOW-II or RADIOACTIVE YELLOW-III labels when being placed in a rail car, depot, or other place may not be placed closer than three feet to an area (or dividing partition between areas) which may be continuously occupied by any passenger, rail employee, or shipment of animals, nor closer than 15 feet to any package containing undeveloped film (if so marked). If more than one package of radioactive materials is present, the distance must be computed from the table below on the basis of the total transport index number (determined by adding together the transport index numbers on the labels of the individual packages) of packages in the car or storeroom:

Total transport index	Minimum separation distance in feet to nearest undeveloped film <sup>1</sup>	Minimum distance in feet to area of persons, or minimum distance in feet from dividing partition of a combination car <sup>2</sup>
None.....	0	0
0.1 to 10.0.....	15	3

Total transport index	Minimum separation distance in feet to nearest undeveloped film <sup>1</sup>	Minimum distance in feet to area of persons, or minimum distance in feet from dividing partition of a combination car <sup>2</sup>
10.1 to 20.0 .....	22	4
20.1 to 30.0 .....	29	5
30.1 to 40.0 .....	33	6
40.1 to 50.0 .....	36	7

<sup>1</sup> In feet to nearest undeveloped film.

<sup>2</sup> In feet to area of persons, or minimum distance in feet from dividing partition of a combination car.

**NOTE:** The distance in the table must be measured from the nearest point on the packages of radioactive materials.

(d) Each fissile Class III radioactive material shipment (as defined in § 173.455(a)(3) of this subchapter) must be transported in accordance with one of the methods prescribed in § 173.457 of this subchapter. The transport controls must be adequate to assure that no fissile Class III shipment is transported in the same rail car with any other fissile radioactive material shipment. In loading and storage areas each fissile Class III shipment must be segregated by a distance of at least 20 feet from other packages required to bear one of the "radioactive" labels described in Part 172 of this subchapter.

(e) A flatcar may be used to transport radioactive materials in a container weighing 15,000 pounds or more. A gondola car (other than a drop bottom car) may be used to transport any of the following:

- (1) Radioactive materials in containers weighing 5,000 pounds or more;
- (2) Strong wooden boxes with inside containers of solid radioactive material, securely braced and cushioned; or
- (3) Radioactive material in concrete-filled metal drums or in concrete vaults weighing 700 pounds or more.

(f) A person may not remain unnecessarily in a rail car containing radioactive materials.

(g) In the case of packages shipped under the exclusive use provisions of § 173.441(b) for packages with external radiation levels in excess of 200 millirem per hour at the package surface:

(1) The rail car shall meet the requirements for a closed transport vehicle (§ 173.403 of this subchapter);

(2) Provisions shall be made to secure the packages so that their position within the rail car remains fixed under conditions normally incident to transportation; and

(3) The radiation level shall not exceed 2 millirem per hour in any normally occupied position in the transport vehicle or adjacent rail car.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976]

**EDITORIAL NOTE:** For Federal Register citations affecting § 174.700, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 174.715 Cleanliness of cars after use.

(a) Each transport vehicle used for transporting radioactive materials as exclusive use, as defined in § 173.403 of this subchapter, must be surveyed with appropriate radiation detection instruments after each use. A vehicle may not be returned to service until the radiation dose rate at any accessible surface is 0.5 millirem per hour or less, and there is no significant removable radioactive surface contamination, as defined in § 173.443 of this subchapter.

(b) This section does not apply to any rail car used solely for transporting radioactive materials if a survey of the interior surface of the car shows that the radiation dose rate does not exceed 10 millirem per hour at the interior surface or 2 millirem per hour at 3 feet from any interior surface. The car must be stenciled with the words "FOR RADIOACTIVE MATERIALS USE ONLY" in lettering at least 3 inches high in a conspicuous place on both sides of the exterior of the car and it must be kept closed at all times other than during loading and unloading.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976; Amdt. 174-39, 45 FR 81572, Dec. 11, 1980; Amdt. 174-42, 48 FR 10245, Mar. 10, 1983]

§ 174.750 Incidents involving leakage.

(a) In addition to the incident reporting requirements of §§ 171.15 and 171.16 of this subchapter, the carrier

shall also notify the shipper at the earliest practicable moment following any incident in which there has been breakage, spillage, or suspected radioactive contamination involving radioactive materials shipments. Vehicles, buildings, areas, or equipment in which radioactive materials have been spilled may not be again placed in service or routinely occupied until the radiation dose rate at any accessible surface is less than 0.5 millirem per hour and there is no significant removable radioactive surface contamination (see § 173.443 of this subchapter).

(b) The package or materials should be segregated as far as practicable from personnel contact. If radiological advice or assistance is needed, the U.S. Department of Energy (DOE) should also be notified. In case of obvious leakage, or if it appears likely that the inside container may have been damaged, care should be taken to avoid inhalation, ingestion, or contact with the radioactive material. Any loose radioactive materials should be left in a segregated area and held pending disposal instructions, from qualified persons. Information involving the handling of radioactive materials in the event of a wreck may be found in Bureau of Explosives Pamphlet No. 1 and No. 2.

[Amdt. 174-28, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-42, 48 FR 10245, Mar. 10, 1983; Amdt. 174-61, 51 FR 34987, Oct. 1, 1986]

#### **Subpart L—Detailed Requirements for Corrosive Materials**

##### **§ 174.800 Special handling requirements for corrosive materials.**

(a) Carboys of corrosive liquids may not be transported by rail in a container car. Packages of corrosive liquids being transported in a rail car must be loaded, blocked, and braced so that they cannot change position during transportation due to shocks normally incident to transportation. Car doors may be cleated in an open position. Carboys of acid may be transported on a flat or stock car.

(b) When a less-than-carload shipment of corrosive liquids is loaded in a

rail car with other freight, the carboys must be placed near the doorway of the car and must have wooden strips not less than 3 inches in height nailed to the car floor about 8 inches from the bracing. These strips must be arranged so that the liquid from a broken carboy will drain toward the doorway and outside the car. The space between the strips and the floor braces or blocking used for staying the carboy boxes must be covered with at least 1 inch thickness of clean and dry sand or earth, not sawdust or other combustible material.

(c) A carrier may not accept any carboy previously used for the shipment of corrosive liquids for transportation as an empty carboy unless it has been thoroughly and completely drained. The carrier must handle them with the necks up.

##### **§ 174.810 Special handling requirements for wet electric storage batteries.**

(a) Electric storage batteries (wet) for shipment by rail must be completely protected so that short circuits will be prevented and may not be loaded or stored with explosives.

(b) Wet electric storage batteries, and electrolyte must be packed as required by § 173.258 of this subchapter for transportation by rail and must be blocked and braced in the rail car so they cannot change position during transportation due to shocks normally incident to transportation. They must be loaded so that other freight cannot fall onto or slide against them. They may be transported in a gondola car or on a flatcar. However, they may not be transported in a hopper bottom car.

(c) Wet electric storage batteries are not authorized in refrigerator or "plug-door" type cars unless the cars are provided with vents which will prevent an accumulation of gas within the car.

[Amdt. 174-26, 41 FR 16092, Apr. 5, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976; Amdt. 174-26B, 41 FR 57072, Dec. 30, 1976]

##### **§ 174.812 Special handling requirements for nitric acid.**

(a) Carboys of nitric acid may not be transported in a boxcar or in a truck

body or trailer on a flatcar more than two tiers high except that completely boxed carboys, DOT-1D, may be loaded three tiers high.

(b) Nitric acid, being transported by rail, with other corrosive liquids in carboys, must be separated from the other carboys. A 2 x 6 inch plank, set on edge, must be nailed across the car floor at least 12 inches from the nitric acid carboys and the space between the plank and the carboys of nitric acid must be filled with sand, sifted ashes, or other noncombustible absorbent material.

[Amdt. 174-26, 41 FR 16092, Apr. 15, 1976, as amended by Amdt. 174-26A, 41 FR 40686, Sept. 20, 1976]

**Subpart M—Detailed Requirements for Other Regulated Materials**

§ 174.840 Special loading and handling requirements for asbestos.

Asbestos must be loaded, handled, and unloaded, and any asbestos contamination of rail cars removed, in a manner that will minimize occupational exposure to airborne asbestos particles released incident to transportation. (See § 173.1090 of this subchapter.)

[Amdt. 174-33, 43 FR 56668, Dec. 4, 1978]

**PART 175—CARRIAGE BY AIRCRAFT**

**Subpart A—General Information and Regulations**

Sec.

- 175.1 Purpose and scope.
- 175.3 Unacceptable hazardous materials shipments.
- 175.5 Applicability.
- 175.10 Exceptions.
- 175.20 Compliance.
- 175.25 Informing passengers about hazardous materials restrictions.
- 175.30 Accepting and inspecting shipments.
- 175.31 Reports of discrepancies.
- 175.33 Notification of pilot-in-command.
- 175.35 Shipping papers aboard aircraft.
- 175.40 Keeping and replacement of labels.
- 175.45 Reporting hazardous materials incidents.

**Subpart B—Loading, Unloading and Handling**

- 175.75 Quantity limitations aboard aircraft.

Sec.

- 175.78 Stowage compatibility of cargo.
- 175.79 Orientation of cargo.
- 175.81 Securing of packages containing hazardous materials.
- 175.85 Cargo location.
- 175.88 Inspection of unit load devices.
- 175.90 Damaged shipments.

**Subpart C—Specific Regulations Applicable According to Classification of Material**

- 175.305 Self-propelled vehicles.
- 175.310 Transportation of flammable liquid fuel in small, passenger-carrying aircraft.
- 175.320 Cargo aircraft only; only means of transportation.
- 175.630 Special requirements for poisons and etiologic agents.
- 175.640 Special requirements for other regulated materials.
- 175.700 Special limitations and requirements for radioactive materials.
- 175.701 Separation distance requirements for packages containing radioactive materials in passenger-carrying aircraft.
- 175.702 Requirements for carriage of packages containing radioactive materials in a cargo aircraft only.
- 175.703 Other special requirements for the acceptance and carriage of packages containing radioactive materials.
- 175.705 Inspection of aircraft for contamination by radioactive materials.

AUTHORITY: 49 App. U.S.C. 1803, 1804, 1805, 1807, 1808; 49 App. U.S.C. 1472(h) (1); 49 CFR Part 1.

SOURCE: Amdt. 175-1, 41 FR 16106, Apr. 15, 1976, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes to Part 175 appear at 43 FR 48645, Oct. 19, 1978 (Amdt. 175-6) and at 50 FR 45731, Nov. 1, 1985.

**Subpart A—General Information and Regulations**

§ 175.1 Purpose and scope.

This part prescribes requirements, in addition to those contained in Parts 171, 172 and 173 of this subchapter, applicable to aircraft operators transporting hazardous materials aboard (including attached to or suspended from) aircraft.

[Amdt. 175-15, 45 FR 35332, May 27, 1980]

§ 175.3 Unacceptable hazardous materials shipments.

Hazardous materials that are not prepared for shipment in accordance with this subchapter may not be accepted for transportation or transported aboard an aircraft.

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

[Amdt. 175-25, 47 FR 54822, Dec. 8, 1982]

§ 175.5 Applicability.

(a) This part applies to the acceptance for transportation, loading and transportation of hazardous materials in any aircraft in the United States and in aircraft of United States registry anywhere in air commerce. This part does not apply to:

(1) Aircraft owned and operated by a government when not engaged in carrying persons or property for commercial purposes;

(2) Aircraft which are not owned by a government nor engaged in carrying persons or property for commercial purposes but which are under the exclusive direction and control of a government for a period of not less than 90 days as specified in a written contract or lease. An aircraft is under the exclusive direction and control of a government when the government exercises responsibility for:

(i) Approving crew members and determining that they are qualified to operate the aircraft;

(ii) Determining the airworthiness and directing maintenance of the aircraft; and

(iii) Dispatching the aircraft, including the times of departure, airports to be used, and type and amount of cargo to be carried;

(3) Aircraft of United States registry under lease to and operated by foreign nationals outside the United States if:

(i) Hazardous materials forbidden aboard aircraft by § 172.101 of this subchapter are not carried on the aircraft; and

(ii) Other hazardous materials are carried in accordance with the regulations of the State (nation) of the aircraft operator.

[Amdt. 175-15, 45 FR 35332, May 27, 1980]

§ 175.10 Exceptions.

(a) This subchapter does not apply to:

(1) Aviation fuel and oil in tanks that are in compliance with the installation provisions of 14 CFR, Chapter 1.

(2) Hazardous materials required aboard an aircraft in accordance with the applicable airworthiness requirements and operating regulations. Unless otherwise approved by the Director, Office of Hazardous Materials Transportation, items of replacement for such hazardous materials must be transported in accordance with this subchapter except that—

(i) In place of the required packagings, packagings specially designed for the transport of aircraft spares and supplies may be used, provided such packagings provide at least an equivalent level of protection to those that would be required by this subchapter;

(ii) Aircraft batteries are not subject to quantity limitations such as those provided in § 172.101 or § 175.75(a) of this subchapter; and,

(iii) A tire assembly with a serviceable tire is not subject to the provisions of this subchapter provided the tire is not inflated to a gauge pressure exceeding the maximum rated pressure for that tire.

(3) Hazardous materials loaded and carried in hoppers or tanks of aircraft certificated for use in aerial seeding, dusting, spraying, fertilizing, crop improvement, or pest control, to be dispensed during such an operation.

(4) Non-radioactive medicinal and toilet articles carried by a crewmember or passenger in checked or carry-on baggage, and aerosols, with no subsidiary risk, for sporting or home use, when carried in checked baggage only, when:

(i) The total capacity of all the containers used by a crewmember or passenger does not exceed 75 ounces (net weight ounces and fluid ounces);

(ii) The capacity of each container other than an aerosol container does not exceed 16 fluid ounces or 1 pound of material.

(5) Small-arms ammunition for personal use carried by a crewmember or passenger in his baggage (excluding

carry-on baggage) if securely packed in fiber, wood, or metal boxes.

(6) [Reserved]

(7) Oxygen, or any hazardous material used for the generation of oxygen, carried for medical use by a passenger in accordance with 14 CFR 121.574 or 135.114.

(8) Human beings and animals with an implanted medical device, such as a heart pacemaker, that contains radioactive material or with radio-pharmaceuticals that have been injected or ingested.

(9) Smoke grenades, flares, or similar devices carried only for use during a sport parachute jumping activity.

(10) Personal smoking materials intended for use by any individual when carried on his person except lighters with flammable liquid reservoirs and containers containing lighter fluid for use in refilling lighters.

(11) Smoke grenades, flares, and pyrotechnic devices affixed to aircraft carrying no person other than a required flight crewmember during any flight conducted at and as a part of a scheduled air show or exhibition of aeronautical skill. The affixed installation accommodating the smoke grenades, flares, or pyrotechnic devices on the aircraft must be approved by the FAA for its intended use.

(12) Hazardous materials which are loaded and carried on or in cargo aircraft only and which are to be dispensed or expended during flight for weather control, forest preservation and protection, flood control, or avalanche control purposes when the following requirements are met:

(i) Operations may not be conducted over densely populated areas, in a congested airway, or near any airport where air carrier passenger operations are conducted.

(ii) Each operator shall prepare and keep current a manual containing operational guidelines and handling procedures, for the use and guidance of flight, maintenance, and ground personnel concerned in the dispensing or expending of hazardous materials. The manual must be approved by the FAA Civil Aviation Security Office responsible for the operator's overall aviation security program or the FAA Civil Aviation Security Office in the

region where the operator is located. Each operation must be conducted in accordance with the manual.

(iii) No person other than a required flight crewmember, FAA inspector, or person necessary for handling or dispensing the hazardous material may be carried on the aircraft.

(iv) The operator of the aircraft must have advance permission from the owner of any airport to be used for the dispensing or expending operation.

(v) When dynamite and blasting caps are carried for avalanche control flights, the explosives must be handled and, at all times, be under the control of the blaster who is licensed under a state or local authority identified in writing to the FAA Civil Aviation Security Office responsible for the operator's overall aviation security program or the FAA Civil Aviation Security Office in the region where the operator is located.

(13) Carbon dioxide, solid (dry ice) in quantities not exceeding 5 pounds per package packed as prescribed by § 173.615(a) of this subchapter and used as a refrigerant for the contents of the package. The package must be marked with the name of the contents being cooled, the net weight of the dry ice or an indication that the net weight is 5 pounds or less, and also marked "Carbon Dioxide, Solid" or "Dry Ice."

(14) A transport incubator unit necessary to protect life or an organ preservation unit necessary to protect human organs provided:

(i) The compressed gas used to operate the unit is in an authorized DOT specification cylinder and is marked, labeled, filled and maintained as prescribed by this subchapter;

(ii) Each battery used in the operation of the unit is of the nonspillable type;

(iii) The unit is constructed so that valves, fittings, and gauges are protected from damage;

(iv) The pilot in command is advised when the unit is on board, and when it is intended for use;

(v) The unit is accompanied by a person qualified to operate it;

(vi) The unit is secured in the aircraft in a manner so as not to restrict access to or use of any required emer-

gency or regular exit or of the aisle in the passenger compartment; and,

(vii) Smoking within ten feet of the unit is prohibited.

(15) Alcoholic beverages, perfumes, colognes, and liquefied gas lighters that have been examined by the Bureau of Explosives (B of E) and approved by the Director, Office of Hazardous Materials Transportation, carried aboard a passenger-carrying aircraft by the operator for use or sale on the aircraft.

(16) Alcoholic beverages, perfumes and colognes, purchased through duty free sales, carried by passengers or crew as carry-on baggage.

(17) Carbon dioxide, solid (dry ice) intended for use in food and beverage service aboard aircraft and dry ice in quantities not exceeding 4 pounds per passenger when used to pack perishables in carry-on baggage provided the package permits the release of carbon dioxide gas.

(18) Carbon dioxide gas cylinders worn by passengers for the operation of mechanical limbs and spare cylinders of a similar size for the same purpose in sufficient quantities to ensure an adequate supply for the duration of the journey.

(19) Wheel chairs with non-spillable batteries, as defined in § 173.260(d) of this subchapter, as checked baggage, provided that the battery is disconnected, the battery terminals are insulated to prevent accidental short circuits, and the battery is securely attached to the wheel chair.

(20) Wheel chairs with spillable batteries, as checked baggage, provided that the wheel chair can be loaded, stowed, secured, and unloaded always in an upright position. The battery must be disconnected, the terminals insulated to prevent accidental short circuits, and the battery securely attached to the wheel chair. The pilot-in-command must be advised either orally or in writing of the location of the wheel chair aboard the aircraft prior to departure. If the wheel chair cannot be loaded, stowed, secured and unloaded always in an upright position, the battery must be removed and the wheel chair may then be carried as checked baggage without restriction. The removed battery must be carried

in strong, rigid, outside packagings as follows:

(i) Outside packagings must be leak-tight, impervious to battery fluid, loaded aboard the aircraft in accordance with the required orientation markings and be protected against upset by securing to pallets or by securing them in cargo compartments using appropriate means of securement (other than by bracing with freight or baggage) such as by use of restraining straps, brackets or holders;

(ii) Batteries must be protected against short circuits, secured upright in their outside packagings, and surrounded by compatible absorbent material sufficient to absorb their total liquid contents; and

(iii) Outside packagings must be marked to indicate proper orientation, and with the words "Battery, wet, with wheel chair", and be labeled with a Corrosive label.

(21) Catalytic hair curlers containing hydrocarbon gas, not more than one per passenger or crew member, when carried in checked baggage, provided that the safety cover is securely fitted over the heating element. Gas refills for such curlers are not permitted in checked or carry-on baggage.

(22) A mercurial barometer carried as carry-on-baggage only, by a representative of a government weather bureau or similar official agency, provided that individual advises the operator of the presence of the barometer in his baggage. The barometer must be packaged in a strong outer packaging having sealed inner liner or bag of strong, leak proof and puncture-resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position. The pilot-in-command must be informed of the presence of any such barometer by the operator of the aircraft.

(49 U.S.C. 1803, 1804, 1806, 1808; 49 CFR 1.53, App. A to Part 1)

[Amdt. 175-1, 41 FR 16106, Apr. 15, 1976]

EDITORIAL NOTE: For Federal Register citations affecting § 175.10, see the List of CFR Sections Affected appearing in the Finding Aids section of this volume.

§ 175.20 Compliance.

Unless the regulations in this subchapter specifically provide that another person must perform a duty, each operator shall comply with all the regulations in Parts 106, 171, 172, and 175 of this subchapter and shall thoroughly instruct his employees in relation thereto. (See 14 CFR 121.135, 121.401, 121.433a, 135.323, 135.327 and 135.333.)

[Amdt. 175-1, 41 FR 16106, Apr. 15, 1976, as amended by Amdt. 175-18, 45 FR 81572, Dec. 11, 1980; Amdt. 175-38, 51 FR 34987, Oct. 1, 1986]

§ 175.25 Informing passengers about hazardous materials restrictions.

(a) Each aircraft operator who engages in for hire transportation of passengers shall display notices to passengers concerning the requirements and penalties associated with the carriage of hazardous materials aboard aircraft. Such a notice shall be prominently displayed in each location at an airport where the aircraft operator issues tickets, checks baggage, and maintains aircraft boarding areas.

(1) Each notice must contain the following information:

Federal law forbids the carriage of hazardous materials aboard aircraft in your luggage or on your person.

A violation can result in penalties of up to \$25,000 and 5 years imprisonment. (49 U.S.C. 1809)

Hazardous materials include explosives, compressed gases, flammable liquids and solids, oxidizers, poisons, corrosives and radioactive materials.

Examples: Paints, lighter fluid, fireworks, tear gases, oxygen bottles, and radio-pharmaceuticals.

There are special exceptions for small quantities (up to 75 ounces total) of medicinal and toilet articles carried in your luggage and certain smoking materials carried on your person.

For further information contact your airline representative.

(2) The information contained in paragraph (a)(1) of this section must be printed:

(i) In legible English;

(ii) In lettering of at least three eighths of an inch in height for the first three paragraphs and one quarter inch in height for the last three paragraphs; and

(iii) On a background of contrasting color.

(3) Size and color of the notice are optional. Additional information, if not inconsistent with required information, may be included.

[Amdt. 175-12, 45 FR 13091, Feb. 28, 1980, as amended by 175-23, 47 FR 43066, Sept. 30, 1982]

§ 175.30 Accepting and inspecting shipments.

(a) No person may accept a hazardous material for transportation aboard an aircraft unless the hazardous material is:

(1) Authorized, and is within the quantity limitations specified for carriage aboard aircraft according to § 172.101 of this subchapter or as otherwise specifically provided by this subchapter.

(2) Described and certified on a shipping paper prepared in duplicate in accordance with Subpart C of Part 172 or as authorized by § 171.11 of this subchapter. The originating aircraft operator must retain one copy of each shipping paper for 90 days;

(3) Labeled and marked in accordance with Subparts D and E of Part 172 or as authorized in § 171.11 of this subchapter, and placarded (when required) in accordance with Subpart F of Part 172 of this subchapter; and,

(4) Labeled with a "CARGO AIRCRAFT ONLY" label (see § 172.448 of this subchapter) if the material as presented is not permitted aboard passenger-carrying aircraft.

(b) Except as provided in paragraph (d) of this section, no person may carry a hazardous material in a package, outside container, or overpack aboard an aircraft unless the package, outside container, or overpack is inspected by the operator of the aircraft immediately before placing it:

(1) Aboard the aircraft; or,

(2) In a unit load device or on a pallet prior to loading aboard the aircraft.

(c) A hazardous material may only be carried aboard an aircraft if, based on the inspection prescribed in paragraph (b) of this section, the operator determines that the package, outside

container, or overpack containing the hazardous material:

(1) Has no holes, leakage or other indication that its integrity has been compromised; and

(2) For radioactive materials, does not have a broken seal, except that packages contained in overpacks need not be inspected for seal integrity.

(d) The requirements of paragraphs (b) and (c) of this section do not apply to:

(1) An ORM-D material packed in a freight container and offered for transportation by one consignor;

(2) Dry ice (carbon dioxide, solid); or

(e) An overpack containing packages of hazardous materials may be accepted only if the operator has taken all reasonable steps to establish that:

(1) The overpack does not contain a package bearing the "CARGO AIR-CRAFT ONLY" label unless—

(i) The overpack affords clear visibility of and easy access to the package; or

(ii) The package contains a material which may be carried inaccessibly under the provisions of § 175.85(c)(1); or

(iii) Not more than one package is overpacked.

(2) The proper shipping names, identification numbers, labels and special handling instructions appearing on the inside packages are clearly visible or reproduced on the outside of the overpack, and

(3) Has determined that a statement to the effect that the inside packages comply with the prescribed specifications appears on the outside of the overpack, when specification packages are prescribed.

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

[Amdt. 175-1, 41 FR 16106, Apr. 15, 1976, as amended by Amdt. 175-1A, 41 FR 40636, Sept. 20, 1976; Amdt. 175-12, 45 FR 13091, Feb. 28, 1980; Amdt. 175-17, 45 FR 68654, Oct. 11, 1980; Amdt. 175-25, 47 FR 54822, Dec. 6, 1982; Amdt. 175-34, 50 FR 48420, Nov. 25, 1985; Amdt. 175-37, 51 FR 5974, Feb. 18, 1986; Amdt. 175-39, 51 FR 44791, Dec. 12, 1986]

§ 175.31 Reports of discrepancies.

(a) Each person who discovers a discrepancy, as defined in paragraph (b) of this section, relative to the ship-

ment of a hazardous material following its acceptance for transportation aboard an aircraft shall, as soon as practicable, notify the nearest FAA Civil Aviation Security Office by telephone and shall provide the following information:

(1) Name and telephone number of the person reporting the discrepancy.

(2) Name of the aircraft operator.

(3) Specific location of the shipment concerned.

(4) Name of the shipper.

(5) Nature of discrepancy.

(b) Discrepancies which must be reported under paragraph (a) of this section are those involving hazardous materials which are improperly described, certified, labeled, marked, or packaged, in a manner not ascertainable when accepted under the provisions of § 175.30(a) of this subchapter, including:

(1) Package which are found to contain hazardous materials:

(i) Other than as described or certified on shipping papers;

(ii) In quantities exceeding authorized limits;

(iii) In inside containers which are not authorized or have improper closures;

(iv) In inside containers not oriented as shown by package markings;

(v) With insufficient or improper absorption materials, when required; or

(2) Packages or baggage which are found to contain hazardous materials subsequent to their being offered and accepted as other than hazardous materials.

[Amdt. 175-15, 45 FR 35332, May 27, 1980, as amended by Amdt. 175-41, 52 FR 36672, Sept. 30, 1987]

§ 175.33 Notification of pilot-in-command.

(a) Except as provided in § 175.10, when a hazardous material subject to the provisions of this subchapter is carried in an aircraft, the operator of the aircraft shall provide the pilot-in-command at least the following information in writing as early as practicable prior to departure:

(1) The proper shipping name, hazard class and identification number of the material as specified in § 172.101 of this subchapter or the

ICAO Technical Instructions. If a hazardous material is described by the proper shipping name, hazard class, and identification number appearing in:

(i) Section 172.101 of this subchapter, any additional description requirements provided in §§ 172.202 and 172.203 of this subchapter must also be shown in the notification.

(ii) The ICAO Technical Instructions, any additional information required to be shown on shipping papers by § 171.11 of this subchapter must also be shown in the notification.

(2) The total number of packages;

(3) The net quantity or gross weight, as applicable, for each package except those containing radioactive materials and those for which there is no limit imposed on the maximum net quantity per package;

(4) The location of the packages aboard the aircraft;

(5) Confirmation that no damaged or leaking packages have been loaded on the aircraft;

(6) For radioactive materials, the number of packages, overpacks or freight containers their category, transport index (if applicable), and their location aboard the aircraft; and

(7) Confirmation that the package must be carried on cargo aircraft only if its transportation aboard passenger-carrying aircraft is forbidden.

(8) An indication, when applicable, that a hazardous material is being carried under terms of an exemption.

(b) A copy of the written notification to pilot-in-command shall be readily available to the pilot-in-command during flight.

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

[Amdt. 175-25, 47 FR 54823, Dec. 6, 1982, as amended by Amdt. 175-30, 48 FR 53713, Nov. 29, 1983; Amdt. 175-32, 49 FR 45750, Nov. 20, 1984; Amdt. 175-35, 50 FR 49394, Dec. 2, 1985]

§ 175.35 Shipping papers aboard aircraft.

(a) A copy of the shipping papers required by § 175.30(a)(2) must accompany the shipment it covers during transportation aboard an aircraft.

(b) The documents required by paragraph (a) of this section and § 175.33 may be combined into one document if

it is given to the pilot-in-command before departure of the aircraft.

§ 175.40 Keeping and replacement of labels.

(a) Aircraft operators who engage in the transportation of hazardous materials must keep an adequate supply of the labels specified in Subpart E of Part 172 of this subchapter, on hand at each location where shipments are loaded aboard aircraft.

(b) Lost or detached labels for packages of hazardous materials must be replaced in accordance with the information provided on the shipping papers.

§ 175.45 Reporting hazardous materials incidents.

(a) Each operator who transports hazardous materials shall report to the nearest FAA Civil Aviation Security Office by telephone at the earliest practicable moment after each incident that occurs during the course of transportation (including loading, unloading or temporary storage) in which as a direct result of any hazardous materials:

(1) A person is killed;

(2) A person receives injuries requiring his or her hospitalization;

(3) Estimated carrier or other property damage, or both, exceeds \$50,000;

(4) Fire, breakage, or spillage or suspected radioactive contamination occurs involving shipment of radioactive materials (see § 175.700(b));

(5) Fire, breakage, spillage, or suspected contamination occurs involving shipment of etiologic agents. In addition to the report required by paragraph (a) of this section, a report on an incident involving etiologic agents should be telephoned directly to the Director, Center for Disease Control, U.S. Public Health, Atlanta, Georgia, area code 404-633-5313; or

(6) A situation exists of such a nature that, in the judgment of the carrier, it should be reported to the Department even though it does not meet the criteria of paragraph (a) (1), (2), or (3) of this section, e.g., a continuing danger to life exists at the scene of the incident.