

§ 173.304a Additional requirements for shipment of liquefied compressed gases in specification cylinders.

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(f) *Oxidizing gases.* A cylinder containing carbon dioxide and oxygen mixture, compressed; liquefied gas, oxidizing, n.o.s.; or nitrous oxide is authorized for transportation by aircraft only when it meets the following requirements:

(1) Only DOT specification 3A, 3AA, 3AL, and 3HT cylinders, and UN pressure receptacles ISO 9809-1, ISO 9809-2, ISO 9809-3 and ISO 7866 cylinders are authorized.

(2) Cylinders must be equipped with a pressure relief device in accordance with §173.301(f) and, beginning with the first requalification due after October 1, 2007:

(i) The rated burst pressure of a rupture disc for DOT 3A, 3AA, and 3AL cylinders must be 100% of the cylinder minimum test pressure with a tolerance of -10 to plus zero percent; and

(ii) The rated burst pressure of a rupture disc for a 3HT must be 90% of the cylinder minimum test pressure with a tolerance of -10 to plus zero percent.

(3) After September 30, 2009, the cylinder must be placed in a rigid outer packaging that—

(i) Conforms to the requirements of either part 178, subparts L and M, of this subchapter at the Packing Group I or II performance level, or the performance criteria in Air Transport Association (ATA) Specification No. 300 for a Category I Shipping Container;

(ii) Is capable of passing, as demonstrated by design testing, the Flame Penetration Resistance Test in part III of Appendix F to 14 CFR part 25, modified as follows:

(A) At least three specimens of the outer packaging materials must be tested;

(B) Each test must be conducted on a flat 16 inch x 24 inch test specimen mounted in the horizontal ceiling position of the test apparatus to represent the outer packaging design;

(C) Testing must be conducted on all design features (latches, seams, hinges, etc.) affecting the ability of the outer packaging to safely prevent the passage of fire in the horizontal ceiling position; and

(D) There must be no flame penetration of any specimen within 5 minutes after application of the flame source and the maximum allowable temperature at a point 4 inches above the test specimen, centered over the burner cone, must not exceed 205 °C (400 °F); and

(iii) Prior to each shipment, passes a visual inspection that verifies that all features of the packaging are in good condition, including all latches, hinges, seams, and other features, and the packaging is free from per-

forations, cracks, dents, or other abrasions that may negatively affect the flame penetration resistance and thermal resistance characteristics of the container.

(4) After September 30, 2009, the cylinder and the outer packaging must be capable of passing, as demonstrated by design testing, the Thermal Resistance Test specified in Appendix D to part 178 of this subchapter.

(5) The cylinder and the outer packaging must both be marked and labeled in accordance with part 172, subparts D and E of this subchapter.

(6) A cylinder of compressed oxygen that has been furnished by an aircraft operator to a passenger in accordance with 14 CFR 121.574, 125.219, and 135.91 is excepted from the outer packaging requirements of paragraph (f)(3) of this section.

2. At 72 FR 55099, Sept. 28, 2007, (f) was removed and the effectiveness of the amendment at 72 FR 4456, Jan. 31, 2007 was delayed until Oct. 1, 2008.

§ 173.304b Additional requirements for shipment of liquefied compressed gases in UN pressure receptacles.

(a) *General.* Liquefied gases and gas mixtures must be offered for transportation in UN pressure receptacles subject to the requirements in this section and §173.304. In addition, the general requirements applicable to UN pressure receptacles in §§173.301 and 173.301b must be met.

(b) *UN pressure receptacle filling limits.* A UN pressure receptacle is authorized for the transportation of liquefied compressed gases and gas mixtures as specified in this section. When a liquefied compressed gas or gas mixture is transported in a UN pressure receptacle, the filling ratio may not exceed the maximum filling ratio (FR) prescribed in this section and the applicable ISO standard. Compliance with the filling limits may be determined by referencing the numerical values and data in Table 2 of P200 of the UN Recommendations (IBR, see §171.7 of this subchapter). Alternatively, the maximum allowable filling limits may be determined as follows:

(1) For high pressure liquefied gases, in no case may the filling ratio of the settled pressure at 65 °C (149 °F) exceed the test pressure of the UN pressure receptacle.

(2) For low pressure liquefied gases, the filling factor (maximum mass of contents per liter of water capacity) must be less than or equal to 95 percent

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of the liquid phase at 50 °C. In addition, the UN pressure receptacle may not be liquid full at 60 °C. The test pressure of the pressure receptacle must be equal to or greater than the vapor pressure of the liquid at 65 °C.

(3) For high pressure liquefied gases or gas mixtures, the maximum filling ratio may be determined using the formulas in (3)(b) of P200 of the UN Recommendations.

(4) For low pressure liquefied gases or gas mixtures, the maximum filling ratio may be determined using the formulas in (3)(c) of P200 of the UN Recommendations.

(c) *Special filling limits.* Notwithstanding the numerical values shown in Table 2 of P200, the maximum allowable filling limits authorized for the following gases in UN pressure receptacles must be in accordance with the following table:

Identification No.	Proper shipping name	P–200 filling limit	HMR filling limit
UN1020	Chloropentafluoroethane or Refrigerant gas R 115	1.08	1.05
UN1048	Hydrogen bromide	1.54	1.51
UN1973	Chlorodifluoromethane and chloropentafluoroethane mixture or Refrigerant gas R 502.	1.05	1.01
UN1976	Octafluorocyclobutane, or Refrigerant gas RC 318	1.34	1.32
UN1982	Tetrafluoromethane or Refrigerant gas R 14	0.94	0.90
UN2035	1,1,1-Trifluoroethane, or Refrigerant gas R 143a	0.75	0.73
UN2192	Germane	1.02	1.00
UN2198	Phosphorous Pentafluoride	1.34	1.25
UN2424	Octafluoropropane or Refrigerant gas R 218	1.09	1.04
UN2599	Chlorotrifluoromethane and trifluoromethane azeotropic mixture or Refrigerant gas R 503.	0.20, 0.66	0.17, 0.64

(d) *Tetrafluoroethylene, stabilized, UN1081* must be packaged in a pressure receptacle with a minimum test pressure of 200 bar and a working pressure not exceeding 5 bar.

(e) *Fertilizer ammoniating solution with free ammonia, UN1043* is not authorized in UN tubes or MEGCs.

[71 FR 33883, June 12, 2006]

§ 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 §173.115 and when not in violation of §173.301(a).

(b) *Filling limits.* (See §173.301.) For mixtures, the liquid portion of the liquefied compressed gas at 131 °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 Associate Administrator, and packed in strong wooden or fiber boxes of such design as to protect valves from damage 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.”

(2) [Reserved]

(d) *Poisonous mixtures.* A mixture containing any poisonous material (Division 6.1 or 2.3) in such proportions that the mixture would be classed as poisonous under §173.115 or §173.132 must