

(1) The IBC type is authorized according to the IBC packaging code for the specific hazardous material in Column (7) of the §172.101 Table;

(2) The IBC conforms to the requirements in subpart O of part 178 of this subchapter at the Packing Group performance level in Column (5) of the §172.101 Table for the material being transported.

(b) [Reserved]

[80 FR 1161, Jan. 8, 2015]

Subpart G—Gases; Preparation and Packaging

§ 173.300 [Reserved]

§ 173.301 General requirements for shipment of compressed gases and other hazardous materials in cylinders, UN pressure receptacles and spherical pressure vessels.

(a) *General qualifications for use of cylinders.* Unless otherwise stated, as used in this section, the term “cylinder” includes a UN pressure receptacle. As used in this subpart, filled or charged means an introduction or presence of a hazardous material in a cylinder. A cylinder filled with a Class 2 hazardous material (gas) and offered for transportation must meet the requirements in this section and §§173.301a through 173.305, as applicable.

(1) Compressed gases must be in UN pressure receptacles built in accordance with the UN standards or in metal cylinders and containers built in accordance with the DOT and ICC specifications and part 178 of this subchapter in effect at the time of manufacture or CRC, BTC, CTC or TC specification, and requalified and marked as prescribed in subpart C in part 180 of this subchapter, if applicable. The DOT, ICC, CRC, BTC, CTC and TC specifications authorized for use are as follows:

PACKAGINGS ¹

2P	4AA480
2Q	4B
ICC-3 ²	4B240ET
3A	4BA
3AA	4BW
3AL	4D
3AX	4DA
3A480X	4DS

PACKAGINGS ¹—Continued

3AAX	4E
3B	4L
3BN	8
3E	8AL
3HT	39
3T	

¹ Authorized CRC, BTC, CTC or TC specification cylinders that correspond with a DOT specification cylinder are listed in §171.12(a)(4)(iii) of this subchapter.

² Use of existing cylinders is authorized. New construction is not authorized.

(2) A cylinder must be filled in accordance with this part, except that a “TC” cylinder must be filled in accordance with the Transport Canada TDG Regulations (IBR; see §171.7 of this subchapter). Before each filling of a cylinder, the person filling the cylinder must visually inspect the outside of the cylinder. A cylinder that has a crack or leak, is bulged, has a defective valve or a leaking or defective pressure relief device, or bears evidence of physical abuse, fire or heat damage, or detrimental rusting or corrosion, may not be filled and offered for transportation. A cylinder may be repaired and requalified only as prescribed in subpart C of part 180 of this subchapter.

(3) Pressure relief devices must be tested for leaks before a filled cylinder is shipped from the cylinder filling plant. It is expressly forbidden to repair a leaking fusible plug device where the leak is through the fusible metal or between the fusible metal and the opening in the plug body, except by removal and replacement of the pressure relief device.

(4) A cylinder that previously contained a Class 8 material must be requalified in accordance with §180.205(e) of this subchapter.

(5) When a cylinder with a marked pressure limit is prescribed, another cylinder made under the same specification but with a higher marked pressure limit is authorized. For example, a cylinder marked “DOT-4B500” may be used when “DOT-4B300” is specified.

(6) No person may fill a cylinder overdue for periodic requalification with a hazardous material and then offer it for transportation. The prohibition against offering a cylinder for transportation that is overdue for periodic requalification does not apply to a

cylinder filled prior to the requalification due date.

(7) A cylinder with an authorized service life may not be offered for transportation in commerce after its authorized service life has expired. However, a cylinder in transportation or a cylinder filled prior to the expiration of its authorized service life may be transported for reprocessing or disposal of the cylinder's contents. After emptying, the cylinder must be condemned in accordance with § 180.205 of this subchapter.

(8) The pressure of the hazardous material at 55 °C (131 °F) may not exceed $\frac{3}{4}$ of the service pressure of the cylinder. Sufficient outage must be provided so the cylinder will not be liquid full at 55 °C (131 °F).

(9) Specification 2P, 2Q, 3E, 3HT, spherical 4BA, 4D, 4DA, 4DS, and 39 cylinders must be packed in strong non-bulk outer packagings. The outside of the combination packaging must be marked with an indication that the inner packagings conform to the prescribed specifications.

(10) Any person who installs a valve into an aluminum cylinder in oxygen service must verify the valve and the cylinder have the same thread type.

(11) Cylinder valves manufactured on or after November 7, 2019, used on cylinders to transport compressed gases must conform to the requirements in CGA V-9 (IBR; see § 171.7 of this subchapter). A valve for a UN pressure receptacle must conform to the requirements of § 173.301b(c)(1). Cylinder valves used on cylinders in liquefied petroleum gas (LPG) service are permitted to comply with the requirements of NFPA 58 (IBR; see § 171.7 of this subchapter).

(12) Cylinder valve protection caps manufactured on or after November 7, 2019, must conform to the requirements of CGA V-9.

(b) *Cylinder markings.* Required markings on a cylinder must be legible and must meet the applicable requirements of subpart C of part 180 of this subchapter. Additional information may be marked on the cylinder provided it does not affect the required markings prescribed in the applicable cylinder specification.

(c) *Toxic gases and mixtures.* Cylinders containing toxic gases and toxic gas mixtures meeting the criteria of Division 2.3 Hazard Zone A or B must conform to the requirements of § 173.40 and CGA S-1.1 (compliance with paragraph 9.1.1.1 is not required) (IBR; see § 171.7 of this subchapter) and CGA S-7 (IBR; see § 171.7 of this subchapter). A DOT 39 cylinder, UN non-refillable cylinder, or a UN composite cylinder certified to ISO-11119-3 may not be used for a toxic gas or toxic gas mixture meeting the criteria for Division 2.3, Hazard Zone A or B.

(d) *Gases capable of combining chemically.* A filled cylinder may not contain any gas or material capable of combining chemically with the cylinder's contents or with the cylinder's material of construction, so as to endanger the cylinder's serviceability.

(e) *Ownership of cylinder.* A cylinder filled with a hazardous material may not be offered for transportation unless it was filled by the owner of the cylinder or with the owner's consent.

(f) *Pressure relief device systems.* (1) Except as provided in paragraphs (f)(5) through (f)(7) and (j) of this section, and § 171.23(a) of this subchapter, a cylinder filled with a gas and offered for transportation must be equipped with one or more pressure relief devices sized and selected as to type, location, and quantity, and tested in accordance with CGA S-1.1 (compliance with paragraph 9.1.1.1 is not required) and CGA Pamphlet S-7 (IBR, see § 171.7 of this subchapter). The pressure relief device must be capable of preventing rupture of the normally filled cylinder when subjected to a fire test conducted in accordance with CGA C-14 (IBR, see § 171.7 of this subchapter), or, in the case of an acetylene cylinder, CGA C-12 (IBR, see § 171.7 of this subchapter).

(2) A pressure relief device, when installed, must be in communication with the vapor space of a cylinder containing a Division 2.1 (flammable gas) material. This requirement does not apply to DOT Specification 39 cylinders of 1.2L (75 cubic inches) or less in volume filled with a Liquefied petroleum gas, Methyl acetylene and Propadiene mixtures, stabilized, Propylene, Propane or Butane.

(3) For a specification 3, 3A, 3AA, 3AL, 3AX, 3AXX, 3B, 3BN, or 3T cylinder filled with gases in other than Division 2.2 (except oxygen and oxidizing gases transported by aircraft, see §§ 173.302(f) and 173.304(f)), beginning with the first requalification due after December 31, 2003, the burst pressure of a CG-1, CG-4, or CG-5 pressure relief device must be at test pressure with a tolerance of plus zero to minus 10%. An additional 5% tolerance is allowed when a combined rupture disk is placed inside a holder. This requirement does not apply if a CG-2, CG-3, or CG-9 thermally activated relief device or a CG-7 reclosing pressure valve is used on the cylinder.

(4) A pressure relief device is required on a DOT 39 cylinder regardless of cylinder size or filled pressure. A DOT 39 cylinder used for liquefied Division 2.1 materials must be equipped with a metal pressure relief device. Fusible pressure relief devices are not authorized on a DOT 39 cylinder containing a liquefied gas.

(5) A pressure relief device is not required on—

(i) A cylinder 305 mm (12 inches) or less in length, exclusive of neck, and 114 mm (4.5 inches) or less in outside diameter, except when the cylinder is filled with a liquefied gas for which this part requires a service pressure of 1800 psig or higher or a nonliquefied gas to a pressure of 1800 psig or higher at 21 °C (70 °F);

(ii) A cylinder with a water capacity of less than 454 kg (1000 lbs) filled with a nonliquefied gas to a pressure of 300 psig or less at 21 °C (70 °F), except for a DOT 39 cylinder or a cylinder used for acetylene in solution; or

(iii) A cylinder containing a Class 3 or a Class 8 material without pressurization, unless otherwise specified for the hazardous material.

(iv) A UN pressure receptacle transported in accordance with paragraph (k) or (l) or this section.

(6) A pressure relief device is prohibited on a cylinder filled with a Division 2.3 or 6.1 material in Hazard Zone A.

(7) A pressure relief device is not required on a DOT Specification 3E cylinder measuring up to 50mm (2 inches) in diameter by 305mm (12 inches) in

length for the following specified gases and maximum weight limits:

- (i) Carbon Dioxide 0.24L (8 oz.)
- (ii) Ethane 0.12L (4 oz.)
- (iii) Ethylene 0.12L (4 oz.)
- (iv) Hydrogen Chloride, anhydrous 0.24L (8 oz.)
- (v) Monochlorotrifluoromethane 0.35L (12 oz.)
- (vi) Nitrous oxide, 0.24L (8 oz.)
- (vii) Vinyl fluoride, stabilized 0.24L (8 oz.)

(g) *Manifolding cylinders in transportation.* (1) Cylinder manifolding is authorized only under conditions prescribed in this paragraph (g). Manifolled cylinders must be supported and held together as a unit by structurally adequate means. Except for Division 2.2 materials, each cylinder must be equipped with an individual shutoff valve that must be tightly closed while in transit. Manifold branch lines must be sufficiently flexible to prevent damage to the valves that otherwise might result from the use of rigid branch lines. Each cylinder must be individually equipped with a pressure relief device as required in paragraph (f) of this section, except that pressure relief devices on manifolled horizontal cylinders that are mounted on a motor vehicle or framework may be selected as to type, location, and quantity according to the lowest marked pressure limit of an individual cylinder in the manifolled unit. The pressure relief devices selected for the manifolled unit must have been tested in accordance with CGA S-1.1 and CGA S-7. Pressure relief devices on manifolled horizontal cylinders filled with a compressed gas must be arranged to discharge unobstructed to the open air. In addition, for Division 2.1 (flammable gas) material, the pressure relief devices (PRDs) must be arranged to discharge upward to prevent any escaping gas from contacting personnel or any adjacent cylinders. Valves and pressure relief devices on manifolled cylinders filled with a compressed gas must be protected from damage by framing, a cabinet or other method. Manifolding is authorized for cylinders containing the following gases:

- (i) Nonliquefied (permanent) compressed gases authorized by § 173.302.

(ii) Liquefied compressed gases authorized by §173.304. Each manifolded cylinder containing a liquefied compressed gas must be separately filled and means must be provided to ensure no interchange of cylinder contents can occur during transportation.

(iii) Acetylene as authorized by §173.303. Mobile acetylene trailers must be maintained, operated and transported in accordance with CGA G-1.6 (IBR, see §171.7 of this subchapter).

(2) For the checking of tare weights or replacing solvent, the cylinder must be removed from the manifold. This requirement is not intended to prohibit filling acetylene cylinders while manifolded.

(h) *Cylinder valve protection.* UN pressure receptacles must meet the valve protection requirements in §173.301b(c). A DOT specification cylinder used to transport a hazardous material must meet the requirements specified in this paragraph (h).

(1) The following specification cylinders are not subject to the cylinder valve protection requirements in this paragraph (h):

(i) A cylinder containing only a Division 2.2 material without a Division 5.1 subsidiary hazard;

(ii) A cylinder containing a Class 8 liquid corrosive only to metal;

(iii) A cylinder with a water capacity of 4.8 liters (293 in³) or less containing oxygen, compressed;

(iv) A cylinder containing oxygen, refrigerated liquid (cryogenic liquid);

(v) A Medical E cylinder with a water capacity of 4.9 liters (300 in³) or less;

(vi) A fire extinguisher; or

(vii) A “B” style cylinder with a capacity of 40 ft³ (1.13 m³) or an “MC” style cylinder with a capacity of 10 ft³ (0.28m³) containing acetylene.

(2) For cylinders manufactured before October 1, 2007, a cylinder must have its valves protected by one of the following methods:

(i) By equipping the cylinder with securely attached metal or plastic caps of sufficient strength to protect valves from damage during transportation;

(ii) By boxing or crating the cylinders so as to protect valves from damage during transportation;

(iii) By constructing the cylinder so that the valve is recessed into the cyl-

inder or otherwise protected to the extent that it will not be subjected to a blow when the container is dropped onto a flat surface; or

(iv) By loading the cylinders in an upright position and securely bracing the cylinders in rail cars or motor vehicles, when loaded by the consignor and unloaded by the consignee.

(3) For cylinders manufactured on or after October 1, 2007, each cylinder valve assembly must be of sufficient strength or protected such that no leakage occurs when a cylinder with the valve installed is dropped 1.8 m (6 ft.) or more onto a non-yielding surface, such as concrete or steel, impacting the valve assembly or protection device at an orientation most likely to cause damage. The cylinder valve assembly protection may be provided by any method meeting the performance requirement in this paragraph (h)(3). Examples include:

(i) Equipping the cylinder with a securely attached metal cap.

(ii) Packaging the cylinder in a box, crate, or other strong outer packaging conforming to the requirements of §173.25.

(iii) Constructing the cylinder such that the valve is recessed into the cylinder or otherwise protected.

(i) *Cylinders mounted in motor vehicles or in frames.* (1) MEGCs must conform to the requirements in §173.312. DOT specification cylinders mounted on motor vehicles or in frames must conform to the requirements specified in this paragraph (i).

(2) Seamless DOT specification cylinders longer than 2 m (6.5 feet) are authorized for transportation only when horizontally mounted on a motor vehicle or in an ISO framework or other framework of equivalent structural integrity in accordance with CGA TB-25 (IBR, see §171.7 of this subchapter). The pressure relief device must be arranged to discharge unobstructed to the open air. In addition, for Division 2.1 (flammable gas) material, the pressure relief devices must be arranged to discharge upward to prevent any escaping gas from contacting personnel or any adjacent cylinders.

(3) Cylinders may not be transported by rail in container on freight car (COFC) or trailer on flat car (TOFC)

service except under conditions approved by the Associate Administrator for Safety, Federal Railroad Administration.

(j) *Non-specification cylinders in domestic use.* Except as provided in §§ 171.12(a) and 171.23(a) of this subchapter, a filled cylinder manufactured to other than a DOT specification or a UN standard in accordance with part 178 of this subchapter, or a DOT exemption or special permit cylinder or a cylinder used as a fire extinguisher in conformance with § 173.309(a), may not be transported to, from, or within the United States.

(k) *Metal attachments.* Metal attachments to cylinders must have rounded or chamfered corners, or be otherwise protected, so as to prevent the likelihood of causing puncture or damage to other hazardous materials packages. This requirement applies to anything temporarily or permanently attached to the cylinder, such as metal skids.

(l) *Cylinders made of aluminum alloy 6351-T6.* A DOT 3AL cylinder manufactured of aluminum alloy 6351-T6 may not be filled and offered for transportation or transported with pyrophoric gases. The use of UN cylinders manufactured of aluminum alloy 6351-T6 is prohibited.

[67 FR 51643, Aug. 8, 2002]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 173.301, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

§ 173.301a Additional general requirements for shipment of specification cylinders.

(a) *General.* The requirements in this section are in addition to the requirements in § 173.301 and apply to the shipment of gases in specification cylinders.

(b) *Authorized cylinders not marked with a service pressure.* For authorized cylinders not marked with a service pressure, the service pressure is designated as follows:

Specification marking	Service Pressure psig
3	1800
3E	1800
8	250

(c) *Cylinder pressure at 21 °C (70 °F).* The pressure in a cylinder at 21 °C (70 °F) may not exceed the service pressure for which the cylinder is marked or designated, except as provided in § 173.302a(b). For certain liquefied gases, the pressure at 21 °C (70 °F) must be lower than the marked service pressure to avoid having a pressure at a temperature of 55 °C (131 °F) that is greater than permitted.

(d) *Cylinder pressure at 55 °C (131 °F).* The pressure in a cylinder at 55 °C (131 °F) may not exceed ¾ times the service pressure, except:

(1) For a cylinder filled with acetylene, liquefied nitrous oxide, or carbon dioxide.

(2) For a cylinder filled in accordance with § 173.302a(b), the pressure in the cylinder at 55 °C (131 °F) may not exceed ¾ times the filling pressure.

(3) The pressure at 55 °C (131 °F) of Hazard Zone A and Hazard Zone B materials may not exceed the service pressure of the cylinder. Sufficient outage must be provided so that the cylinder will not be liquid full at 55 °C (131 °F).

(e) *Grandfather clause.* A cylinder in domestic use prior to the date on which the specification for the cylinder was first made effective may be used if the cylinder has been properly tested and otherwise conforms to the requirements applicable to the gas with which it is charged.

[67 FR 51645, Aug. 8, 2002, as amended at 67 FR 61289, Sept. 30, 2002; 68 FR 24661, May 8, 2003; 76 FR 56317, Sept. 13, 2011]

§ 173.301b Additional general requirements for shipment of UN pressure receptacles.

(a) *General.* The requirements of this section are in addition to the requirements in § 173.301 and apply to the shipment of gases in UN pressure receptacles. A UN pressure receptacle, including closures, must conform to the design, construction, inspection and testing requirements specified in parts 178 and 180 of this subchapter, as applicable. Bundles of cylinders must conform to the requirements in § 178.70(e) of this subchapter.

(1) A UN pressure receptacle may not be filled and offered for transportation when damaged to such an extent that