

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](http://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<br>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  $\frac{5}{4}$  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  $\frac{5}{4}$  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

the integrity of the UN pressure receptacle or its service equipment may be affected. Prior to filling, the service equipment must be examined and found to be in good working condition (see § 178.70(d) of this subchapter). In addition, the required markings must be legible on the pressure receptacle.

(2) The gases or gas mixtures must be compatible with the UN pressure receptacle and valve materials as prescribed for metallic materials in ISO 11114-1:2012(E) and ISO 11114-1:2012/Amd 1:2017(E) (IBR, *see* § 171.7 of this subchapter) and for non-metallic materials in ISO 11114-2:2013(E) (IBR, *see* § 171.7 of this subchapter).

(3) A refillable UN pressure receptacle may not be filled with a gas or gas mixture different from that previously contained in the UN pressure receptacle unless the necessary operations for change of gas service have been performed in accordance with ISO 11621 (IBR, *see* § 171.7 of this subchapter).

(4) When a strong outer packaging is prescribed, for example as provided by paragraphs (c)(2)(vi) or (d)(1) of this section, the UN pressure receptacles must be protected to prevent shifting. Unless otherwise specified in this part, more than one UN pressure receptacle may be enclosed in the strong outer packaging.

(b) *Individual shut-off valves and pressure relief devices.* Except for Division 2.2 permanent gases, each UN pressure receptacle must be equipped with an individual shutoff valve that must be tightly closed while in transit. Each UN pressure receptacle must be individually equipped with a pressure relief device as prescribed by § 173.301(f), except that pressure relief devices on bundles of cylinders or manifolded horizontal cylinders must have a set-to-discharge pressure that is based on the lowest marked pressure of any cylinder in the bundle or manifolded unit.

(c) *Pressure receptacle valve requirements.* (1) When the use of a valve is prescribed, the valve must conform to the requirements in ISO 10297:2014(E) and ISO 10297:2014/Amd 1:2017 (IBR, *see* § 171.7 of this subchapter). Quick release cylinder valves for specification and type testing must conform to the requirements in ISO 17871:2015(E) (IBR,

*see* § 171.7 of this subchapter). Until December 31, 2022, the manufacture of a valve conforming to the requirements in ISO 10297:2014(E) is authorized. Until December 31, 2020, the manufacture of a valve conforming to the requirements in ISO 10297:2006(E) (IBR, *see* § 171.7 of this subchapter) was authorized. Until December 31, 2008, the manufacture of a valve conforming to the requirements in ISO 10297:1999(E) (IBR, *see* § 171.7 of this subchapter) was authorized.

(2) A UN pressure receptacle must have its valves protected from damage that could cause inadvertent release of the contents of the UN pressure receptacle by one of the following methods:

(i) By constructing the pressure receptacle so that the valves are recessed inside the neck of the UN pressure receptacle and protected by a threaded plug or cap;

(ii) By equipping the UN pressure receptacle with a valve cap conforming to the requirements in ISO 11117:2008(E) and Technical Corrigendum 1 (IBR, *see* § 171.7 of this subchapter). Until December 31, 2014, the manufacture of a valve cap conforming to the requirements in ISO 11117:1998(E) (IBR, *see* § 171.7 of this subchapter) was authorized. The cap must have vent-holes of sufficient cross-sectional area to evacuate the gas if leakage occurs at the valve;

(iii) By protecting the valves by shrouds or guards conforming to the requirements in ISO 11117:2008(E) and Technical Corrigendum 1 (IBR, *see* § 171.7 of this subchapter). Until December 31, 2014, the manufacture of a shroud or guard conforming to the requirements in ISO 11117:1998(E) (IBR, *see* § 171.7 of this subchapter) was authorized. For metal hydride storage systems, by protecting the valves in accordance with the requirements in ISO 16111:2008(E) (IBR, *see* § 171.7 of this subchapter).

(iv) By using valves designed and constructed with sufficient inherent strength to withstand damage in accordance with Annex B of ISO 10297:2014(E)/Amd. 1: 2017;

(v) By enclosing the UN pressure receptacles in frames (*e.g.*, bundles of cylinders);

(vi) By packing the UN pressure receptacles in a strong outer package,

such as a box or crate, capable of meeting the drop test specified in § 178.603 of this subchapter at the Packing Group I performance level; or

(vii) By using valves designed and constructed in accordance with Annex A of ISO 17879:2017(E) (IBR, *see* § 171.7 of this subchapter) for UN pressure receptacles with self-closing valves with inherent protection (except those in acetylene service).

(d) *Non-refillable UN pressure receptacles.* (1) When the use of a valve is prescribed, the valve must conform to the requirements in ISO 11118:2015(E), (IBR, *see* § 171.7 of this subchapter). Manufacture of valves to ISO 13340:2001(E) is authorized until December 31, 2020;

(2) The receptacles must be transported as an inner package of a combination package;

(3) The receptacle must have a water capacity not exceeding 1.25 L when used for a flammable or toxic gas or 50 liters for receptacles used to contain chemical under pressure; and

(4) The receptacle is prohibited for Hazard Zone A material.

(e) *Pyrophoric gases.* A UN pressure receptacle must have valve outlets equipped with gas-tight plugs or caps when used for pyrophoric or flammable mixtures of gases containing more than 1% pyrophoric compounds. When UN pressure receptacles are manifolded in a bundle, each of the pressure receptacles must be equipped with an individual valve that must be closed while in transportation, and the outlet of the manifold valve must be equipped with a pressure retaining gas-tight plug or cap. Gas-tight plugs or caps must have threads that match those of the valve outlets.

(f) *Hydrogen bearing gases.* A steel UN pressure receptacle bearing an “H” mark must be used for hydrogen bearing gases or other embrittling gases that have the potential of causing hydrogen embrittlement.

(g) *Composite cylinders in underwater use.* A composite cylinder certified to ISO-11119-2 or ISO-11119-3 may not be used for underwater applications unless the cylinder is manufactured in accordance with the requirements for underwater use and is marked “UW” as pre-

scribed in § 178.71(q)(18) of this subchapter.

[71 FR 33882, June 12, 2006, as amended at 71 FR 54395, Sept. 14, 2006; 76 FR 3380, Jan. 19, 2011; 78 FR 1091, Jan. 7, 2013; 78 FR 65485, Oct. 31, 2013; 80 FR 1161, Jan. 8, 2015; 82 FR 15891, Mar. 30, 2017; 85 FR 27896, May 11, 2020; 85 FR 83400, Dec. 21, 2020; 87 FR 44996, July 26, 2022]

**§ 173.302 Filling of cylinders with non-liquefied (permanent) compressed gases or adsorbed gases.**

(a) *General requirements.* (1) Except as provided in § 171.23(a)(3) of this subchapter, a cylinder filled with a non-liquefied compressed gas (except gas in solution) must be offered for transportation in accordance with the requirements of this section and § 173.301 of this subpart. In addition, a DOT specification cylinder must meet the requirements in §§ 173.301a, 173.302a, and 173.305 of the subpart, as applicable. UN pressure receptacles must meet the requirements in §§ 173.301b and 173.302b of this subpart, as applicable. Where more than one section applies to a cylinder, the most restrictive requirements must be followed.

(2) *Adsorbed gas.* Except as provided in § 171.23(a)(3) of this subchapter, a cylinder filled with an adsorbed gas must be offered for transportation in accordance with the requirements of paragraph (d) of this section, and §§ 173.301, and 173.302c of this subpart. UN cylinders must meet the requirements in §§ 173.301b and 173.302b of this subpart, as applicable. Where more than one section applies to a cylinder, the most restrictive requirements must be followed.

(b) *Aluminum cylinders in oxygen service.* Each aluminum cylinder filled with oxygen must meet all of the following conditions:

(1) Metallic portions of a valve that may come into contact with the oxygen in the cylinder must be constructed of brass or stainless steel.

(2) Except for UN cylinders, each cylinder opening must be configured with straight threads only.

(3) Each UN pressure receptacle must be cleaned in accordance with the requirements of ISO 11621 (IBR, *see* § 171.7 or this subchapter). Each DOT cylinder must be cleaned in accordance with the