

compatible compressed gas must be offered in a DOT 3AL1800 or 3AA1800 cylinder. The maximum filling density of the diborane may not exceed 7 percent. Diborane mixed with compatible compressed gas may not have a pressure exceeding the service pressure of the cylinder if complete decomposition of the diborane occurs. Cylinder valve assemblies must be protected in accordance with § 173.301(h).

(f) *Fluorine*. Fluorine must be shipped in specification 3A1000, 3AA1000, or 3BN400 cylinders without pressure relief devices and equipped with valve protection cap. The cylinder may not be charged to over 400 psig at 21 °C (70 °F) and may not contain over 2.7 kg (6 lbs) of gas.

[67 FR 51646, Aug. 8, 2002, as amended at 68 FR 75745, Dec. 31, 2003; 70 FR 34075, June 13, 2005; 71 FR 54395, Sept. 14, 2006; 72 FR 4455, Jan. 31, 2007; 72 FR 55098, Sept. 28, 2007; 78 FR 1091, Jan. 7, 2013; 81 FR 3676, Jan. 21, 2016; 85 FR 85416, Dec. 28, 2020]

**§ 173.302b Additional requirements for shipment of non-liquefied (permanent) compressed gases in UN pressure receptacles.**

(a) *General*. A cylinder filled with a non-liquefied gas must be offered for transportation in UN pressure receptacles subject to the requirements in this section and § 173.302. In addition, the requirements in §§ 173.301 and 173.301b must be met.

(b) *UN pressure receptacles filling limits*. A UN pressure receptacle is authorized for the transportation of non-liquefied compressed gases as specified in this section. Except where filling limits are specifically prescribed in this section, the working pressure of a UN pressure receptacle may not exceed  $\frac{2}{3}$  of the test pressure of the receptacle. Alternatively, the filling limits specified for non-liquefied gases in Table 1 of P200 of the UN Recommendations (IBR, see § 171.7 of this subchapter) are authorized. In no case may the internal pressure at 65 °C (149 °F) exceed the test pressure.

(c) *Fluorine, compressed, UN 1045 and Oxygen difluoride, compressed, UN 2190*. Fluorine, compressed and Oxygen difluoride, compressed must be packaged in a UN pressure receptacle with a minimum test pressure of 200 bar and a maximum working pressure not to ex-

ceed 30 bar. A UN pressure receptacle made of aluminum alloy is not authorized. The maximum quantity of gas authorized in each UN pressure receptacle is 5 kg.

(d) *Diborane and diborane mixtures, UN 1911*. Diborane and diborane mixtures must be packaged in a UN pressure receptacle with a minimum test pressure of 250 bar and a maximum filling ratio dependent on the test pressure not to exceed 0.07. Filling should be further limited so that if complete decomposition of diborane occurs, the pressure of diborane or diborane mixtures will not exceed the working pressure of the cylinder. The use of UN tubes and MEGCs is not authorized.

(e) *Carbon monoxide, compressed UN 1016*. Carbon monoxide, compressed is authorized in UN pressure receptacles. The settled pressure in a steel pressure receptacle containing carbon monoxide may not exceed  $\frac{1}{3}$  of the pressure receptacle's test pressure at 65 °C (149 °F) except, if the gas is dry and sulfur-free, the settled pressure may not exceed  $\frac{1}{2}$  of the marked test pressure.

[71 FR 33883, June 12, 2006]

**§ 173.302c Additional requirements for the shipment of adsorbed gases in UN pressure receptacles.**

(a) A cylinder filled with an adsorbed gas must be offered for transportation in UN pressure receptacles subject to the requirements in this section and § 173.302, as well as, §§ 173.301 and 173.301b.

(b) The pressure of each filled cylinder must be less than 101.3 kPa at 20 °C (68 °F) and must not exceed 300 kPa at 50 °C (122 °F).

(c) The minimum test pressure of the cylinder must be 21 bar.

(d) The minimum burst pressure of the cylinder must be 94.5 bar.

(e) The internal pressure at 65 °C (149 °F) of the filled cylinder must not exceed the test pressure of the cylinder.

(f) The adsorbent material must be compatible with the cylinder and must not form harmful or dangerous compounds with the gas to be adsorbed. The gas in combination with the adsorbent material must not affect or weaken the cylinder or cause a dangerous reaction (*e.g.*, a catalyzing reaction).

§ 173.303

49 CFR Ch. I (10–1–23 Edition)

(g) The quality of the adsorbent material must be verified at the time of each fill to assure the pressure and chemical stability requirements of this section are met each time an adsorbed gas package is offered for transport.

(h) The adsorbent material must not meet the definition of any other hazard class.

(i) Cylinders and closures containing toxic gases with an LC50 less than or equal to 200 ml/m3 (ppm) (see the following Adsorbed Gases Table) must meet the following requirements:

(1) Valve outlets must be fitted with pressure retaining gas-tight plugs or caps having threads matching those of the valve outlets.

(2) Each valve must either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing.

(3) Each cylinder and closure must be tested for leakage after filling.

(4) Each valve must be capable of withstanding the test pressure of the cylinder and be directly connected to the cylinder by either a taper-thread or other means which meets the requirements of ISO 10692–2 (IBR, see §171.7 of this subchapter); and

(5) Cylinders and valves must not be fitted with a pressure relief device.

(j) Valve outlets for cylinders containing pyrophoric gases must be fitted with gas-tight plugs or caps having threads matching those of the valve outlets.

(k) The filling procedure must be in accordance with Annex A of ISO 11513 (IBR, see §171.7 of this subchapter).

(l) The maximum period for periodic requalification must be in accordance with §180.207(c) of this subchapter.

ADSORBED GASES TABLE

ID No.	Hazardous material	LC <sub>50</sub> ml/m <sup>3</sup>	Notes
3510 ...	Adsorbed gas, flammable, n.o.s. ....	.....	z.
3511 ...	Adsorbed gas, n.o.s. ....	.....	z.
3512 ...	Adsorbed gas, toxic, n.o.s. ....	≤5000	z.
3513 ...	Adsorbed gas, oxidizing, n.o.s. ....	.....	z.
3514 ...	Adsorbed gas, toxic, flammable, n.o.s. ....	≤5000	z.
3515 ...	Adsorbed gas, toxic, oxidizing, n.o.s. ....	≤5000	z.
3516 ...	Adsorbed gas, toxic, corrosive, n.o.s. ....	≤5000	z.
3517 ...	Adsorbed gas, toxic, flammable, corrosive, n.o.s. ....	≤5000	z.
3518 ...	Adsorbed gas, toxic, oxidizing, corrosive, n.o.s. ....	≤5000	z.
3519 ...	Boron trifluoride, adsorbed ....	387	a.
3520 ...	Chlorine, adsorbed ....	293	a.
3521 ...	Silicon tetrafluoride, adsorbed ....	450	a.
3522 ...	Arsine, adsorbed ....	20	d.
3523 ...	Germane, adsorbed ....	620	d, r.
3524 ...	Phosphorus pentafluoride, adsorbed ....	190	
3525 ...	Phosphine, adsorbed ....	20	d.
3526 ...	Hydrogen selenide, adsorbed ....	2	

Notes:

a: Aluminum alloy cylinders must not be used.

d: When steel cylinders are used, only those bearing the “H” mark in accordance with §173.302b(f) are authorized.

r: The filling of this gas must be limited such that, if complete decomposition occurs, the pressure does not exceed two thirds of the test pressure of the cylinder.

z: The construction materials of the cylinders and their accessories must be compatible with the contents and must not react to form harmful or dangerous compounds therewith.

[80 FR 1161, Jan. 8, 2015]

§ 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 cylinders (§178.59 or §178.60 of this subchapter). 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 successfully tested in accordance with CGA C–12 (IBR, see §171.7 of this subchapter). Representative samples of cylinders charged with acetylene must be successfully tested in accordance with CGA C–12.