

Subpart H - Hazardous Materials

§1910.101

Compressed gases (general requirements)

- (a) **Inspection of compressed gas cylinders.** Each employer shall determine that compressed gas cylinders under his control are in a safe condition to the extent that this can be determined by visual inspection. Visual and other inspections shall be conducted as prescribed in the Hazardous Materials Regulations of the Department of Transportation (49 CFR Parts 171-179 and 14 CFR Part 103). Where those regulations are not applicable, visual and other inspections shall be conducted in accordance with Compressed Gas Association Pamphlets C-6-1968 and C-8-1962, which is incorporated by reference as specified in §1910.6.
- (b) **Compressed gases.** The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank-cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965, which is incorporated by reference as specified in §1910.6.
- (c) **Safety relief devices for compressed gas containers.** Compressed gas cylinders, portable tanks, and cargo tanks shall have pressure relief devices installed and maintained in accordance with Compressed Gas Association Pamphlets S-1.1-1963 and 1965 addenda and S-1.2-1963, which is incorporated by reference as specified in §1910.6.

[39 FR 23502, June 27, 1974, as amended at 61 FR 9236, Mar. 7, 1996]

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Acetylene

- (a) **Cylinders.** The in-plant transfer, handling, storage, and utilization of acetylene in cylinders shall be in accordance with Compressed Gas Association Pamphlet G-1-1966, which is incorporated by reference as specified in §1910.6.
- (b) **Piped systems.** The piped systems for the in-plant transfer and distribution of acetylene shall be designed, installed, maintained, and operated in accordance with Compressed Gas Association Pamphlet G-1.3-1959, which is incorporated by reference as specified in §1910.6.
- (c) **Generators and filling cylinders.** Plants for the generation of acetylene and the charging (filling) of acetylene cylinders shall be designed, constructed, and tested in accordance with the standards prescribed in Compressed Gas Association Pamphlet G-1.4-1966, which is incorporated by reference as specified in §1910.6.

[39 FR 23502, June 27, 1974, as amended at 61 FR 9236, Mar. 7, 1996]

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Hydrogen

(a) General.

(1) Definitions. As used in this section:

- (i) **Gaseous hydrogen system** is one in which the hydrogen is delivered, stored and discharged in the gaseous form to consumer's piping. The system includes stationary or movable containers, pressure regulators, safety relief devices, manifolds, interconnecting piping and controls. The system terminates at the point where hydrogen at service pressure first enters the consumer's distribution piping.
- (ii) **Approved** — means, unless otherwise indicated, listed or approved by a nationally recognized testing laboratory. Refer to §1910.7 for definition of nationally recognized testing laboratory.
- (iii) **Listed** — See "approved".
- (iv) **ASME** — American Society of Mechanical Engineers.
- (v) **DOT Specifications** — Regulations of the Department of Transportation published in 49 CFR Chapter I.
- (vi) **DOT regulations** — See §1910.103(a)(1)(v).

(2) Scope.

(i) Gaseous hydrogen systems.

- [a] Paragraph (b) of this section applies to the installation of gaseous hydrogen systems on consumer premises where the hydrogen supply to the consumer premises originates outside the consumer premises and is delivered by mobile equipment.
- [b] Paragraph (b) of this section does not apply to gaseous hydrogen systems having a total hydrogen content of less than 400 cubic feet, nor to hydrogen manufacturing plants or other establishments operated by the hydrogen supplier or his agent for the purpose of storing hydrogen and refill-

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(a)(2)(i)[b] ing portable containers, trailers, mobile supply trucks, or tank cars.

(ii) Liquefied hydrogen systems.

- [a] Paragraph (c) of this section applies to the installation of liquefied hydrogen systems on consumer premises.
- [b] Paragraph (c) of this section does not apply to liquefied hydrogen portable containers of less than 150 liters (39.63 gallons) capacity; nor to liquefied hydrogen manufacturing plants or other establishments operated by the hydrogen supplier or his agent for the sole purpose of storing liquefied hydrogen and refilling portable containers, trailers, mobile supply trucks, or tank cars.

(b) Gaseous hydrogen systems.

(1) Design.

(i) Containers.

[a] Hydrogen containers shall comply with one of the following:

- [1] *Designed, constructed,* and tested in accordance with appropriate requirements of ASME Boiler and Pressure Vessel Code, Section VIII — Unfired Pressure Vessels — 1968, which is incorporated by reference as specified in §1910.6.
- [2] *Designed, constructed,* tested and maintained in accordance with U.S. Department of Transportation Specifications and Regulations.

[b] *Permanently installed containers* shall be provided with substantial noncombustible supports on firm noncombustible foundations.

[c] *Each portable container* shall be legibly marked with the name "Hydrogen" in accordance with "Marking Portable Compressed Gas Containers to Identify the Material Contained" ANSI Z48.1-1954, which is incorporated by reference as specified in §1910.6. Each manifolded hydrogen supply unit shall be legibly marked with the name Hydrogen or a legend such as "This unit contains hydrogen."

(ii) Safety relief devices.

[a] *Hydrogen containers* shall be equipped with safety relief devices as required by the ASME Boiler and Pressure Vessel Code, Section VIII Unfired Pressure Vessels, 1968 or the DOT Specifications and Regulations under which the container is fabricated.

[b] *Safety relief devices* shall be arranged to discharge upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container, adjacent structure or personnel. This requirement does not apply to DOT Specification containers having an internal volume of 2 cubic feet or less.

[c] *Safety relief devices* or vent piping shall be designed or located so that moisture cannot collect and freeze in a manner which would interfere with proper operation of the device.

(iii) Piping, tubing, and fittings.

[a] *Piping, tubing, and fittings* shall be suitable for hydrogen service and for the pressures and temperatures involved. Cast iron pipe and fittings shall not be used.

[b] *Piping and tubing shall conform* to Section 2 — "Industrial Gas and Air Piping" — Code for Pressure Piping, ANSI B31.1-1967 with addenda B31.1-1969, which is incorporated by reference as specified in §1910.6.

[c] *Joints in piping and tubing* may be made by welding or brazing or by use of flanged, threaded, socket, or compression fittings. Gaskets and thread sealants shall be suitable for hydrogen service.

(iv) Equipment assembly.

[a] *Valves, gauges, regulators,* and other accessories shall be suitable for hydrogen service.

[b] *Installation of hydrogen systems* shall be supervised by personnel familiar with proper practices with reference to their construction and use.

[c] *Storage containers, piping, valves,* regulating equipment, and other accessories shall be readily accessible, and shall be protected against physical damage and against tampering.

[d] *Cabinets or housings* containing hydrogen control or operating equipment shall be adequately ventilated.

[e] *Each mobile hydrogen supply unit* used as part of a hydrogen system shall be adequately secured to prevent movement.

[f] *Mobile hydrogen supply units* shall be electrically bonded to the system before discharging hydrogen.