
29 C.F.R. § 1910.111

Storage and handling of anhydrous ammonia.

- (a) *General*—(1) *Scope*. (i) This standard is intended to apply to the design, construction, location, installation, and operation of anhydrous ammonia systems including refrigerated ammonia storage systems.
- (ii) This standard does not apply to:
- (a) Ammonia manufacturing plants.
- (b) Refrigeration plants where ammonia is used solely as a refrigerant.
- (2) *Definitions*. As used in this section.
- (i) *Appurtenances*. All devices such as pumps, compressors, safety relief devices, liquid-level gaging devices, valves and pressure gages.
- (ii) *Cylinder*. A container of 1,000 pounds of water capacity or less constructed in accordance with Department of Transportation specifications.
- (iii) *Code*. The Boiler and Pressure Vessel Code, Section VIII, Unfired Pressure Vessels of the American Society of Mechanical Engineers (ASME)—1968.
- (iv) *Container*. Includes all vessels, tanks, cylinders, or spheres used for transportation, storage, or application of anhydrous ammonia.
- (v) *DOT*. U.S. Department of Transportation.
- (vi) *Design pressure* is identical to the term *Maximum Allowable Working Pressure* used in the Code.
- (vii) *Farm vehicle* (implement of husbandry). A vehicle for use on a farm on which is mounted a container of not over 1,200 gallons water capacity.
- (viii) *Filling density*. the percent ratio of the weight of the gas in a container to the weight of water at 60 °F. that the container will hold.
- (ix) *Gas*. Anhydrous ammonia in either the gaseous or liquefied state.
- (x) *Gas masks*. Gas masks must be approved by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR part 84 for use with anhydrous ammonia.
- (xi) *Capacity*. Total volume of the container in standard U.S. gallons.
- (xii) *DOT specifications*—Regulations of the Department of Transportation published in 49 CFR chapter I.
- (b) *Basic rules*. This paragraph applies to all paragraphs of this section unless otherwise noted.
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(1) *Approval of equipment and systems.* Each appurtenance shall be approved in accordance with paragraph (b)(1) (i), (ii), (iii), or (iv) of this section.

(i) It was installed before February 8, 1973, and was approved, tested, and installed in accordance with either the provisions of the American National Standard for the Storage and Handling of Anhydrous Ammonia, K61.1, or the Fertilizer Institute Standards for the Storage and Handling of Agricultural Anhydrous Ammonia, M-1, (both of which are incorporated by reference as specified in § 1910.6) in effect at the time of installation; or

(ii) It is accepted, or certified, or listed, or labeled, or otherwise determined to be safe by a nationally recognized testing laboratory; or

(iii) It is a type which no nationally recognized testing laboratory does, or will undertake to, accept, certify, list, label, or determine to be safe; and such equipment is inspected or tested by any Federal, State, municipal, or other local authority responsible for enforcing occupational safety provisions of a Federal, State, municipal or other local law, code, or regulation pertaining to the storage, handling, transport, and use of anhydrous ammonia, and found to be in compliance with either the provisions of the American National Standard for the Storage and Handling of Anhydrous Ammonia, K61.1, or the Fertilizer Institute Standards for the Storage and Handling of Agricultural Anhydrous Ammonia, M-1, in effect at the time of installation; or

(iv) It is a custom-designed and custom-built unit, which no nationally recognized testing laboratory, or Federal, State, municipal or local authority responsible for the enforcement of a Federal, State, municipal, or local law, code or regulation pertaining to the storage, transportation and use of anhydrous ammonia is willing to undertake to accept, certify, list, label or determine to be safe, and the employer has on file a document attesting to its safe condition following the conduct of appropriate tests. The document shall be signed by a registered professional engineer or other person having special training or experience sufficient to permit him to form an opinion as to safety of the unit involved. The document shall set forth the test bases, test data and results, and also the qualifications of the certifying person.

(v) For the purposes of this paragraph (b)(1), the word *listed* means that equipment is of a kind mentioned in a list which is published by a nationally recognized laboratory which makes periodic inspection of the production of such equipment, and states such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner. *Labeled* means there is attached to it a label, symbol, or other identifying mark of a nationally recognized testing laboratory which, makes periodic inspections of the production of such equipment, and whose labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner. *Certified* means it has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner, or is of a kind whose production is periodically inspected by a nationally recognized testing laboratory, and it bears a label, tag, or other record of certification.

(vi) For the purposes of this paragraph (b)(1), refer to § 1910.7 for definition of nationally recognized testing laboratory.

(2) *Requirements for construction, original test and requalification of nonrefrigerated containers.* (i) Containers used with systems covered in paragraphs (c), (f), (g), and (h) of this section shall be constructed and tested in accordance with the Code except that construction under Table UW12 at a basic joint efficiency of under 80 percent is not authorized.

(ii) Containers built according to the Code do not have to comply with Paragraphs UG125 to UG128 inclusive, and Paragraphs UG132 and UG133 of the Code.

(iii) Containers exceeding 36 inches in diameter or 250 gallons water capacity shall be constructed to comply with one or more of the following:

(a) Containers shall be stress relieved after fabrication in accordance with the Code, or

(b) Cold-form heads when used, shall be stress relieved, or

(c) Hot-formed heads shall be used.

(iv) Welding to the shell, head, or any other part of the container subject to internal pressure shall be done in compliance with the Code. Other welding is permitted only on saddle plates, lugs, or brackets attached to the container by the container manufacturer.

(v) Containers used with systems covered in paragraph (e) of this section shall be constructed and tested in accordance with the DOT specifications.

(vi) The provisions of subdivision (i) of this subparagraph shall not be construed as prohibiting the continued use or reinstallation of containers constructed and maintained in accordance with the 1949, 1950, 1952, 1956, 1959, and 1962 editions of the Code or any revisions thereof in effect at the time of fabrication.

(3) *Marking nonrefrigerated containers.* (i) System nameplates, when required, shall be permanently attached to the system so as to be readily accessible for inspection and shall include markings as prescribed in subdivision (ii) of this subparagraph.

(ii) Each container or system covered in paragraphs (c), (f), (g), and (h) of this section shall be marked as specified in the following:

(a) With a notation "Anhydrous Ammonia."

(b) With a marking identifying compliance with the rules of the Code under which the container is constructed.

Under ground: Container and system nameplate.

Above ground: Container.

(c) With a notation whether the system is designed for underground or aboveground installation or both.

(d) With the name and address of the supplier of the system or the trade name of the system and with the date of fabrication.

Under ground and above ground: System nameplate.

(e) With the water capacity of the container in pounds at 60 °F. or gallons, U.S. Standard.

Under ground: Container and system nameplate.

Above ground: Container.

(f) With the design pressure in pounds per square inch.

Under ground: Container and system nameplate.

Above ground: Container.

(g) With the wall thickness of the shell and heads.

Under ground: Container and system nameplate.

Above ground: Container.

(h) With marking indicating the maximum level to which the container may be filled with liquid anhydrous ammonia at temperatures between 20 °F. and 130 °F. except on containers provided with fixed level indicators, such as fixed length dip tubes, or containers that are filled with weight. Markings shall be in increments of not more than 20 °F.

Above ground and under ground: System nameplate or on liquid-level gaging device.

(i) With the total outside surface area of the container in square feet.

Under ground: System nameplate.

Above ground: No requirement.

(j) Marking specified on the container shall be on the container itself or on a nameplate permanently attached to it.

(4) *Marking refrigerated containers.* Each refrigerated container shall be marked with nameplate on the outer covering in an accessible place as specified in the following:

(i) With the notation, "Anhydrous Ammonia."

(ii) With the name and address of the builder and the date of fabrication.

(iii) With the water capacity of the container in gallons, U.S. Standard.

(iv) With the design pressure.

(v) With the minimum temperature in degrees Fahrenheit for which the container was designed.

(vi) The maximum allowable water level to which the container may be filled for test purposes.

(vii) With the density of the product in pounds per cubic foot for which the container was designed.

(viii) With the maximum level to which the container may be filled with liquid anhydrous ammonia.

(5) *Location of containers.* (i) Consideration shall be given to the physiological effects of ammonia as well as to adjacent fire hazards in selecting the location for a storage container. Containers shall be located outside of buildings or in buildings or sections thereof especially provided for this purpose.

(ii) Permanent storage containers shall be located at least 50 feet from a dug well or other sources of potable water supply, unless the container is a part of a water-treatment installation.

(iii)-(iv) [Reserved]

(v) Storage areas shall be kept free of readily ignitable materials such as waste, weeds, and long dry grass.

(6) *Container appurtenances.* (i) All appurtenances shall be designed for not less than the maximum working pressure of that portion of the system on which they are installed. All appurtenances shall be fabricated from

materials proved suitable for anhydrous ammonia service.

(ii) All connections to containers except safety relief devices, gaging devices, or those fitted with No. 54 drill-size orifice shall have shutoff valves located as close to the container as practicable.

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