

1 Department of Agriculture

2

3 Adopted Permanent Rules Relating to Anhydrous Ammonia

4

5 Rules as Adopted

6 1513.0010 INTRODUCTION.

7 Subpart 1. Scope. This chapter is adopted under Minnesota
8 Statutes, section 18C.121, to regulate the design, construction,
9 repair, alteration, location, installation, and operation of
10 agricultural anhydrous ammonia systems ~~including-refrigerated~~
11 ~~ammonia-systems~~ with product used or intended for use as a
12 fertilizer.

13 Subp. 2. Exceptions. This chapter does not apply to:

14 A. ammonia manufacturing plants;

15 B. refrigeration systems where ammonia is used solely
16 as a refrigerant;

17 C. ammonia transportation pipelines; and

18 D. ammonia barges and tankers; and

19 E. ammonia regulated under Minnesota Statutes,
20 chapter 326.

21 1513.0020 INCORPORATIONS BY REFERENCE.

22 The most current edition of the standards in items A to T
23 are incorporated by reference. The standards are not subject to
24 frequent change and are available as indicated or can be
25 purchased from the institute or organization that published them.

26 A. ANSI Z87.1, Practice for Occupational and
27 Educational Eye and Face Protection; American National Standards
28 Institute, Inc., 1430 Broadway, New York, NY 10018. It is
29 available for reference at the Minneapolis Public Library, 300
30 Nicollet Mall, Minneapolis, MN 55401.

31 B. ANSI Z358.1, Emergency Eyewash and Shower
32 Equipment; American National Standards Institute, Inc., 1430
33 Broadway, New York, NY 10018. It is available through the
34 Minitex interlibrary loan system.

35 C. Code of Federal Regulations, title 29, parts

1 1900-1910 (Labor), chapter XVII--Occupational Safety and Health
2 Administration, United States Department of Labor.
3 Superintendent of Documents, United States Government Printing
4 Office, Washington, DC 20402. It is available through the
5 Minitex interlibrary loan system.

6 D. National Board Inspection Code, ANSI/NB-23
7 National Board of Boiler and Pressure Vessel Inspectors, 1055
8 Crupper Avenue, Columbus, OH 43229. It is available through the
9 Minitex interlibrary loan system.

10 E. ANSI Z88.2, Practices for Respiratory Protection,
11 American National Standards Institute, Inc., 1430 Broadway, New
12 York, NY 10018. It is available for reference at the
13 Minneapolis Public Library, 300 Nicollet Mall, Minneapolis, MN
14 55401.

15 F. ANSI/ASME B31.3, American National Standard for
16 Chemical Plant and Petroleum Refinery Piping, American Society
17 of Mechanical Engineers, 345 East 47th Street, New York, NY
18 10017-2392. It is available for reference at the University of
19 Minnesota, Walter Library, 117 Pleasant Street SE., Minneapolis,
20 MN 55455.

21 G. ANSI/ASME B31.5, American National Standard for
22 Refrigeration Piping, American Society of Mechanical Engineers,
23 345 East 47th Street, New York, NY 10017-2392. It is available
24 for reference at the University of Minnesota, Walter Library,
25 117 Pleasant Street SE., Minneapolis, MN 55455.

26 H. ASTM Specification A53, Annual Book of ASTM
27 Standards; ASTM, 1916 Race Street, Philadelphia, PA 19103. It
28 is available for reference at the University of Minnesota,
29 Walter Library, 117 Pleasant Street SE., Minneapolis, MN 55455.

30 I. ASME Boiler and Pressure Vessel Code, Section IX,
31 American Society of Mechanical Engineers, 345 East 47th Street,
32 New York, NY 10017-2392. It is available for reference at the
33 University of Minnesota, Walter Library, 117 Pleasant Street
34 SE., Minneapolis, MN 55455.

35 J. ANSI/SAE J513f, Refrigeration Tube Fittings,
36 Society of Automotive Engineers, 400 Commonwealth Dr.,

1 Warrendale, PA 15096-0001. It is available for reference at the
2 University of Minnesota, Walter Library, 117 Pleasant Street
3 SE., Minneapolis, MN 55455.

4 K. ASTM Specification A47 and Specification A395,
5 Annual Book of ASTM Standards; ASTM, 1916 Race Street,
6 Philadelphia, PA 19103. It is available for reference at the
7 University of Minnesota, Walter Library, 117 Pleasant Street
8 SE., Minneapolis, MN 55455.

9 L. ANSI RMA IP-14, Specifications for Anhydrous
10 Ammonia Hose; American National Standards Institute, Inc., 1430
11 Broadway, New York, NY 10018. It is available through the
12 Minitex interlibrary loan system.

13 M. CGA P-7, Standard for Requalification of Cargo
14 Tank Hose Used in the Transfer of Compressed Gases; Compressed
15 Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington,
16 VA 22202. It is available through the Minitex interlibrary loan
17 system.

18 N. UL 132, Standard on Safety Relief Valves for
19 Anhydrous Ammonia and LP-Gas; Underwriters Laboratories, Inc.,
20 333 Pfingsten Road, Northbrook, IL 60062. It is available
21 through the Minitex interlibrary loan system.

22 O. API Standard 620, Recommended Rules for Design and
23 Construction of Large Welded Low-Pressure Storage Tanks;
24 American Petroleum Institute, 1220 L Street, N.W., Washington,
25 DC 20005. It is available for reference at the University of
26 Minnesota, Walter Library, 117 Pleasant Street SE., Minneapolis,
27 MN 55455.

28 P. ANSI/NFPA 70, National Electrical Code; National
29 Fire Protection Association, Batterymarch Park, Quincy, MA
30 02269. It is available through the Minitex interlibrary loan
31 system.

32 Q. Code of Federal Regulations, title 49, parts
33 300-399 (Transportation) chapter III--Federal Highway
34 Administration, United States Department of Transportation.
35 Superintendent of Documents, United States Government Printing
36 Office, Washington, DC 20402. It is available through the

1 Minitex interlibrary loan system.

2 R. CGA C-4 American National Standard Method of
3 Marking Portable Compressed Gas Containers to Identify the
4 Material Contained (ANSI/CGA C-4); Compressed Gas Association,
5 Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202. It is
6 available for reference at the Minneapolis Public Library, 300
7 Nicollet Mall, Minneapolis, MN 55401.

8 S. CGA V-1, American National, Canadian, and
9 Compressed Gas Association Standard for Compressed Gas Cylinder
10 Valve Outlet and Inlet Connections (ANSI/CSA/CGA V-1);
11 Compressed Gas Association, Inc., 1235 Jefferson Davis Highway,
12 Arlington, VA 22202. It is available for reference at the
13 Minneapolis Public Library, 300 Nicollet Mall, Minneapolis, MN
14 55401.

15 T. ASAE S276.4, Slow-Moving Vehicle Identification
16 Emblem; American Society of Agricultural Engineers, 2950 Niles
17 Road, St. Joseph, MI 49085. It is available for reference at
18 the University of Minnesota, St. Paul Central Library, 1984
19 Buford Avenue, St. Paul, MN 55108.

20 1513.0030 DEFINITIONS.

21 Subpart 1. **Scope.** The definitions in this part apply to
22 this chapter.

23 Subp. 2. **Alteration.** "Alteration" means a change in an
24 item described in the original manufacturer's data report which
25 affects the pressure-containing capability of the container.
26 Alteration includes rerating a container by increasing maximum
27 allowable working pressure or by increasing or decreasing
28 allowable working temperature.

29 Subp. 3. **Ammonia or anhydrous ammonia.** "Ammonia" and
30 "anhydrous ammonia" are used interchangeably in this chapter and
31 refer to the compound formed by the chemical combination of the
32 elements nitrogen and hydrogen in the molar proportion of one
33 part nitrogen to three parts hydrogen. This relationship is
34 shown by the chemical formula, NH_3 . On a weight basis, the
35 ratio is 14 parts nitrogen to three parts hydrogen or

1 approximately 82 percent nitrogen to 18 percent hydrogen.
2 Ammonia may exist in either a gaseous or a liquid state.
3 Ammonia does not include aqua ammonia or ammonium hydroxide
4 which are solutions of ammonia in water and are sometimes called
5 "ammonia."

6 Subp. 4. **Approved.** "Approved" means:

- 7 A. listed by a recognized testing laboratory; or
8 B. recommended by the manufacturer as suitable for
9 use with anhydrous ammonia and so marked.

10 Subp. 5. **Appurtenance.** "Appurtenance" means a device such
11 as a pressure relief device, liquid level gauging device, valve,
12 pressure gauge, pressure regulator, ~~pipin~~g~~ing~~7~~fitting~~7 or
13 metering~~7~~ or dispensing device designed to be attached to an
14 ammonia container.

15 Subp. 6. **API-ASME code.** "API-ASME code" refers to the
16 Code for Unfired Pressure Vessels for Petroleum Liquids and
17 Gases of the American Petroleum Institute and the American
18 Society of Mechanical Engineers (API-ASME). The API-ASME code,
19 as a joint publications and interpretation service, was
20 discontinued as of December 31, 1956, and construction of
21 containers to the API-ASME code has not been authorized after
22 July 1, 1961. The API-ASME code is incorporated by reference.
23 It is not subject to frequent change and is available for
24 reference at the University of Minnesota, Walter Library, 117
25 Pleasant Street SE., Minneapolis, MN 55455.

26 Subp. 7. **ASME code.** "ASME code" refers to:

27 A. paragraphs U-68, U-69, U-200, or U-201 of Section
28 VIII of the Boiler and Pressure Vessel Code of the American
29 Society of Mechanical Engineers, 1949 Edition; or

30 B. Section VIII Division I of the Boiler and Pressure
31 Vessel Code of the American Society of Mechanical Engineers,
32 1950 Edition, through the current edition including addenda and
33 applicable code case interpretations. The ASME code is
34 incorporated by reference. It is not subject to frequent change
35 and is available through the Minitex interlibrary loan system.

36 Subp. 8. **Capacity.** "Capacity" means the total volume of a

1 container measured in standard United States gallons, unless
2 otherwise specified.

3 Subp. 9. **Cargo tank.** "Cargo tank" means a container
4 designed to be permanently attached to or forming a part of a
5 highway motor vehicle, or a container not permanently attached
6 to a highway motor vehicle, which by reason of the container's
7 size, construction, or attachment to a highway motor vehicle,
8 must be loaded or unloaded without being removed from the
9 highway motor vehicle. Cargo tank does not apply to cylinders,
10 implements of husbandry, or containers normally used for storage.

11 Subp. 10. **Chemical splash goggles or goggles.** "Chemical
12 splash goggles" or "goggles" mean flexible fitting protective
13 eyewear designed to provide primary protection of the eyes and
14 eye sockets from the splash of hazardous liquids and meeting the
15 requirements of ANSI Z87.1, Practice for Occupational and
16 Educational Eye and Face Protection. Chemical splash goggles or
17 goggles does not include direct vented goggles.

18 Subp. 11. **Commissioner.** "Commissioner" means the
19 commissioner of agriculture or an agent authorized by the
20 commissioner.

21 Subp. 12. **Container.** "Container" means a tank, except for
22 a cylinder and piping, used for the mobile transportation or
23 storage of anhydrous ammonia.

24 Subp. 13. **Cylinder.** "Cylinder" means a pressure vessel of
25 1,000 pounds water capacity or less, constructed according to
26 United States Department of Transportation specifications for
27 cylinders and authorized for the transportation of ammonia.
28 Cylinder does not include a storage tank, cargo tank, portable
29 tank, nurse tank, or tank car.

30 Subp. 14. **Design pressure.** "Design pressure" has the
31 meaning given to the term "maximum allowable working pressure"
32 in the ASME code.

33 Subp. 15. **DOT regulations.** "DOT regulations" means the
34 Hazardous Materials Regulations of the Department of
35 Transportation (See the Code of Federal Regulations, title 49,
36 parts 100 to 199, Transportation, including "Specifications for

1 Shipping Containers.") The DOT regulations are incorporated by
2 reference. They are not subject to frequent change and are
3 available through the Minitex interlibrary loan system.

4 Subp. 16. **Emergency shower.** "Emergency shower" means a
5 shower unit permanently connected to a source of clean water
6 that enables the user to have water cascading over the entire
7 body and that otherwise meets the requirements of ANSI Z358.1,
8 Emergency Eyewash and Shower Equipment.

9 Subp. 17. **Eye wash unit.** "Eye wash unit" means a device
10 used to irrigate and flush the eyes with clean water. Depending
11 upon the requirements in this chapter, the device may be a
12 plumbed unit, permanently connected to a source of clean water,
13 or it may be a self-contained unit, not permanently installed
14 which must be refilled or replaced after use. An eye wash unit
15 must meet the requirements of ANSI Z358.1, Emergency Eyewash and
16 Shower Equipment.

17 Subp. 18. **Filling density.** "Filling density" means the
18 percent ratio of the weight of the ammonia permitted in a
19 container to the weight of water at 60 degrees Fahrenheit that
20 the container will hold when full. One pound of water equals
21 27.74 cubic inches at 60 degrees Fahrenheit. For determining
22 the water capacity of the tank in pounds, the weight of one
23 gallon of water at 60 degrees Fahrenheit (15.6 degrees
24 centigrade) in air is 8.328 pounds.

25 Subp. 19. **Full face shield.** "Full face shield" means a
26 device meeting the requirements of ANSI Z87.1, Practice for
27 Occupational and Educational Eye and Face Protection, designed
28 to provide protection to all of the face from hazard. A full
29 face shield may only be worn as secondary eye protection,
30 supplementing the primary eye protection afforded by chemical
31 splash goggles.

32 Subp. 20. **Gas mask.** "Gas mask" means an air-purifying
33 device with a full face piece approved by NIOSH/MSHA under Code
34 of Federal Regulations, title 30, part II, subpart I, for use in
35 an ammonia contaminated atmosphere in compliance with Code of
36 Federal Regulations, title 29, part 1910.134.

1 Subp. 21. **Hydrostatic relief valve.** "Hydrostatic relief
2 valve" means a pressure relief device for liquid service
3 designed to prevent excessive pressure due to thermal expansion
4 when a pipe or hose is filled with liquid such as between block
5 valves or blinds.

6 Subp. 22. **IDLH.** An atmosphere is "IDLH" if it poses an
7 immediate hazard to life or produces irreversible debilitating
8 effects on health. The IDLH for ammonia is 300 ppm by volume.

9 Subp. 23. **Implement of husbandry.** "Implement of husbandry"
10 means a system, including a nurse tank, with a capacity of 3,000
11 gallons (11.35m³) or less, or an applicator tank, used for
12 transporting and applying anhydrous ammonia exclusively for
13 agricultural purposes.

14 Subp. 24. **Loading.** "Loading" means the flow of ammonia
15 from a container, such as a tank car or cargo tank, into a fixed
16 storage tank.

17 Subp. 25. **National board inspection code.** "National board
18 inspection code" refers to the manual published by the National
19 Board of Boiler and Pressure Vessel Inspectors which provides
20 the rules and guidelines for inspection by a commissioned
21 inspector of the repair, alteration, and rerating of ASME code
22 containers after being placed into service.

23 Subp. 26. **Permanent storage installation.** "Permanent
24 storage installation" means a system employing a stationary,
25 fixed, container used exclusively for storage or supply.

26 Subp. 27. **Positive pressure self-contained breathing
27 apparatus.** "Positive pressure self-contained breathing
28 apparatus" means a full face piece respirator approved by
29 NIOSH/MSHA for respiratory protection for both entry into or
30 escape from oxygen-deficient atmospheres or concentration of
31 gases, or vapors which are immediately dangerous to life or
32 health where the supply of air is carried by the wearer. The
33 air pressure inside the face piece is positive in relation to
34 the air pressure of the outside atmosphere during exhalation and
35 inhalation.

36 Subp. 28. **Pressure relief valve.** "Pressure relief valve"

1 means a device designed to open to prevent an increase in
2 internal fluid pressure in excess of a specified value due to an
3 emergency or abnormal condition, and to close and prevent
4 further flow after normal conditions have been restored.

5 Subp. 29. Psig and psia. "Psig" and "psia" refer to
6 pounds per square inch gauge and pounds per square inch
7 absolute, respectively.

8 Subp. 30. Repair. "Repair" means the work necessary to
9 restore a container or system to a safe and satisfactory
10 operating condition, provided that in all cases the container or
11 system design must continue to comply with this chapter or the
12 standard in effect at the time of installation. In addition,
13 the original design of the container or system must not be
14 altered by the repair. ~~Repair includes the addition or~~
15 ~~replacement of pressure or nonpressure parts which do not change~~
16 ~~the design temperature or pressure of the container or~~
17 ~~system.~~ Repair of a pressure container must be performed in
18 compliance with the applicable provisions of the current edition
19 of the National Board Inspection Code and must conform to the
20 ASME code section and edition to which the container was
21 constructed. Welding repair of piping must be done by a welder
22 certified in accordance with the ASME code, Section IX, "Welding
23 Qualifications."

24 Subp. 31. Short-term exposure limit or STEL. "Short-term
25 exposure limit" or "STEL" means a 15-minute time-weighted
26 average exposure to an air contaminant which should not be
27 exceeded at any time during a work day and which should not be
28 repeated more than four times a day. Exposures at the
29 short-term exposure limit should not occur at less than
30 60-minute intervals.

31 Subp. 32. System. "System" refers to an assembly of
32 equipment consisting ~~essentially~~ of the container or containers,
33 hoses, appurtenances, pumps, compressors, and ~~interconnecting~~
34 piping the ammonia storage connector.

35 Subp. 33. Transfer, fill, and charge. "Transfer," "fill,"
36 and "charge" may be used interchangeably and mean movement of a

1 quantity of ammonia from one container to another container or
2 cylinder, as contrasted to feeding ammonia to a use or
3 application device.

4 Subp. 34. **Unloading.** "Unloading" means the flow of
5 ammonia from a fixed storage tank into another container, such
6 as a cargo tank or a nurse tank.

7 1513.0040 SAFETY.

8 Subpart 1. **Training.** A person required to store, handle,
9 transfer, transport, or otherwise work with ammonia must be
10 trained, in accordance with Code of Federal Regulations, title
11 29, parts ~~1990-1910~~ 1900-1910, to understand the properties of
12 ammonia, to become competent in safe operating practices, and to
13 take appropriate actions in the event of a leak or an emergency.

14 Subp. 2. **Protective gear.** A person making, breaking, or
15 testing an ammonia connection, transferring ammonia, or
16 performing maintenance or repair on an ammonia system under
17 pressure, must wear protective gloves and chemical splash
18 goggles. A full face shield may be worn over the goggles.
19 However, a face shield may not be worn as a substitute for
20 goggles.

21 Subp. 3. **Permanent storage installations.** Permanent
22 storage installations must have on hand, as a minimum, the
23 equipment listed in items A to F.

24 A. Two full face gas masks, each with one spare
25 ammonia canister in a readily accessible location for use in
26 ammonia concentrations less than those that pose an IDLH.

27 B. One pair of protective gauntlet-style gloves of
28 sufficient length to allow for cuffing that are impervious to
29 ammonia.

30 C. One pair of protective boots impervious to ammonia.

31 D. One protective slicker or protective pants and
32 jacket, all impervious to ammonia.

33 E. An easily accessible emergency shower and a
34 plumbed eye wash unit or in lieu of these, at least 150 gallons
35 of clean water in an open top container. ~~It is recommended that~~

1 ~~the distance from the point of greatest potential exposure to~~
2 ~~ammonia to the emergency water supply should not exceed ten~~
3 ~~seconds travel time or 100 feet.~~

4 F. Chemical splash goggles or chemical splash goggles
5 with full face shield to be worn over the goggles.

6 Subp. 4. Cargo tanks. A cargo tank transporting ammonia,
7 except an implement of husbandry, must carry the equipment
8 listed in items A to D.

9 A. For first aid purposes, at least five gallons (20
10 liters) of clean water in a container designed to provide ready
11 access to the water for flushing any area of the body contacted
12 by ammonia.

13 B. One pair of protective gauntlet style gloves
14 impervious to ammonia.

15 C. A full face piece gas mask with an ammonia
16 canister and at least one space canister.

17 D. Chemical splash goggles, or chemical splash
18 goggles with a full face shield to be worn over the goggles.

19 Subp. 5. Cylinder and DOT portable tank installations. At
20 ammonia installations comprising cylinders and DOT portable
21 tanks, the employer shall provide ready access to a supply of
22 clean, running water for emergency use, including provision for
23 flushing of the eyes by an employee in the event of contact with
24 ammonia, or a self-contained eye wash unit with clean water.

25 BASIC RULES

26 1513.0100 APPLICABILITY.

27 Parts 1513.0100 to 1513.0230 apply to this chapter unless
28 otherwise noted.

29 1513.0110 EXISTING EQUIPMENT AND SYSTEMS.

30 Subpart 1. Containers. Part 1513.0120 does not prohibit
31 the continued use or reinstallation of containers constructed
32 and maintained in accordance with, or exceeding the requirements
33 of, the 1949, 1950, 1952, 1956, 1959, 1965, 1968, 1971, 1974,
34 1977, 1980, 1983, 1986, 1989, 1992, and 1995 editions of the
35 ASME code, or any revisions in effect at the time of fabrication.

1 Subp. 2. Systems and components. Systems and components
2 that were fabricated, installed, and maintained in accordance
3 with the American National Standard K61.1, Safety Requirements
4 for the Storage and Handling of Anhydrous Ammonia and Ammonia
5 Solutions--Part 1 Anhydrous Ammonia, or The Agricultural
6 Nitrogen Institute, Standard M-1, Standard for Storage and
7 Handling of Agricultural Ammonia, in effect at the time of
8 installation, are acceptable for continued use.

9 1513.0120 NEW CONSTRUCTION, REPAIRS, ALTERATIONS, AND ORIGINAL
10 TEST OF CONTAINERS, OTHER THAN REFRIGERATED STORAGE TANKS.

11 Subpart 1. Construction and testing. Containers used with
12 systems covered in parts 1513.0300 to 1513.0380, 1513.0700 to
13 1513.0830, and 1513.1000 to 1513.1070 must be made of steel or
14 other material compatible with ammonia, and tested in accordance
15 with the current ASME code. An exception to the ASME code
16 requirements is that construction under Table UW 12 at a basic
17 joint efficiency of under 80 percent is not authorized.

18 Subp. 2. Additional requirements. Containers designed and
19 constructed in accordance with the ASME code, other than
20 refrigerated storage containers, shall comply with the
21 additional requirements in items A to C.

22 A. The entire container must be post weld heat
23 treated after completion of all welds in or to the shells and
24 heads. The method employed must be as prescribed in the ASME
25 code, except that provisions for extended time at lower
26 temperature for post weld heat treatment are not permitted.
27 Implements of husbandry do not require post weld heat treatment
28 if they are fabricated with hot formed heads or with cold formed
29 heads that have been stress relieved.

30 B. Welded attachments to pads may be made after post
31 weld heat treatment.

32 C. Steels used in fabricating pressure containing
33 parts of a container must not exceed a specified tensile
34 strength of 70,000 psi (does not apply to parts 1513.0600 to
35 1513.0640, 1513.0700 to 1513.0830 and 1513.0900 to 1513.0930),

1 except implements of husbandry may be fabricated from steel
2 having a specified tensile strength of 75,000 psi.

3 Subp. 3. **Inspectors.** All containers, except refrigerated
4 storage tanks with a design pressure of 15 psig and less, and
5 cylinders and containers covered in parts 1513.0600 to 1513.0710
6 must be inspected by a person who holds a valid National Board
7 commission as a commissioned inspector or as an owner-user
8 inspector as defined in the National Board Inspection Code.

9 Subp. 4. **Certified welder.** Welding for the repair or
10 alteration of a pressure container must be performed in
11 compliance with the applicable provisions of the current edition
12 of the National Board Inspection Code. All repair or alteration
13 must conform to the ASME code section and edition to which the
14 container was constructed.

15 1513.0130 LOCATION OF CONTAINERS.

16 Subpart 1. **Site selection considerations.** The location
17 for a storage container must be selected considering the
18 potential physiological and environmental effects of ammonia on
19 the surroundings adjacent to the proposed site. Containers must
20 be located outside of buildings except in buildings or sections
21 of buildings especially approved for the purpose.

22 Subp. 2. **Distance from potable water source.** Storage
23 containers installed after the effective date of this chapter
24 must be located at least 50 feet from a dug well or other source
25 of potable water, unless the container is a part of a water
26 treatment installation.

27 Subp. 3. **Distance from other property and dwellings.**
28 Containers installed after the effective date of this chapter
29 must be located in accordance with the following:

30 A. Containers with a nominal capacity of 100,000
31 gallons or less may not be located less than 50 feet from the
32 line of adjoining property or from the near side of a public
33 roadway or mainline of railroad; and 400 feet from the nearest
34 occupied dwelling or dwelling intended to be occupied, place of
35 public assembly, or confined resident institution.

1 B. Containers with a nominal capacity of greater than
2 100,000 gallons may not be located less than 50 feet from the
3 line of adjoining property, from the near side of a public
4 roadway or mainline of railroad; and 1,000 feet from the nearest
5 occupied dwelling or dwelling intended to be occupied, place of
6 public assembly, or confined resident institution.

7 Subp. 4. **Emergency accessibility.** Container storage areas
8 must be accessible to emergency vehicles and personnel.

9 Subp. 5. **Clear areas.** Areas within ten feet of a storage
10 container must be maintained clear of dry grass and weeds and
11 other combustible materials and materials not required for the
12 operation of the system.

13 1513.0140 MARKINGS OF NONREFRIGERATED CONTAINERS AND SYSTEMS
14 OTHER THAN DOT CONTAINERS.

15 Subpart 1. **Nameplates.** Each system nameplate must be made
16 of a noncorroding metal permanently attached to the system by
17 continuous welding around its perimeter and located so as to be
18 readily accessible for inspection. Nameplates must be
19 maintained in legible condition and include markings as
20 prescribed in subpart 2.

21 Subp. 2. **Information required.** Each container or system
22 covered in parts 1513.0300 to 1513.0380 and 1513.0700 to
23 1513.0930, except "ton containers" and "cylinders," and parts
24 1513.1000 to 1513.1070 must be marked as specified by paragraphs
25 UG-116 and UG-118(b) of the ASME code or as follows:

26 A. with an identification number issued by the
27 commissioner;

28 B. with the certification date;

29 C. with the maximum allowable working pressure;

30 D. with the wall thickness of the container shell and
31 heads in inches or millimeters; and

32 E. with the water capacity of the container in pounds
33 or kilograms, or United States standard gallons or cubic meters
34 (m^3) at 60 degrees Fahrenheit (15.6 degrees centigrade).

35 Items A to E must be determined and documented, on forms

1 provided by the commissioner, by a company that holds a valid
2 R-stamp, in compliance with the current edition of the National
3 Board Inspection Code. Storage containers installed prior to
4 the effective date of parts 1513.0010 to 1513.1100 are not
5 required to be renameplated. If needed, nurse tanks and
6 ~~applicators~~ applicator tanks must be renameplated within two
7 years of the effective date of this part.

8 Subp. 3. **Liquid level gauge.** Each container or system
9 covered in parts 1513.0300 to 1513.0380 and 1513.0700 to
10 1513.0930, except cylinders, and parts 1513.1000 to 1513.1070
11 must be fitted with a liquid level gauge indicating the maximum
12 level to which the container may be filled with liquid anhydrous
13 ammonia at temperatures between 20 degrees Fahrenheit and 100
14 degrees Fahrenheit, except on containers provided with fixed
15 maximum level indicators, such as fixed length dip tubes or
16 containers that are filled by weight. Marks must be in
17 increments of not more than 20 degrees Fahrenheit. Part
18 1513.0190, subpart 3, contains requirements for thermometer
19 wells and thermometers.

20 Subp. 4. **Container openings.** All nonrefrigerated system
21 openings and appurtenances except for pressure relief valves,
22 pressure indicating devices, thermometer wells, or liquid level
23 indicators must be marked, stenciled, tagged, or decaled to
24 indicate whether the opening is in contact with the liquid or
25 vapor phase when the container is filled to the maximum
26 allowable filling density. If paint is used to identify the
27 phases, liquid must be orange and vapor yellow. The valves and
28 lines must be painted to within three feet, except for hose, of
29 the system openings.

30 1513.0150 CONTAINER APPURTENANCES.

31 Subpart 1. **Approval.** All appurtenances of each system
32 must be approved in accordance with part 1513.0030, subpart 4.

33 Subp. 2. **Materials and design.** All appurtenances must be
34 designed for not less than the maximum working pressure of that
35 portion of the system on which they are installed. All

1 appurtenances must be fabricated from materials proved suitable
2 for anhydrous ammonia service.

3 Subp. 3. **Shut-off valves.** All connections to containers
4 except those for pressure relief devices, thermometer wells,
5 liquid level gauging devices, or those fitted with a No. 54
6 (0.055 inch) drill size orifice, or those plugged, must have
7 shut-off valves located as close to the container as practical,
8 with the valve installed so that the product in the tank is
9 under the disc holder when the valve is closed. The shut-off
10 valves at the risers must also be installed so that the product
11 in the piping is under the disc holder when the valve is
12 closed. Any other shut-off valves in the piping may be
13 installed either direction, unless the manufacturer specifies
14 otherwise.

15 Subp. 4. **Excess flow valves.** Excess flow valves must
16 close automatically at the rated flows of vapor or liquid as
17 specified by the manufacturer. The connections and line,
18 including valves and fittings being protected by an excess flow
19 valve, must have a greater capacity than the rated flow of the
20 excess flow valve.

21 Subp. 5. **Exceptions.**

22 A. Liquid level gauging devices that require bleeding
23 of the product to the atmosphere, and which are so constructed
24 that outward flow will not exceed that passed by a No. 54 (0.055
25 inch) drill size opening, need not be equipped with excess flow
26 valves.

27 B. An opening in a container to which a pressure
28 gauge connection is made need not be equipped with an excess
29 flow valve, if such an opening is not larger than No. 54 (0.055
30 inch) drill size.

31 Subp. 6. **Installation.** If an excess flow or back pressure
32 check valve is required by this part, it must be installed
33 directly in the container opening or at a point outside as close
34 as practicable to where the line enters the container. In the
35 latter case the installation must be made in such a manner that
36 any undue strain beyond the excess flow or back pressure check

1 valve will not cause breakage between the container and the
2 valve.

3 Subp. 7. **By-pass.** An excess flow valve must be designed
4 with a by-pass, not to exceed a No. 60 (0.040 inch) drill size
5 opening, to allow equalization of pressures.

6 Subp. 8. **Integral excess flow valve.** A shut-off valve
7 with an integral excess flow valve must be designed for proper
8 installation in a container opening so that the excess flow
9 valve will close in the event that the valve body, extending
10 above the coupling, is sheared or broken off.

11 Subp. 9. **Markings.** An excess flow valve must be plainly
12 and permanently marked with the name or trademark of the
13 manufacturer, the catalog number, and the rated capacity.

14 Subp. 10. **Positive shut-off valve.** Each liquid filling
15 connection on nonrefrigerated containers must have a positive
16 shut-off valve in conjunction with either a back-pressure check
17 valve or an excess flow valve. Vapor connections on
18 nonrefrigerated containers must have a positive shut-off valve
19 together with an excess flow valve. The back-pressure check
20 valves or excess flow valves must be installed in the facility
21 prior to the positive shut-off valves.

22 Subp. 11. **Quick opening valves.** Quick opening (1/4 turn)
23 valves must not be used on transfer lines.

24 1513.0160 PIPING, TUBING, AND FITTINGS.

25 Subpart 1. **Material and design.** Piping, tubing, and
26 fittings must be made of steel or other material suitable for
27 anhydrous ammonia service and must be designed for a pressure
28 not less than the maximum pressure to which they may be
29 subjected in service.

30 Subp. 2. **Standards.** Piping must be supported in
31 accordance with good piping practices and provisions must be
32 made as necessary for expansion, contraction, impact, vibration,
33 and settling. Piping must conform to ANSI/ASME B31.3, American
34 National Standard for Chemical Plant and Petroleum Refinery
35 Piping, except ANSI/ASME B31.5, American National Standard for

1 Refrigeration Piping, may be used for refrigeration piping
2 systems within its scope.

3 Subp. 3. **Pipe connections.** Piping used on nonrefrigerated
4 systems must be at least ASTM A-53 Grade B seamless or Electric
5 Resistance Welded Pipe. Pipe joints must be threaded, welded,
6 or flanged. Pipe must be at least Schedule 40 when joints are
7 welded, or welded and flanged. Pipe must be at least schedule
8 80 when joints are threaded. Brass, copper, or galvanized steel
9 pipe or tubing may not be used. Threaded nipples must be
10 seamless. Welding must be done by a welder certified in
11 accordance with the ASME code, Section IX, "Welding
12 Qualifications." Tubing joints must be ~~flared-and-made-up-with~~
13 ~~flared~~, flareless, or compression type fittings complying with
14 ANSI/SAE J513f, ANSI/ASME B31.3, or ANSI/ASME 31.5.

15 Subp. 4. **Minimum working pressure.** All metal flexible
16 connections for permanent nonrefrigerated installations shall
17 have a minimum working pressure of 250 psig (safety factor of
18 four).

19 Subp. 5. **Materials for fittings and valves.** Cast iron
20 fittings may not be used. Those parts of valves which are
21 subjected to gas pressure must be made of steel, ductile
22 (nodular) iron, or malleable iron. Valves in this case include
23 shut-off valves, excess flow valves, back check valves,
24 emergency shut-off valves, and remotely controlled valves.
25 Ductile iron must meet the requirements of ANSI/ASTM A395 and
26 malleable iron the requirements of ANSI/ASTM A47.

27 Subp. 6. **Protection from damage.** Adequate provisions must
28 be made to protect all exposed piping from physical damage that
29 might result from impact by moving machinery, automobiles,
30 trucks, or any other equipment at the facility.

31 Subp. 7. **Joint compounds.** Joint compounds must be
32 resistant to ammonia at the maximum pressure and temperature to
33 which they may be subjected in service.

34 Subp. 8. **Testing.** After assembly, all piping, hose, and
35 tubing must be tested and proved to be free from leaks at a
36 pressure not less than the normal operating pressure of the

1 system.

2 1513.0170 HOSE SPECIFICATIONS.

3 Subpart 1. Standards. Hose used in ammonia service and
4 subject to container pressure must conform to the American
5 National Standard RMA IP-14, Specifications for Anhydrous
6 Ammonia Hose.

7 Subp. 2. Pressures. Hose subject to container pressure
8 must be designed for a minimum working pressure of 350 psig and
9 a minimum burst pressure of 1,750 psig. Hose assemblies, when
10 made up, must be capable of withstanding a test pressure of 500
11 psig.

12 Subp. 3. Design of hoses and connections. Hose and hose
13 connections located on the low pressure side of flow control, or
14 pressure reducing valves on devices discharging to atmospheric
15 pressure, must be designed for the maximum low side working
16 pressure. All connections must be designed, constructed, and
17 installed so that there will be no leakage when connected.
18 Shut-off valves on the end of liquid and vapor transfer hoses
19 must be equipped with bleed valves to enable the operator to
20 bleed off pressure before disconnecting the hoses.

21 Subp. 4. Transfer hose. If a transfer hose is not drained
22 of ammonia upon completion of transfer operations, the hose must
23 be equipped with an approved shut-off valve at the discharge
24 end. Provision must be made to prevent excessive hydrostatic
25 pressure in the hose under part 1513.0180, subpart 11.

26 Subp. 5. Information on hose. All hose that is one-half
27 inch outside diameter or larger and that is used in ammonia
28 service and subject to container pressure, must have etched,
29 cast, or impressed at five foot intervals on the outer hose
30 cover the following information:

- 31 A. anhydrous ammonia;
32 B. XXX psig (maximum working pressure);
33 C. manufacturer's name or trademark; and
34 D. year of manufacture or expiration.

35 ~~Subp. 6. Replacement or requalification of hose in service~~

1 ~~must be replaced in accordance with the manufacturer's~~
 2 ~~recommendations or requalified periodically in accordance with~~
 3 ~~requirements specified in CGA-P-77 Standard for Requalification~~
 4 ~~of Cargo Tank Hose Used in the Transfer of Compressed Gases.~~

5 1513.0180 PRESSURE RELIEF DEVICES.

6 Subpart 1. Standards. Every container used in systems
 7 covered by parts 1513.0300 to 1513.0380 and 1513.1000 to
 8 1513.1070 must be provided with one or more pressure relief
 9 valves of the spring-loaded type conforming with the applicable
 10 requirements of UL 132, Standard on Safety Relief Valves for
 11 Anhydrous Ammonia and LP-Gas.

12 Subp. 2. Direct contact with vapor space. Pressure relief
 13 valves with a rating not greater than the designed working
 14 pressure of the container or appurtenances must be in direct
 15 contact with the vapor space of the container.

16 Subp. 3. Discharge. The discharge from pressure relief
 17 valves must be vented away from the container, upward and
 18 unobstructed to the atmosphere. Pressure relief valves shall
 19 not be painted or contain other foreign substances. All
 20 pressure relief valve discharge openings shall have rain caps
 21 that will allow free discharge of the vapor and prevent the
 22 entrance of water. Provision must be made for draining
 23 condensate which may accumulate. The rate of the discharge must
 24 be in accordance with part 1513.1100.

25 Subp. 4. Start to discharge. Container pressure relief
 26 valves with relation to the design pressure of the container
 27 must be set to start to discharge as follows:

28 Containers	29 Minimum	30 Maximum
	31 Percent	32 Percent
33 ASME U-68,U-69	34 110	35 125
36 ASME U-200,U-201	37 95	38 100
39 ASME 1952, 1956, 1959, 1962, 40 1965, 1968, 1971, 1974, 41 1977, 1980, 1983, 1986, 42 and 1989	43 95	100
44 API-ASME	95	100
45 U.S. Coast Guard (As required by USCG regulations)		

1 DOT (As required by DOT regulations)

2

3 Subp. 5. Discharge rates. Pressure relief valves used on
4 containers covered by parts 1513.0300 to 1513.0380 and 1513.1000
5 to 1513.1070 shall be constructed to discharge at not less than
6 the rates required in subpart 3 before the pressure is in excess
7 of 120 percent (not including the ten percent tolerance referred
8 to in subpart 4) of the maximum permitted start to discharge
9 pressure setting of the device.

10 Subp. 6. Tampering. Pressure relief valves must be so
11 arranged that the possibility of tampering will be minimized.
12 If the pressure setting adjustment is external, the relief
13 valves must be provided with means for sealing the adjustment.

14 Subp. 7. Shut-off valve locations. Shut-off valves must
15 not be installed between the pressure relief valves and the
16 containers or systems covered by parts 1513.0300 to 1513.0380
17 and 1513.1000 to 1513.1070 except that a shut-off valve may be
18 used where the arrangement of the shut-off valve is such as
19 always to afford the full capacity flow specified in subpart 3
20 through a nonisolated pressure relief valve which must remain
21 operative.

22 Subp. 8. Marking. Each pressure relief valve used with
23 systems covered by parts 1513.0300 to 1513.0380 and 1513.1000 to
24 1513.1070 must be plainly and permanently marked as follows:

- 25 A. with the letters "AA" or the symbol "NH₃";
26 B. the pressure in pounds per square inch gauge at
27 which the valve is set to start to discharge;
28 C. the rate of discharge of the valve in cubic feet
29 per minute of air at 60 degrees Fahrenheit and atmospheric
30 pressure; and
31 D. the manufacturer's name and catalog number.

32 Subp. 9. Restriction of flow capacity. The flow capacity
33 of the pressure relief valve must not be restricted by any
34 connection to it on either the upstream or downstream side.

35 Subp. 10. Data; testing. The manufacturer or supplier of
36 a pressure relief valve manifold must publish complete data
37 showing the flow rating through the combined assembly of the

1 manifold with pressure relief valves installed. The manifold
2 flow rating must be determined by testing the manifold with all
3 but one valve discharging. If one or more openings have
4 restrictions not present in the remaining openings, the
5 restricted opening or openings, or those having the lowest flow,
6 must be used to establish the flow rate marked on the manifold
7 nameplate. The marking must be in accordance with subpart 8 for
8 individual valves.

9 Subp. 11. **Hydrostatic relief valve.** A hydrostatic relief
10 valve or equivalent, with a rating of 350-400 psig, must be
11 installed in each section of piping, including hose, in which
12 liquid ammonia can be isolated between shut-off valves to
13 relieve the pressure which could develop from the trapped
14 liquid. In no case may the hydrostatic relief valve or
15 equivalent setting exceed system design pressure.

16 Subp. 12. **Discharge opening.** The discharge opening from
17 any pressure relief valve may not terminate inside any building
18 or below the highest roof line of a building.

19 Subp. 13. **Periodic inspection.** A pressure relief device
20 must be subject to a periodic visual external inspection by the
21 facility operator to determine that it:

22 A. is free of evidence of tampering, damage,
23 corrosion, or foreign matter that might prevent proper
24 operation;

25 B. is free of leakage when subject to pressures below
26 the minimum allowable start to discharge setting;

27 C. has a properly secured rain cap or other device to
28 avoid entry of moisture or other matter into the relief valve
29 outlet; and

30 D. has an open weep hole to permit moisture to escape.

31 Subp. 14. **Replacement.** No nonrefrigerated container
32 pressure relief valve may be used ~~after-the-replacement-date~~
33 ~~specified-by-the-manufacturer-of-the-device---~~~~if-no-date-is~~
34 ~~specified,~~ a pressure relief valve must be replaced no later
35 than five years after the date of its manufacture or last repair
36 unless it has first been disassembled, inspected, repaired, and

1 ~~tested in a manner such that the valve's condition and~~
 2 ~~performance is verified as being equivalent to the standards for~~
 3 ~~the original valve~~ over five years after the date of
 4 installation of the pressure relief device. Records must be
 5 maintained which identify each container and indicate the date
 6 of installation for each container pressure relief device.

7 1513.0190 FILLING DENSITIES.

8 Subpart 1. Nonrefrigerated containers. The maximum
 9 filling densities for nonrefrigerated containers are:

	Aboveground	Underground
10		
11		
12	56%*	58%
13		
14	57%	
15		
16	(3) DOT containers and cylinders shall be filled	
17	in accordance with DOT regulations.	
18		

19 * This corresponds to 82 percent by volume at minus 28 degrees
 20 Fahrenheit, 85 percent by volume at 5 degrees Fahrenheit, 87.5
 21 percent by volume at 30 degrees Fahrenheit, and 90.6 percent by
 22 volume at 60 degrees Fahrenheit.

23 Subp. 2. Refrigerated storage tanks. The filling density
 24 for refrigerated storage tanks must be such that the tanks will
 25 not be liquid full at a liquid temperature corresponding to the
 26 vapor pressure at the start to discharge pressure setting of the
 27 pressure relief valve.

28 Subp. 3. Required thermometers and wells. If containers
 29 are to be filled according to liquid level by any gauging method
 30 other than a fixed length dip tube gauge, each container must
 31 have a thermometer well and thermometer so that the internal
 32 liquid temperature can be easily determined and the amount of
 33 liquid and vapor in the container corrected to a 60 degrees
 34 Fahrenheit basis.

35 1513.0200 TRANSFER OF LIQUIDS.

36 Subpart 1. Construction materials. Anhydrous ammonia must
 37 always be at a temperature suitable for the material of
 38 construction and design of the receiving containers.
 39 Construction materials must be in accordance with appendix R of

1 API Standard 620, Recommended Rules for Design and Construction
2 of Large Welded Low-Pressure Storage Tanks, for materials for
3 low temperature service.

4 Subp. 2. Operator. At least one qualified operator
5 experienced in transfer procedures and trained in accordance
6 with Code of Federal Regulations, title 29, parts 1900-1910,
7 shall monitor the transfer of ammonia from the time the transfer
8 connections are first made until they are finally disconnected.
9 The monitoring may be performed by a person on site, from a
10 remote location, or by electronic means. Capability must be
11 provided to halt the transfer in the event of an emergency.

12 Subp. 3. Unloading cargo tanks and tank cars. Cargo tanks
13 and tank cars must not be unloaded with gas pressure other than
14 from an ammonia source and must not be unloaded from any
15 location other than a permanent storage location permitted
16 according to Minnesota Statutes, section 18C.305.

17 Subp. 4. Owner's authorization. Containers and cylinders
18 must be filled or used only upon the owner's authorization.

19 Subp. 5. Gauging and charging. Containers and cylinders
20 must be gauged and charged only in the open atmosphere or in
21 buildings provided for that purpose.

22 Subp. 6. Pumps. Pumps used for transferring ammonia must
23 be recommended and labeled for ammonia service by the
24 manufacturer.

25 A. Positive displacement pumps must be equipped with
26 a pressure actuated by-pass valve on the discharge side of the
27 pump. This valve must operate to limit the pressure developed
28 by the pump to the maximum for which the pump is rated. Piping
29 sized to carry the full capacity of the pump at the actuation
30 pressure of this valve must connect the discharge of this valve
31 with the container from which ammonia is being pumped. If this
32 line is capable of being closed off by a valve, an additional
33 by-pass device must be incorporated in the pump to by-pass back
34 to the suction port. The pressure actuated by-pass valve and
35 the return piping must be installed and operate according to the
36 pump manufacturer's recommendations.

1 B. On the discharge side of the pump, before the
2 by-pass valve line, a pressure gauge graduated from 0 to 400
3 psig must be installed.

4 C. Plant piping must contain shut-off valves located
5 as close as practical to pump connections.

6 Subp. 7. Compressors. Compressors used for transferring
7 or refrigerating ammonia must be suitable for ammonia service.

8 A. Compressors, except those used for refrigeration,
9 must be designed for at least 250 psig working pressure. Crank
10 cases of compressors not designed to withstand system pressure
11 must be protected with a suitable pressure relief valve.

12 B. Plant piping must contain shut-off valves located
13 as close as practical to compressor connections.

14 C. A pressure relief valve large enough to discharge
15 the full capacity of the compressor must be connected to both
16 sides before any shut-off valve.

17 D. Compressors must have pressure gauges at both the
18 suction and discharge sides graduated from 0-400 psig.

19 E. Adequate means, such as a drainable liquid trap,
20 must be provided on the compressor suction to minimize the entry
21 of liquid into the compressor.

22 F. Where necessary to prevent contamination, an oil
23 separator must be provided on the discharge side of the
24 compressor.

25 Subp. 8. Protection of lines. Loading lines on
26 nonrefrigerated containers must be protected by a backflow check
27 valve or other suitable protection for liquid and an excess flow
28 valve or other suitable protection for vapor. Unloading lines
29 on nonrefrigerated containers must be protected by excess flow
30 valves or other suitable protection. Piping must be sized so as
31 not to restrict flow rates to the extent that protective devices
32 will not function. The backflow check valves, excess flow
33 valves, or equivalent protection must be installed in the
34 facility piping so that any break will occur on the side of the
35 hose or swivel connection.

36 Stationary storage installations must have approved

1 automatically operated emergency shut-off valves, weakness or
2 shear fittings, or other suitable protection installed in the
3 fixed piping of the transfer system prior to where the hose or
4 swivel piping is attached to the fixed piping. This requirement
5 does not apply to the liquid barge, truck, and tank car
6 loading or unloading lines, or a line feeding a fixed process
7 system. Emergency shut-off valves must remain closed when the
8 facility is not in use. The emergency shut-off valves, weakness
9 or shear fittings, or equivalent protection must be installed in
10 the facility piping so that any break will occur on the side of
11 the hose or swivel connection. This must be completed within
12 two years of the effective date of this chapter.

13 Subp. 9. Meters. Meters used for the measurement of
14 liquid anhydrous ammonia for retail sale must be recommended and
15 labeled for ammonia service by the manufacturer.

16 A. Liquid meters must be designed for minimum working
17 pressure of 250 psig.

18 B. The metering system must incorporate devices that
19 will prevent the inadvertent measurement of vapor.

20 1513.0210 LIQUID LEVEL GAUGING DEVICES.

21 Subpart 1. Required. A container must be equipped with a
22 liquid level gauging device designed for use with ammonia.

23 Subp. 2. Arrangement. A gauging device must be arranged
24 so that the maximum liquid level to which the container is
25 filled is readily determined and be installed according to part
26 1513.0140, subpart 3.

27 Subp. 3. Gauging devices requiring bleeding. Except as
28 provided in parts 1513.1000 to 1513.1070, gauging devices that
29 require bleeding of the product to the atmosphere such as rotary
30 tube, fixed tube, and slip tube devices, must be designed so
31 that the maximum opening of the bleed valve is not larger than
32 No. 54 (0.055 inch) drill size unless provided with an excess
33 flow valve.

34 Subp. 4. Design pressure. Gauging devices must have a
35 design pressure equal to or greater than the design pressure of

1 the container on which they are installed.

2 Subp. 5. Fixed maximum liquid level gauges. Fixed maximum
3 liquid level gauges must be designed and installed to indicate a
4 volumetric level not to exceed 85 percent of the container's
5 water capacity. This does not apply to refrigerated storage.

6 Subp. 6. Columnar gauge glasses. Gauge glasses of the
7 columnar type are restricted to stationary nonrefrigerated
8 storage installations. They must be equipped with shut-off
9 valves having metallic hand wheels, with excess flow valves, and
10 with extra heavy glass adequately protected with a metal housing
11 applied by the gauge manufacturer. They must be shielded
12 against the direct rays of the sun.

13 1513.0220 PAINTING OF CONTAINERS.

14 Aboveground uninsulated containers must have a reflective
15 surface maintained in good condition. White is recommended for
16 painted surfaces, but other colors having similar reflecting
17 characteristics are acceptable.

18 1513.0230 ELECTRICAL EQUIPMENT AND WIRING.

19 Subpart 1. Ammonia installations. Electrical equipment
20 and wiring for use in ammonia installations must be general
21 purpose or weather resistant as appropriate.

22 Subp. 2. High concentrations of ammonia. Where
23 concentrations of ammonia in air in excess of 16 percent by
24 volume are likely to be encountered, electrical equipment and
25 wiring must be installed to comply with the requirements for use
26 in hazardous locations, Class I, Group D, of NFPA 70, National
27 Electrical Code, Articles 500 and 501.

28 SYSTEMS USING STATIONARY, PIER-MOUNTED OR SKID-MOUNTED
29 ABOVEGROUND OR UNDERGROUND, NONREFRIGERATED STORAGE

30 1513.0300 APPLICABILITY.

31 Parts 1513.0300 to 1513.0380 apply to stationary,
32 pier-mounted, skid-mounted, aboveground or underground,
33 nonrefrigerated storage installations using containers other
34 than those constructed in accordance with United States
35 Department of Transportation specifications. All basic rules of

1 parts 1513.0100 to 1513.0230 apply to parts 1513.0300 to
2 1513.0380 unless otherwise noted.

3 1513.0310 DESIGN PRESSURE AND CONSTRUCTION OF CONTAINERS.

4 The minimum design pressure for nonrefrigerated containers
5 is 250 psig or in accordance with part 1513.0110, subpart 2.

6 1513.0320 CONTAINER VALVES, ACCESSORIES, AND DISCHARGE
7 CONNECTIONS.

8 Subpart 1. Excess flow valves. All vapor and liquid
9 connections, except for pressure relief valves and those
10 specifically exempted in part 1513.0150, subparts 5 and 6, must
11 be equipped with approved excess flow valves. Back-pressure
12 check valves are acceptable in container filling connections.
13 Alternatively, vapor and liquid connections covered by this
14 subpart may be fitted with quick-closing internal valves which,
15 except during operating periods, shall remain closed. If
16 internal valves are not practical, external quick-closing valves
17 may be used according to part 1513.0150, subpart 6, and with
18 appropriate protection as required in part 1513.0370.

19 Subp. 2. Pressure gauge. Each storage container must be
20 provided with a pressure gauge graduated from 0 to 400 psig.
21 Gauges must be designated for use in ammonia service.

22 Subp. 3. Vapor equalizing connection. All containers must
23 be equipped with a vapor equalizing connection.

24 1513.0330 PRESSURE RELIEF DEVICES.

25 Subpart 1. Required valves. A container must be provided
26 with one or more pressure relief valves of spring-loaded or
27 equivalent type which comply with items A to C.

28 A. Relief valves must be installed in a manifold so
29 that they can be replaced while the container remains
30 pressurized.

31 B. The discharge from pressure relief valves must be
32 vented away from the container, upward and unobstructed to the
33 open air to an area such that persons, property, and the
34 environment will not be harmed. Vent pipes must not be

1 restrictive or smaller in size than the pressure relief valve
2 outlet connection. All pressure relief valves must have rain
3 caps that will allow free discharge of the vapor and prevent the
4 entrance of water. Provision must be made for draining
5 condensate which may accumulate.

6 C. Noncorrosive vent pipes from two or more pressure
7 relief devices located on the same unit, or similar lines from
8 one or more different units, may be run into a common header,
9 provided the cross-sectional area of the header is at least
10 equal to the sum of the cross-sectional areas of the individual
11 vent pipes.

12 Subp. 2. Rate of discharge. The rate of discharge of
13 spring-loaded pressure relief valves installed on underground
14 containers may be reduced by not more than 30 percent of the
15 rate of discharge specified in part 1513.1100. Containers so
16 protected must not be uncovered after installation until the
17 liquid ammonia has been removed. Containers which may contain
18 liquid ammonia before being installed underground, and before
19 being completely covered with earth, are to be considered
20 aboveground containers when determining the rate of discharge
21 requirements of the pressure relief valves.

22 Subp. 3. Discharge from underground installations. On
23 underground installations where there is a probability of the
24 manhole or housing becoming flooded, the discharge from vent
25 lines must be located above the high water level. Manholes or
26 housings must be provided with ventilated louvers or their
27 equivalent, the area of such openings equaling or exceeding the
28 combined discharge areas of the pressure relief valves and vent
29 lines which discharge their content into the manhole housing.

30 1513.0340 INSTALLATION OF STORAGE CONTAINERS.

31 Subpart 1. Footings, foundations, and subparts.
32 Containers installed aboveground must be provided with
33 reinforced concrete footings and foundations or structural steel
34 supports mounted on reinforced concrete foundations. In either
35 case, the reinforced concrete foundations or footing must extend

1 below the established frost line and be of sufficient width and
2 thickness to support the total weight of the containers and
3 contents adequately. The foundation must maintain the lowest
4 point of the tank not less than 18 inches above the ground.
5 Floating type foundations must also be acceptable if the
6 foundations are designed to adequately support the tank,
7 contents, and piping according to part 1513.0160.

8 Subp. 2. **Horizontal aboveground containers.** Horizontal
9 aboveground containers must be mounted on foundations so as to
10 permit expansion and contractions. A container must be
11 supported to prevent the concentration of excessive loads. The
12 bearing afforded by the saddles must extend over at least
13 one-third of the circumference of the shell. Suitable means for
14 preventing corrosion must be provided on that portion of the
15 container in contact with the foundations or saddles.

16 Subp. 3. **Buried containers.** Containers buried underground
17 must be placed so that the top of the container is at least one
18 foot below the surface. It is not necessary to cover the
19 portion of the container to which a manhole and other
20 connections are affixed. If necessary to prevent floating,
21 containers must be securely anchored or weighted.

22 Subp. 4. **Corrosion resistance.** As a minimum, an
23 underground container must be set on firm earth or another firm
24 foundation, and must be surrounded by at least six inches of
25 noncorrosive, inert materials, such as soft earth, sand, or
26 gravel well compacted into place. As a further means of
27 resisting corrosion, the container and its piping, prior to
28 placement in the ground, must be provided with the following:

29 A. a suitable protective coating applied after proper
30 surface preparation according to the coating manufacturer's
31 recommendations;

32 B. cathodic protection; and

33 C. electrical isolation of the container from
34 ancillary equipment.

35 Corrosion-resistant materials of construction may be used
36 as an option. A coated container must be lowered into place in

1 a manner to prevent abrasion or damage to the coating.

2 Subp. 5. **Separation.** The horizontal distance between
3 aboveground and underground containers of over 1,200 gallons
4 capacity must be at least five feet.

5 Subp. 6. **Protection against flotation.** Secure anchorage
6 or adequate pier height must be provided against container
7 flotation wherever sufficiently high flood water might occur.

8 1513.0350 REINSTALLATION OF CONTAINERS.

9 Subpart 1. **Testing.** Containers, once installed
10 underground shall not later be reinstalled aboveground or
11 underground, unless they successfully withstand hydrostatic
12 pressure retests at the pressure specified for the original
13 hydrostatic test as required by the ASME code under which the
14 tank was constructed, and show no evidence of serious corrosion.

15 Subp. 2. **Coating; valves.** If a container is reinstalled
16 underground, the corrosion resistant coating, if used, must be
17 put in good condition, according to part 1513.0340, subpart 4.
18 If a container is reinstalled aboveground, pressure relief
19 devices or gauging devices must comply with parts 1513.0180,
20 1513.0210, and 1513.0330 as applicable to aboveground containers.

21 1513.0360 MARKING CONTAINERS.

22 Each container or group of containers must be marked on at
23 least two sides that are visible with the words, "ANHYDROUS
24 AMMONIA," and "INHALATION HAZARD," in sharply contrasting colors
25 with letters not less than four inches high, or in compliance
26 with DOT regulations. Each container or group of containers
27 must also be marked with the UN identification number for
28 ammonia, 1005, on each side.

29 Each container must be labeled in a conspicuous manner with
30 the appropriate grade or guaranteed analysis of the contents of
31 the storage container.

32 Each container or group of containers which is installed
33 underground must have a sign bearing marks and labeling as
34 required in this part located adjacent to the cover described in
35 part 1513.0370.

1 1513.0370 PROTECTION OF CONTAINER AND APPURTENANCES.

2 Containers and appurtenances must be located or protected
3 by suitable barriers so as to avoid damage by trucks or other
4 vehicles. Main container shut-off valves and riser hose end
5 valves must be kept closed and locked when the installation is
6 unattended. If the facility is protected against tampering by
7 fencing, valve locks are not required.

8 All connections to underground containers must be located
9 within a dome, housing, or manhole fitted with a substantial
10 removable cover.

11 Storage containers need not be electrically grounded.

12 1513.0380 IDENTIFICATION.

13 A legible sign must be displayed on the premises at which a
14 storage system is located, so as to be readily visible to
15 emergency response personnel, stating the name, address, and
16 telephone number of the nearest representative, agent, or owner
17 of the storage system.

18 1513.0400 REFRIGERATED STORAGE.

19 Parts 1513.0400 to 1513.0500 apply specifically to systems
20 using tanks for the storage of anhydrous ammonia under
21 refrigerated conditions. Parts 1513.0100 to 1513.0230 apply
22 unless otherwise stated.

23 1513.0410 DESIGN OF TANKS.

24 Subpart 1. **Economical design.** Tanks may be designed for
25 any storage pressure desired as determined by economical design
26 of the refrigerated system.

27 Subp. 2. **Design temperature.** The design temperature must
28 be the minimum temperature to which the container will be
29 refrigerated and must be so designated.

30 Subp. 3. **Design pressure over 15 psig.** Containers with a
31 design pressure exceeding 15 psig must be constructed according
32 to part 1513.0120 and the material must be selected from those
33 listed in API Standard 620, Recommended Rules for Design and
34 Construction of Large, Welded, Low-Pressure Storage Tanks,

1 Tables 2.02, R.2.2, R.2.3, or R.2.4.

2 Subp. 4. Design pressure of 15 psig or less. Tanks with a
3 design pressure of 15 psig and less must be constructed
4 according to the general requirements of API Standard 620,
5 including Appendix R.

6 Subp. 5. Certain metals. When austenitic stainless steels
7 or nonferrous metals are used, the ASME code must be used in
8 selection of materials for use at the design temperature.

9 1513.0420 INSTALLATION OF STORAGE TANKS ABOVEGROUND.

10 Subpart 1. Foundations. Tanks must be supported on
11 noncombustible foundations designed to accommodate the type of
12 tank being used.

13 Subp. 2. Water protection. Adequate protection against
14 flotation or other water damage must be provided wherever high
15 flood water might occur.

16 Subp. 3. Freezing protection. Tanks storing product at
17 less than 32 degrees Fahrenheit must be supported in such a way,
18 or heat must be supplied, to prevent the effects of freezing and
19 subsequent frost heaving of the soil.

20 Subp. 4. Liquid containment system. The area surrounding
21 a refrigerated tank or group of tanks must be provided with
22 drainage or must be diked or provided with other secondary
23 containment systems to prevent accidental discharge of liquid
24 from spreading to uncontrolled areas.

25 Subp. 5. Drainage. If drainage is employed, a slope of
26 not less than one percent must be provided. The drainage system
27 must terminate in an impounding basin having a capacity as large
28 as the largest tank served.

29 Subp. 6. Rain water. Provision must be made for the
30 drainage of rain water from the dike or impounding area.
31 Drainage must be provided with a positive means to stop the flow.

32 Subp. 7. Dike capacity. If a dike is employed, the
33 capacity of the diked enclosure must be 110 percent of the
34 capacity of the largest tank served. When computing the volume
35 of the dike, allowance must be made for the volume displaced by

1 all other containers in the diked area.

2 Subp. 8. Walls. The walls of a diked enclosure or the
3 wall of an impounding basin used in a drainage system must be of
4 earth, steel, concrete, or other suitable material designed to
5 be liquid tight and to withstand the hydrostatic pressure and
6 temperature. Earth walls must have a flat top at least two feet
7 wide. The slope must be stable and consistent with the angle of
8 repose of the earth used.

9 Subp. 9. Grading. The ground in an impounding basin or
10 within a diked enclosure, should be graded so that small spills
11 or the early part of a large spill will accumulate at one side
12 or corner, thereby contacting only a relatively small area of
13 ground and exposing a relatively small area of ground and
14 exposing a relatively small surface area for heat gain. Shallow
15 channels in the ground surface or low curbs of earth can help
16 guide the liquid to these low areas without contacting a large
17 ground area.

18 1513.0430 MARKING REFRIGERATED CONTAINERS.

19 Each refrigerated container must be marked with a nameplate
20 on the outer covering in an accessible place as specified in the
21 following:

22 A. the name and address of the builder and the date
23 of fabrication;

24 B. the maximum volume or weight of the product
25 whichever is most meaningful to the user;

26 C. the design pressure;

27 D. the minimum temperature in degrees Fahrenheit ($^{\circ}$ F)
28 or degrees Celsius ($^{\circ}$ C) for which the container was designed;

29 E. the maximum allowable water level to which the
30 container may be filled for the test purposes;

31 F. the density of the product in pounds per cubic
32 foot or kilograms per cubic meter (kg/m^3) for which the
33 container was designed; and

34 G. the maximum level to which the container may be
35 filled with liquid anhydrous ammonia.

1 Each refrigerated container must also be marked on two
2 directly opposite sides at near eye level with the words,
3 "ANHYDROUS AMMONIA," and "INHALATION HAZARD" in sharply
4 contrasting colors with letters not less than four inches high,
5 and the UN identification number for ammonia, 1005, or in
6 compliance with DOT regulations. |

7 1513.0440 TANK VALVES, ACCESSORIES, FILL PIPES, AND DISCHARGE
8 PIPES.

9 Subpart 1. Shut-off valves. Shut-off valves must be:

10 A. provided for all connections except those with a
11 No. 54 (0.055 inch) drill size restriction, plugs, pressure
12 relief valves, and thermometer wells; and

13 B. located as close to the tank as practical.

14 Subp. 2. Check valve. A check valve must be installed on
15 the fill connection, if located below the maximum liquid level,
16 and a remotely operated shut-off valve on other connections
17 located below the maximum liquid level according to part
18 1513.0200, subpart 8.

19 Subp. 3. Refrigerated containers. A refrigerated
20 container must be equipped with an approved liquid level gauging
21 device and high liquid level alarm.

22 1513.0450 PRESSURE RELIEF VALVES.

23 Subpart 1. Start to discharge pressure; relieving
24 capacity. The tank must be provided with a system of one or
25 more pressure relief valves which can limit the tank pressure,
26 below 115 percent (110 percent if only one pressure relief valve
27 is used) of the design pressure during operational emergency
28 conditions other than fire and below 121 percent of the design
29 pressure during operational emergency conditions that include
30 fire. One of the pressure relief valves must be set to start to
31 discharge at a pressure not in excess of the design pressure of
32 the tank and all other pressure relief valves needed to limit
33 the tank pressure below 115 percent (110 percent if only one
34 pressure relief valve is used) of the design pressure during
35 operational emergency conditions other than fire must be set to

1 discharge at a pressure not in excess of 105 percent of the
 2 design pressure. All additional pressure relief valves needed
 3 to limit the tank pressure below 121 percent of the design
 4 pressure during operational emergency conditions including fire
 5 must be set to start to discharge at a pressure not in excess of
 6 110 percent of the design pressure.

7 Subp. 2. Total relieving capacity. The pressure relief
 8 valves set to discharge below 105 percent of the design pressure
 9 of the tank must have a total relieving capacity in excess of
 10 the relieving capacity required to handle operating emergency
 11 conditions listed in item A. The total relieving capacity of
 12 all the pressure relief valves in the system must be the larger
 13 requirement of item A or B.

14 A. Possible refrigeration system upset:

- 15 (1) cooling water failure;
- 16 (2) power failure;
- 17 (3) instrument air or instrument failure;
- 18 (4) mechanical failure of any equipment;
- 19 (5) excessive pumping rates; and
- 20 (6) changing atmospheric conditions.

21 B. Either one of the following formulas for fire
 22 exposure:

23 (1) for valve manufacturers who classify valves
 24 on the basis of the weight of the vapors to be relieved:

25
$$W = \frac{34\,500 F A^{0.82}}{L}$$

26
 27
 28
 29
 30 (2) For valve manufacturers who classify valves
 31 on the basis of air flow:

32
$$Qa = \frac{633\,000 F A^{0.82}}{L C} \sqrt{\frac{Z T}{M}}$$

33
 34
 35
 36 Where:

37 W = weight of vapors to be relieved in pounds/hour at
 38 relieving conditions

39 Qa = air flow in cubic feet per minute at standard
 40 conditions (60 degrees Fahrenheit and 14.7 psi)

1 F = fireproofing credit. Use F = 1.0 except when an
 2 approved fireproofing material of recommended thickness is used,
 3 in which case use F = 0.2

4 A = total surface area in square feet up to 25 feet above
 5 grade or to the equator of a sphere, whichever is greater

6 Z = compressibility factor of ammonia at relieving
 7 condition (if not known, use Z = 1.0)

8 T = temperature in degrees R (460 + temperature in degrees
 9 Fahrenheit of gas at relieving conditions)

10 M = molecular weight = 17 for ammonia

11 L = latent heat of ammonia at relieving conditions in Btu
 12 per pound

13 C = constant based on relation of specific heats

14 (C may be obtained from the following table)

15 (If K is not known, use C = 315)

16	K	C	K	C	K	C
17	1.00	315	1.26	343	1.52	366
18	1.02	318	1.28	345	1.54	368
19	1.04	320	1.30	347	1.56	369
20	1.06	322	1.32	349	1.58	371
21	1.08	324	1.34	351	1.60	372
22	1.10	327	1.36	352	1.62	374
23	1.12	329	1.38	354	1.64	376
24	1.14	331	1.40	356	1.66	377
25	1.16	333	1.42	358	1.68	379
26	1.18	335	1.44	359	1.70	380
27	1.20	337	1.46	361	2.00	400
28	1.22	339	1.48	363	2.20	412
29	1.24	341	1.50	364		

30
 31 Where $K = \frac{C_p}{C_v}$ at atmospheric conditions
 32
 33
 34
 35

36 and C_p = Specific heat of vapor at constant pressure

37
 38 C_v = Specific heat of vapor at constant volume
 39

40 **Subp. 3. Shut-off valves.** Shut-off valves of adequate
 41 flow capacity may be provided and used to facilitate inspection
 42 and repair of pressure relief valves. If a shut-off valve is
 43 provided, it must be arranged so that it can be locked or sealed
 44 open and it may not be closed except by an authorized person who
 45 must remain there while the valve remains closed and who must
 46 again lock or seal the valve open when leaving the station.

47 **Subp. 4. Noncorrosive stacks; discharge lines.** Pressure
 48 relief valves must comply with items A and B.

1 A. If noncorrosive stacks are used, they must be
2 suitably designed to prevent obstruction by rain, snow, ice, or
3 condensate. The outlet size may not be smaller than the nominal
4 size of the pressure relief valve outlet connection.

5 B. Discharge lines may be used if desired. Multiple
6 pressure relief valves on the same storage unit may be run into
7 a common discharge header. The discharge line and header must
8 be designed to accommodate the maximum flow and back pressure
9 not exceeding ten percent of the design pressure of the storage
10 container. This back pressure must be included in the 120
11 percent total maximum pressure given in subpart 1. No other
12 container or system may exhaust into this discharge line or
13 header. The vent lines must be installed to prevent
14 accumulation of liquid in the lines.

15 Subp. 5. **Atmospheric storage.** Atmospheric storage must be
16 provided with vacuum breakers of adequate capacity to respond to
17 anticipated rates of liquid withdrawal and to rapid atmospheric
18 changes so as to avoid damage to the container. Ammonia gas may
19 be used to provide a pad.

20 Subp. 6. **Discharge to open air.** Pressure relief valves
21 used to protect other systems at refrigerated storage
22 installations must discharge to the open air.

23 1513.0460 PROTECTION OF CONTAINERS AND APPURTENANCES.

24 Refrigerated storage containers and appurtenances must
25 comply with part 1513.0370.

26 1513.0470 REINSTALLATION OF CONTAINERS.

27 Containers of a size to require a field fabrication must,
28 when moved and reinstalled, be reconstructed and reinspected in
29 complete accordance with the original requirements under which
30 they were constructed. The containers must be subjected to a
31 pressure retest, and if rerating is necessary, it must be done
32 in accordance with the applicable pressure of the original
33 requirements.

34 1513.0480 REFRIGERATION LOAD AND EQUIPMENT.

1 Subpart 1. **Computation.** The total refrigeration load must
2 be computed as the sum of the following:

3 A. load imposed by heat flow into a container caused
4 by the temperature differential between the ambient temperature
5 and the storage temperature;

6 B. load imposed by heat flow into the tank caused by
7 maximum sun radiation; and

8 C. maximum load imposed by filling the tank with
9 ammonia warmer than the design storage temperature.

10 Subp. 2. **Multiple storage tanks.** More than one storage
11 tank may be handled by the same refrigeration system.

12 Subp. 3. **Compressors.** Compressors must meet requirements
13 of part 1513.0200, subpart 7.

14 A. A minimum of two compressors must be provided,
15 either of which is of sufficient size to handle the loads listed
16 in subpart 1, items A and B, except as provided in item C. If
17 more than two compressors are provided, minimum standby
18 equipment equal to the largest normally operating equipment must
19 be installed. Compressors required for subpart 1, item C, may
20 be used as standby equipment for compressors required in subpart
21 1, items A and B.

22 B. Compressors must be sized to operate with a
23 suction pressure at least ten percent below the minimum setting
24 of the pressure relief valves on the storage tank and must
25 withstand a suction pressure at least equal to 121 percent of
26 the design pressure of the tank. Discharge pressure is governed
27 by condensing conditions.

28 C. If facilities are provided to safely dispose of
29 vented vapor to an automatic flare or to a process unit, a
30 single compressor of sufficient size to handle the load listed
31 in subpart 1, items A and B, must be allowed.

32 Subp. 4. **Compressor drives.** Each compressor must have its
33 own drive unit. Any standard drive consistent with good design
34 may be used. An emergency source of power of sufficient
35 capacity to handle the loads listed in subpart 1, items A and B
36 must be provided, unless facilities are provided to safely

1 dispose of vented vapors while the refrigeration system is not
2 operating.

3 Subp. 5. **Automatic control equipment.** Automatic control
4 equipment is governed by items A to D.

5 A. The refrigeration system must be arranged with
6 controls to govern the compressor operation in accordance with
7 the load as evidenced by the pressure in the containers.

8 B. An emergency alarm system must be installed to
9 function in the event the pressure in the containers rises to
10 the maximum or falls to the minimum allowable operating pressure.

11 C. An emergency alarm and shut-off must be located in
12 the condenser system to respond to excess discharge pressure
13 caused by failure of the cooling medium.

14 D. Automatic controls must be installed in a manner
15 to preclude operation of alternate compressors unless the
16 controls will function with the alternate compressors.

17 Subp. 6. **Separators.** An entrainment separator of suitable
18 size and design pressure must be installed in the compressor
19 suction line. The separator must be equipped with a drain and
20 gauging device. A maximum liquid level control with alarm must
21 be installed.

22 An oil separator of suitable size must be installed in the
23 compressor discharge line. It must be designed for at least 250
24 psig and equipped with a gauging device and drain valve. A
25 maximum oil level control with alarm must be installed.

26 A separator must be equipped with a pressure relief valve
27 if the separator can be isolated with shut-off valves.

28 Subp. 7. **Condensers.** A condenser system may be cooled by
29 air or water or both. The condenser must be designed for at
30 least 250 psig. Provision must be made for purging
31 noncondensibles either manually or automatically. The condenser
32 must be equipped with a pressure relief valve if the condenser
33 can be isolated with shut-off valves.

34 Subp. 8. **Receiver and liquid drain.** A condenser effluent
35 receiver must be provided which is equipped with automatic level
36 controls and valving designed to discharge the liquid ammonia to

1 storage or with a high pressure liquid drain trap of suitable
2 capacity. The receiver must be designed for at least 250 psig
3 operating pressure and equipped with the necessary connections,
4 pressure relief valves, and gauging device.

5 Subp. 9. Insulation. Refrigerated containers and
6 pipelines that are insulated must be covered with a material of
7 suitable quality and thickness for the temperatures
8 encountered. Insulation must be supported and protected against
9 the weather. Weatherproofing and insulation must be of a type
10 that will not support flame propagation and will not cause
11 corrosion when wet.

12 1513.0490 SAFETY EQUIPMENT.

13 Each refrigerated storage installation must have on hand
14 the minimum safety equipment required in part 1513.0040, subpart
15 3; at least two independently supplied, positive-pressure,
16 self-contained breathing apparatus; and at least two approved
17 encapsulating corrosive chemical suits that are impervious to
18 ammonia and designed to accommodate a self-contained breathing
19 apparatus.

20 1513.0500 IDENTIFICATION.

21 A legible sign must be displayed on the premises at which a
22 refrigerated storage system is located so as to be readily
23 visible to emergency response personnel stating the name,
24 address, and telephone number of the nearest representative,
25 agent, or owner of the storage system.

26 RAILROAD TANK CARS

27 1513.0600 APPLICABILITY.

28 Parts 1513.0600 to 1513.0640 apply specifically to systems
29 using DOT single unit pressure tank car tanks mounted on railcar
30 structures and used for the rail transportation of ammonia. All
31 containers referred to in this part must be in accordance with
32 DOT regulations.

33 1513.0610 DESIGN AND CONSTRUCTION.

34 Tank car tanks and tank cars must receive approval from the

1 Association of American Railroads Committee on Tank Cars, before
2 being placed into service.

3 1513.0620 PRESSURE RELIEF VALVES.

4 Tank cars must be provided with a pressure relief valve.

5 1513.0630 MARKING AND PLACARDING.

6 Subpart 1. **General requirement.** Each tank car, whether
7 empty or loaded, must be marked with the proper shipping name,
8 "ANHYDROUS AMMONIA," and "INHALATION HAZARD" in letters at least
9 four inches in height with at least a 5/8-inch stroke.

10 Separation between each letter must be at least 3/4-inch. The
11 markings must be displayed on a background of sharply
12 contrasting color on both sides of the tank car and near the
13 stenciled DOT specification markings. Each tank car must also
14 be marked with the UN identification number, 1005, on each side
15 and each end in a manner prescribed by DOT regulations. Tank
16 cars must be marked in compliance with DOT regulations.

17 Subp. 2. **Transportation of ammonia or residue.** Each tank
18 car transporting ammonia must be provided with placarding in
19 accordance with DOT requirements on each side and each end in
20 accordance with DOT regulations. A tank car transporting a
21 residue of ammonia must be provided with "RESIDUE" placards on
22 each side and each end in accordance with DOT regulations.

23 1513.0640 TANK CAR LOADING AND UNLOADING LOCATIONS AND
24 OPERATIONS.

25 Subpart 1. **Governing law.** Anhydrous ammonia tank cars
26 must be loaded and unloaded only at locations that are permitted
27 under Minnesota Statutes, section 18C.305, and meet the
28 requirements of parts 1513.0040, subpart 3, and 1513.0200,
29 subparts 1 to 9, item B.

30 Subp. 2. **Level rail track.** Rail track at tank car loading
31 and unloading positions must be essentially level.

32 Subp. 3. **Brakes; blocks.** Brakes must be set and the
33 wheels blocked in both directions on all tank cars being loaded
34 or unloaded.

1 Subp. 4. Caution signs. Caution signs must be so placed
2 on the track or car to give warning to persons approaching the
3 car from the open end or ends of the siding. The signs must be
4 of metal at least 12 inches high by 15 inches wide in size, and
5 bear the words, "STOP -- TANK CAR CONNECTED," OR "STOP -- MEN AT
6 WORK," the word, "STOP" being in letters at least four inches
7 high. Other words must be in letters at least two inches high.
8 The letters must be white on blue background. A car so
9 protected must not be coupled or moved. The signs must remain
10 in place until the tank car valves have been closed and the
11 transfer lines have been disconnected.

12 Subp. 5. Derail. A standard derail must be properly set
13 and secured in the derailing position between the car being
14 loaded or unloaded and other cars being moved on the same track.

15 Subp. 6. Purging of tank car. A tank car used to
16 transport a commodity other than ammonia must be purged
17 completely of the previous commodity before being loaded with
18 ammonia. Markings and placarding must be changed
19 correspondingly.

20 Subp. 7. Visual inspection. Before connecting loading
21 lines to a tank car and before releasing a tank car to the
22 carrier, a visual inspection, by personnel trained in accordance
23 with part 1513.0040, subpart 1, for obvious defects must be made
24 to determine:

25 A. whether the tank car undercarriage, safety
26 appliances (handrails, grab irons, etc.), walk surfaces,
27 ladders, steps, air and hand brake systems, trucks, head
28 shields, and couplers appear to be in a safe condition;

29 B. if the tank car tank and pressure relief valve
30 periodic retest dates are current;

31 C. if the tank car tank, or jacket if the the tank is
32 insulated, shows evidence of abrasion, dents, gouges, severe
33 corrosion, or other damage; and

34 D. whether manway bolts and gaskets, external valves,
35 pressure relief valves, gauges, and fittings appear to be in
36 serviceable condition and free of leakage.

1 Subp. 8. Leakage. If leakage occurs at any manway, valve,
2 gauge, gasket, or fitting during loading, the loading must stop
3 and the cause of the leak corrected before loading can be
4 resumed. If necessary to effect leak repairs, the tank car must
5 be emptied and repairs made at the loading terminal or qualified
6 repair facility.

7 Subp. 9. Repairs. A damaged or defective tank car must be
8 forwarded to a carrier repair track or to a qualified repair
9 shop before it is returned to service. Structural repairs to a
10 tank car, including welding repairs on the tank car tank must be
11 performed only at a repair facility authorized by the
12 Association of American Railroads and by a qualified welder
13 following authorized procedures.

14 Subp. 10. Private track. An ammonia tank car must be
15 consigned for delivery and unloaded on a private track. If a
16 private track is unavailable, an ammonia tank car equipped with
17 excess flow valves may be consigned for delivery and unloaded on
18 a carrier track, provided it is unloaded into permanent storage
19 of sufficient capacity to receive the entire contents of the car.

20 Subp. 11. Securing tank car. After loading or unloading a
21 tank car, all valves must be closed and transfer lines
22 disconnected. Caps or plugs on tank car sample valves, liquid
23 valves, vapor valves, and gauging device valves must be replaced
24 and made wrench tight. Slip tube gauging devices must be
25 secured and gauge housings screwed in place. Protective housing
26 covers must be secured, pinned, and proper seals put in place
27 when required. Leaks from any source on a tank car must be
28 stopped before a car may be released to the carrier.

29 Subp. 12. Emergency and rescue equipment. Each tank car
30 loading and unloading location must have on hand as a minimum,
31 for emergency and rescue purposes, all of the equipment
32 specified in part 1513.0040, subpart 3.

33 SYSTEMS MOUNTED ON TRUCKS, SEMI-TRAILERS, AND TRAILERS
34 FOR TRANSPORTATION OF AMMONIA

35 1513.0700 APPLICABILITY.

36 Parts 1513.0700 to 1513.0830 apply specifically to systems

1 mounted on trucks, semi-trailers, and trailers (other than those
2 covered under parts 1513.1000 to 1513.1070) used for the
3 transportation of ammonia. Parts 1513.0100 to 1513.0230 apply
4 to trucks, semi-trailers, and trailers unless otherwise noted.

5 1513.0710 DESIGN PRESSURE OF CONTAINERS.

6 Subpart 1. Design and construction. Containers used in
7 interstate commerce must be designed and constructed according
8 to the ASME code, have a minimum design pressure of 265 psig,
9 and meet other applicable requirements of DOT regulations.
10 Containers designed and constructed in accordance with earlier
11 ASME Code editions having a minimum design pressure of 250 psig
12 and meeting conditions prescribed by DOT regulations are
13 authorized for use in intrastate commerce.

14 Subp. 2. Shell or head thickness. The shell or head
15 thickness of any container shall not be less than 3/16 inch.

16 Subp. 3. Labels. All container openings, except pressure
17 relief valves, liquid level gauging devices, and pressure
18 gauges, shall be labeled to designate whether they communicate
19 with liquid or vapor space when the container is filled to the
20 maximum permitted filling density. Labels must be on or
21 adjacent to the valves closing the openings readily visible.

22 Subp. 4. Baffles. Baffles are not required for cargo
23 tanks.

24 1513.0720 CONTAINER MOUNTING.

25 Subpart 1. Attachment. The means of attachment of a
26 container to the cradle, frame, or chassis of a vehicle must be
27 designed on a basis of two "g" loading in either direction,
28 using a safety factor of not less than four, based on the
29 ultimate strength of the material used. For the purpose of this
30 requirement, two "g" of load support is equivalent to three
31 times the static weight of the articles supported, and two "g"
32 of loading and bending, acceleration, and torsion is equivalent
33 to twice the static weight support applied horizontally at the
34 road surface.

35 Subp. 2. Hold-down devices. Hold-down devices, when used,

1 must anchor the container to the cradle, frame, or chassis in a
2 safe manner that will not introduce undue concentration of
3 stresses. These devices must incorporate positive means for
4 drawing the container down tight, and stops or anchors must be
5 provided to prevent relative movement between container and
6 framing due to stopping, starting, or changes in direction.

7 Subp. 3. External cradles. Vehicles designed and
8 constructed so that the cargo tanks constitute in whole or in
9 part the stress member used in lieu of the frame, must be
10 supported by external cradles subtending at least 120 degrees of
11 the shell circumference. The design calculation must include
12 beam stress, shear stress, torsion stress, bending moment, and
13 acceleration stress, in addition to those covered by the code
14 under which the cargo tank was designed.

15 Subp. 4. Liquid withdrawal line. If a liquid withdrawal
16 line is installed in the bottom of a container, the connections
17 to it, including the hose, must not be lower than the lowest
18 horizontal edge of the motor vehicle axle.

19 Subp. 5. Hose ends. Both ends of a hose must be secured
20 while in transit.

21 Subp. 6. Friction. If the cradle and the container are
22 not welded together, material must be used between them to
23 eliminate metal-to-metal friction.

24 1513.0730 CONTAINER APPURTENANCES.

25 Subpart 1. Physical damage protection. Nonrecessed
26 container fittings and appurtenances must be protected against
27 physical damage by either:

- 28 A. a protected location;
29 B. the vehicle frame or bumper; or
30 C. a protective housing.

31 The protection housing, if used, must comply with the
32 requirements under which the containers are fabricated with
33 respect to design and construction, and must be designed to
34 withstand static loadings in any direction equal to twice the
35 weight of the container and attachments when filled with the

1 lading, using a safety factor of not less than four, based on
2 the ultimate strength of the material to be used. The
3 protective housing, if used, must be protected with a weather
4 cover to ensure proper operation of valves and pressure relief
5 devices.

6 Subp. 2. Container openings. With the exception of
7 pressure relief valves, liquid level gauges, pressure gauges,
8 and thermometer wells, every opening in a container must be:

9 A. closed with a plug, cap, bolted flange, or plate;

10 B. provided with an excess flow valve and manual
11 shut-off valve;

12 C. provided with a back flow check valve and manual
13 shut-off valve; or

14 D. provided with a remotely controlled internal
15 shut-off valve as described in subpart 3.

16 Subp. 3. Discharge openings. Every liquid or vapor
17 discharge opening in a container must be provided with a
18 remotely controlled internal shut-off valve. For every opening
19 of less than 1-1/4 inches NPT, an excess flow valve with manual
20 shut-off valve may be used instead. The internal shut-off valve
21 may be operated by mechanical means, by hydraulic means, or by
22 air or gas pressure.

23 A. On a container of 3,500 gallons water capacity or
24 less, each internal shut-off must be provided with at least one
25 remote control station and the actuating means may be
26 mechanical. This station must be at one end of the tank, away
27 from the discharge connection area.

28 B. On a container over 3,500 gallons water capacity,
29 each internal shut-off valve must be provided with remote means
30 of closure, both mechanical and thermal, that are installed at
31 the ends of the tank in at least two, diagonally opposite
32 locations. If the discharge connection at the tank is not in
33 the general vicinity of one of the two locations specified
34 above, one additional fusible element must be installed so that
35 heat from a fire in that area will activate the emergency
36 control system. Fusible elements may not have a melting point

1 exceeding 250 degrees Fahrenheit.

2 Subp. 4. Exception. The requirements of subpart 3 do not
3 apply to a 1-1/4 inch NPT liquid or vapor discharge opening
4 equipped with an excess flow valve and manually operated
5 shut-off valve installed before October 1, 1984.

6 Subp. 5. Vapor equalizing valve. A container must be
7 equipped with an approved vapor equalizing valve of adequate
8 capacity.

9 Subp. 6. Liquid level gauge. A container must be equipped
10 with a fixed maximum liquid level gauge.

11 Subp. 7. Pressure gauge. A container must be equipped
12 with a pressure gauge having a dial graduated from 0-400 psig.

13 1513.0740 PIPING, TUBING, FITTINGS, AND HOSE.

14 Subpart 1. Mounting; protection. All piping, tubing, and
15 fittings shall be securely mounted and protected against
16 physical damage.

17 Subp. 2. Truck unloading line. The truck unloading line
18 must be provided with an excess flow valve at the hose
19 connection unless an approved quick closing internal valve is
20 provided in the container unloading connection according to part
21 1513.0730, subpart 2.

22 Subp. 3. Liquid propane hose. Liquid propane hose must
23 not be used for ammonia service according to part 1513.0170.

24 1513.0750 PRESSURE RELIEF VALVES.

25 The discharge from container pressure relief valves must be
26 vented away from the container upward and unobstructed to the
27 open air in a manner to prevent any impingement of escaping gas
28 upon the container. Loose fitting rain caps must be used to
29 prevent moisture or foreign material from entering the relief
30 valve outlet. The size of discharge lines from pressure relief
31 valves may not be smaller than the nominal size of the pressure
32 relief valve outlet connection. Provision must be made for
33 draining condensate which may accumulate in the discharge pipe.

34 Pressure relief device equipment used on DOT containers
35 must be inspected, repaired, or replaced according to applicable

1 DOT regulations.

2 1513.0760 PLACARDING AND MARKING OF CONTAINER.

3 A container, whether loaded or empty, must be provided with
4 placarding on each side and on each end according to DOT
5 regulations and conspicuously and legibly marked on each side
6 and each end, on a background of sharply contrasting color with
7 the words, "ANHYDROUS AMMONIA" AND "INHALATION HAZARD" in
8 letters at least two inches high. Each container must also be
9 marked with the UN identification number for ammonia, 1005, on
10 each side and each end in a manner prescribed by DOT
11 regulations. Containers must be marked in compliance with DOT
12 regulations.

13 1513.0770 TRANSFER OF LIQUIDS.

14 Subpart 1. **Weighing or gauging contents.** The content of a
15 cargo tank container must be determined by weighing or by liquid
16 level gauging device. If the volume content of a container is
17 to be determined by liquid level measurement, the container must
18 have a thermometer well and thermometer so that the internal
19 liquid temperature can be easily determined.

20 Subp. 2. **Pumps; compressors.** Pumps or compressors must be
21 designed and installed according to part 1513.0200, and
22 protected against physical damage when mounted upon ammonia tank
23 trucks and trailers.

24 Subp. 3. **Permanent storage locations.** A cargo tank
25 container of greater than 3,500 gallons water capacity must be
26 unloaded only at permanent storage locations permitted according
27 to Minnesota Statutes, section 18C.305, and meeting the
28 requirements of parts 1513.0040, subpart 3, and 1513.0200,
29 subpart 8.

30 1513.0780 TRAILERS AND SEMI-TRAILERS.

31 Subpart 1. **Multiple vehicles.** If two or more vehicles are
32 operated in combination, the vehicles must be designed and
33 constructed, and the coupling devices connecting the vehicles
34 must be designed, constructed, and installed, so that when the

1 combination is operated in a straight line on a smooth, level,
2 paved surface, the path of the towed vehicle does not vary more
3 than three inches (80 mm) from the path of the towing vehicle.

4 Subp. 2. **Emergency braking.** A trailer or semi-trailer
5 must be equipped with an emergency braking system to be
6 activated in the event of separation from the towing vehicle.

7 Subp. 3. **Tow-bar; safety chain or cable.** A trailer must
8 be equipped with a tow-bar and means of attaching the tow-bar to
9 the towed and towing vehicles. The tow-bar and means of
10 attachment must be structurally adequate, properly and securely
11 mounted, provide for adequate articulation, and be provided with
12 a locking device to prevent accidental separation of the towed
13 and towing vehicles.

14 One or more safety devices such as safety chains or safety
15 cables must also be properly installed to prevent the towed
16 vehicle from breaking loose in the event of tow-bar failure or
17 disconnection.

18 Subp. 4. **Fifth-wheel assembly.** If a fifth-wheel assembly
19 is employed for towing a semi-trailer, the lower half of the
20 assembly must be properly and securely attached to the frame of
21 the towing vehicle. The upper half of the assembly must be
22 fastened to the towed vehicle in a manner providing at least the
23 same security required for installation of the lower half. A
24 fifth-wheel assembly must have a positive locking mechanism
25 which applies automatically on coupling and which prevents
26 separation of the upper and lower halves except by activation of
27 a manual release.

28 1513.0790 ELECTRICAL EQUIPMENT AND LIGHTING.

29 Subpart 1. **Lighting; wiring.** Tank trucks, tank trailers,
30 and tank semi-trailers may not be equipped with any artificial
31 light other than electric light. Electric lighting circuits
32 must have overcurrent protection (fuses or automatic circuit
33 breakers). The wiring shall have sufficient carrying capacity
34 and mechanical strength, and shall be suitably secured,
35 insulated, and protected against physical damage.

1 Subp. 2. Federal regulations. Tank trucks, tank trailers,
2 and tank semi-trailers must be provided with lighting devices
3 and reflectors according to Code of Federal Regulations, title
4 49, part 393, subpart B.

5 1513.0800 PROTECTION AGAINST COLLISION.

6 A tank motor vehicle must be provided with properly
7 attached bumpers or chassis extensions arranged to protect the
8 tank, piping, valves, and fittings from physical damage in case
9 of collision.

10 1513.0810 BRAKES.

11 No ammonia may be loaded into or unloaded from any tank
12 truck, tank semi-trailer, or tank trailer unless the handbrake
13 or other braker mechanism and wheel chocks on both sides of at
14 least one drive wheel are securely set to prevent motion of the
15 vehicle during the loading or unloading process.

16 1513.0820 PORTABLE TANKS.

17 If portable tanks are used in lieu of cargo tanks and are
18 permanently mounted on highway motor vehicles for the
19 transportation of ammonia, they must comply with parts 1513.0700
20 to 1513.0830. If portable tanks are used as shipping containers
21 in interstate commerce they must comply with parts 1513.0900 to
22 1513.0930.

23 1513.0830 SAFETY EQUIPMENT.

24 Tank trucks, trailers, semi-trailers, and attached power
25 units must be furnished with the equipment specified in part
26 1513.0040, subpart 4, for emergency purposes.

27 SYSTEMS USING DOT PORTABLE TANKS AND CYLINDERS

28 1513.0900 APPLICABILITY.

29 Parts 1513.0900 to 1513.0930 apply specifically to systems
30 using cylinders according to part 1513.0030, subpart 13,
31 portable tanks (DOT-51), or ton containers (DOT-106A)
32 constructed according to United States Department of
33 Transportation specifications. Parts 1513.0100 to 1513.0230

1 also apply to those systems, unless otherwise noted.

2 1513.0910 CONTAINERS AND CYLINDERS.

3 Subpart 1. **Applicable standards.** Containers and cylinders
4 must comply with current DOT specifications and must be
5 maintained, filled, packaged, marked, labeled, and shipped to
6 comply with current DOT regulations, OSHA regulations, and CGA
7 C-4, American National Standard Method of Marking Portable
8 Compressed Gas Containers to Identify the Material Contained
9 (ANSI/CGA C-4).

10 Subp. 2. **Storage.** Containers and cylinders must be stored
11 in an area free from ignitable debris and in a manner that
12 prevents external corrosion. Storage may be indoors or
13 outdoors. Cylinders stored outdoors must be protected against
14 accumulation of ice and snow.

15 Subp. 3. **Burial.** Containers and cylinders must not be
16 buried below ground.

17 Subp. 4. **Surfaces; connections.** Containers and cylinders
18 must be set upon firm, level surfaces or otherwise firmly
19 secured. The possible effect of settling or frost have on the
20 outlet piping must be guarded against by appropriate use of a
21 flexible connection or special fitting.

22 Subp. 5. **Heat sources.** Containers and cylinders must be
23 protected from heat sources such as radiant flame and steam
24 pipes. Heat must not be applied directly to containers or
25 cylinders to raise the pressure. A cylinder filled according to
26 DOT regulations will become liquid full at 145 degrees
27 Fahrenheit and will rupture upon further temperature rise.

28 Subp. 6. **External damage.** Containers and cylinders must
29 be stored in a manner to protect them from moving vehicles or
30 external damage.

31 Subp. 7. **Valve protection.** A container or cylinder
32 designed to have a valve protection cap or device must have the
33 cap or device securely in place when the container or cylinder
34 is not in service. This requirement does not apply at a
35 facility specifically designated for filling containers or

1 cylinders.

2 Subp. 8. Trap; back pressure check valve. Any process
3 system connected to a container or cylinder must be equipped
4 with a trap or back pressure check valve to prevent the entry of
5 foreign matter into the container or cylinder.

6 1513.0920 CONTAINER AND CYLINDER VALVES AND REGULATION EQUIPMENT.

7 Subpart 1. Tampering protection. Container and cylinder
8 valves and pressure regulation equipment must be protected
9 against tampering when installed for use.

10 Subp. 2. Protection during transit and storage. Container
11 and cylinder valves shall be protected while in transit, in
12 storage, and while being moved prior to connection to the
13 process line, as follows:

14 A. by setting them into a recess of the container; or

15 B. by ventilated metal cap or collar, fastened to the
16 container, capable of withstanding a blow from any direction
17 equivalent to that of a 30 pound weight dropped four feet.

18 Construction must be such that a blow will not be transmitted to
19 the valves or other connections.

20 A valve on a cylinder which is enclosed in a box or crate of
21 sufficient strength to protect the valve from damage during
22 transit or storage need not be provided with a protective cap or
23 collar.

24 Subp. 3. Not in service. If containers or cylinders are
25 not connected for service, the outlet valves must be kept
26 tightly closed and protected even though containers are
27 considered empty. This requirement does not apply at a facility
28 specifically designed for filling containers or cylinders.

29 Subp. 4. Cylinder valve connection standards. Cylinder
30 valves must be in accordance with the connection standard for
31 ammonia as contained in CGA V-1, American National, Canadian,
32 and Compressed Gas Association Standard for Compressed Gas
33 Cylinder Valve Outlet and Inlet Connections (ANSI/CSA/CGA V-1).

34 1513.0930 PRESSURE RELIEF DEVICES.

35 A cylinder containing less than 165 pounds (75 kg) of

1 ammonia is not required to have a pressure relief device.

2 Pressure relief device equipment used on DOT containers
3 must be inspected, repaired, or replaced according to applicable
4 DOT regulations.

5 SYSTEMS FOR TRANSPORTATION OF AMMONIA MOUNTED
6 ON FARM WAGONS AND EQUIPMENT OR IMPLEMENTS OF HUSBANDRY

7 1513.1000 APPLICABILITY.

8 Parts 1513.1000 to 1513.1070 apply to containers of 3,000
9 gallons water capacity or less and systems mounted on farm
10 wagons, implements of husbandry, and equipment which is used for
11 the transportation of ammonia. Parts 1513.0100 to 1513.0230
12 apply to those containers and systems unless otherwise noted.

13 1513.1010 DESIGN OF CONTAINERS.

14 The minimum design for containers must be in accordance
15 with part 1513.0120.

16 1513.1020 MOUNTING OF CONTAINERS.

17 Subpart 1. **Secure mounting.** All containers must be
18 securely mounted. A "stop" or "stops" must be mounted on the
19 farm wagon or on the container in such a way that the container
20 cannot be dislodged from its mounting due to the farm wagon
21 coming to a sudden stop. Back slippage must also be prevented.

22 Subp. 2. **Hold-down device.** A hold-down device must be
23 provided which will anchor the container to the farm wagon at
24 one or more places on each side of the container.

25 Subp. 3. **Weight distribution.** If containers are mounted
26 on four-wheel farm wagons, the weight must be distributed evenly
27 over both axles.

28 Subp. 4. **Friction.** If the cradle and the container are
29 not welded together, suitable material must be used between them
30 to eliminate metal-to-metal friction. See part 1513.0120,
31 subparts 2 and 4, with regard to welding on a container.

32 1513.1030 CONTAINER APPURTENANCES.

33 Subpart 1. **Maximum liquid level gauge.** A container must
34 be equipped with a fixed maximum liquid level gauge that is

1 designed to indicate when the container has been filled to 85
2 percent of its water capacity. The dip tube of this gauge must
3 be installed in such a manner that it cannot be readily removed.

4 Subp. 2. **Pressure gauge.** A container must be equipped
5 with a pressure gauge having a dial graduated from 0-400 psig.

6 Subp. 3. **Filling connection.** The filling connection of
7 each container must comply with the requirements of part
8 1513.0150, subpart 10.

9 Subp. 4. **Vapor equalization valve.** A containers must be
10 equipped with a vapor equalizing valve unless equipped for spray
11 loading.

12 Subp. 5. **Excess flow valves.** All vapor and liquid
13 connections, except pressure relief valves and those
14 specifically exempt in part 1513.0150, subpart 5, must be
15 equipped with excess flow valves or may be fitted with
16 quick-closing internal valves, which remain closed except during
17 operating periods. An excess-flow valve is not required if the
18 controlling orifice is not in excess of 7/16 inch in diameter
19 and the valve is a hand-operated, attached hand wheel or
20 equivalent, shut-off valve. To assist in filling applicator
21 tanks, it is permissible to bleed vapors to the open air, if
22 other requirements in this part are met.

23 Subp. 6. **Rigid guard.** Appurtenances on farm wagons must
24 be protected from physical damage by a rigid guard designed to
25 withstand static loading in any direction equal to twice the
26 weight of the container and lading using a safety factor of four
27 based upon the ultimate strength of the material used. If the
28 guard encloses the pressure relief valve, the valve must be
29 properly vented through the guard.

30 Subp. 7. **Coupling device.** If the applicator or nurse tank
31 is trailed and the metering device is remotely mounted, such as
32 on the tool bar, an automatic break-away, self-closing coupling
33 device must be used. The coupling device must be made from or
34 coated with a corrosion resistant material. The coupling device
35 must be mounted in a manner that will permit the device to
36 swivel freely in all directions. A coupling device must be

1 maintained ~~and-replaced~~ in accordance with the manufacturer's
2 recommendations. An angle valve may not be used as a hose end
3 valve connecting to the coupling device.

4 Subp. 8. **Control valve.** Any control valve installed
5 between the regulator and the break-away coupling device must
6 indicate whether the valve is open or closed.

7 Subp. 9. **Liquid withdrawal line.** If a liquid withdrawal
8 line is installed in the bottom of the container, the
9 connections to it, including hose, must not be lower than the
10 lowest horizontal edge of the farm wagon axle. The hose must be
11 drained and depressurized before the container is moved or towed
12 on a public road.

13 Subp. 10. **Hose ends.** Provision shall be made to secure
14 both ends of the hose in transit.

15 Subp. 11. **Containers.** Containers in this part must comply
16 with all requirements as prescribed in Code of Federal
17 Regulations, title 49, section 173.317(m).

18 1513.1040 PLACARDING AND MARKING OF CONTAINERS.

19 Subpart 1. **General.** There must appear on each side and on
20 each end of the container in letters at least two inches high,
21 the words, "ANHYDROUS AMMONIA" and the words "INHALATION HAZARD"
22 on two sides. Each container must also be marked with the UN
23 identification number, 1005, on each side and each end according
24 to DOT requirements. Containers must be marked in compliance
25 with DOT requirements.

26 Subp. 2. **Slow-moving vehicle.** Slow moving (25 mph or less)
27 farm wagons and equipment operating on public roads must be
28 provided with an emblem consisting of a fluorescent orange
29 triangle with a red reflective border. For information
30 regarding construction, location, and mounting of the emblem,
31 refer to ASAE S276.4, Slow-Moving Vehicle Identification
32 Emblem. See also Code of Federal Regulations, title 29, part
33 1910.145(d)(10).

34 1513.1050 FARM WAGONS AND EQUIPMENT.

35 All farm wagons and equipment must be securely attached to

1 the vehicle drawing them by means of drawbars supplemented by
2 hitch pins with a retainer and safety chains.

3 Farm wagons and equipment must be constructed and
4 maintained so they will follow substantially in the path of the
5 towing vehicle and will prevent the towed farm wagon from
6 whipping or swerving dangerously from side to side.

7 Farm wagons and equipment may not be towed in public places
8 such as school yards, malls, or hospital grounds.

9 1513.1060 SAFETY EQUIPMENT.

10 An ammonia tank must be equipped with at least five gallons
11 of clean water in a container designed to provide ready access
12 to the water for flushing any area of the body contacted by
13 ammonia.

14 A. Applicators must have a legible decal depicting
15 the instructions for step-by-step ammonia transfer.

16 B. Toolbars must have information for connecting and
17 disconnecting the coupling device, displayed in a manner that is
18 readily visible near the break-away coupling device.

19 1513.1070 CHEMICAL ADDITIVE COMPATIBILITY.

20 Prior to the addition of a chemical additive, its
21 compatibility with system components must be verified by the
22 manufacturer of the additive.

23 MINIMUM REQUIRED FLOW RATE OF PRESSURE RELIEF DEVICES
24 FOR PROTECTION

25 1513.1100 MINIMUM FLOW RATES.

26 Pressure relief valves for excessive heat or fire
27 protection used on containers covered by parts 1513.0300 to
28 1513.0380 and 1513.1000 to 1513.1070 must be constructed to
29 discharge at not less than the rates required in this part
30 before the pressure is in excess of 121 percent of the maximum
31 allowable working pressure of the container. Relief protection
32 for any other reason, except refrigerated storage, must use ASME
33 UG-125 through UG-136.

34	Surface	Flow Rate,	Surface	Flow Rate,	Surface	Flow Rate,
35	Area,	CFM	Area,	CFM	Area,	CFM
36	Sq.Ft.	Air	Sq.Ft.	Air	Sq.Ft.	Air

1						
2	20	258	185	1,600	900	5,850
3	25	310	190	1,640	950	6,120
4	30	360	195	1,670	1,000	6,380
5	35	408	200	1,710	1,050	6,640
6	40	455	210	1,780	1,100	6,900
7	45	501	220	1,850	1,150	7,160
8	50	547	230	1,920	1,200	7,410
9	55	591	240	1,980	1,250	7,660
10	60	635	250	2,050	1,300	7,910
11	65	678	260	2,120	1,350	8,160
12	70	720	270	2,180	1,400	8,410
13	75	762	280	2,250	1,450	8,650
14	80	804	290	2,320	1,500	8,900
15	85	845	300	2,380	1,550	9,140
16	90	885	310	2,450	1,600	9,380
17	95	925	320	2,510	1,650	9,620
18	100	965	330	2,570	1,700	9,860
19	105	1,010	340	2,640	1,750	10,090
20	110	1,050	350	2,700	1,800	10,330
21	115	1,090	360	2,760	1,850	10,560
22	120	1,120	370	2,830	1,900	10,800
23	125	1,160	380	2,890	1,950	11,030
24	130	1,200	390	2,950	2,000	11,260
25	135	1,240	400	3,010	2,050	11,490
26	140	1,280	450	3,320	2,100	11,720
27	145	1,310	500	3,620	2,150	11,950
28	150	1,350	550	3,910	2,200	12,180
29	155	1,390	600	4,200	2,250	12,400
30	160	1,420	650	4,480	2,300	12,630
31	165	1,460	700	4,760	2,350	12,850
32	170	1,500	750	5,040	2,400	13,080
33	175	1,530	800	5,300	2,450	13,300
34	180	1,570	850	5,590	2,500	13,520

35
36 Surface Area = Total Outside Surface Area of Container in
37 Square Feet. If the surface area is not stamped on the
38 nameplate or when the marking is not legible, the area can be
39 calculated by using one of the following formulas:

- 40 (1) Cylindrical container with hemispherical heads
41 Area = overall length in feet times outside diameter
42 in feet times 3.1416.
43
44 (2) Cylindrical container with other than
45 hemispherical heads
46 Area = (overall length in feet plus 0.3 outside diameter
47 in feet) times outside diameter in feet
48 times 3.1416.
49
50 (3) Spherical container
51 Area = outside diameter in feet squared times 3.1416.
52

53 Flow Rate--CFM Air = cubic feet per minute of air required
54 at standard conditions, 60 degrees Fahrenheit and atmospheric
55 pressure (14.7 psia).

56 The rate of discharge may be interpolated for intermediate
57 values of surface area. For containers with total outside
58 surface area greater than 2,500 square feet, the required flow
59 rate can be calculated using the formula, Flow Rate CFM Air =
60 $22.11 A^{0.82}$ where A = outside surface of the container in square

1 feet.

2 CONVERSION FACTORS:

3 ft² x 0.092 903 = m²
 4 CFM x 0.028 317 = m³/min
 5 ft x 0.304 8 = m

6 REPEALER. Minnesota Rules, parts 1510.0480; 1510.0490;
 7 1510.0500; 1510.0510; 1510.0520; 1510.0530; 1510.0540;
 8 1510.0550; 1510.0560; 1510.0570; 1510.0580; 1510.0590;
 9 1510.0600; 1510.0610; 1510.0620; 1510.0630; 1510.0640;
 10 1510.0650; 1510.0660; 1510.0670; 1510.0680; 1510.0685;
 11 1510.0690; 1510.0700; 1510.0710; 1510.0720; 1510.0730;
 12 1510.0740; 1510.0750; 1510.0760; 1510.0770; 1510.0780;
 13 1510.0790; 1510.0800; 1510.0810; 1510.0820; 1510.0830;
 14 1510.0840; 1510.0850; 1510.0860; 1510.0870; 1510.0880;
 15 1510.1100; 1510.1110; 1510.1120; 1510.1130; 1510.1140;
 16 1510.1150; 1510.1160; 1510.1170; 1510.1180; 1510.1190;
 17 1510.1200; 1510.1210; 1510.1220; 1510.1230; 1510.1240;
 18 1510.1250; 1510.1260; 1510.1270; 1510.1280; 1510.1290;
 19 1510.1300; 1510.1310; 1510.1320; 1510.1330; 1510.1340;
 20 1510.1350; 1510.1360; 1510.1370; 1510.1380; 1510.1390;
 21 1510.1400; 1510.1410; 1510.1420; 1510.1430; 1510.1440;
 22 1510.1450; 1510.1460; 1510.1470; 1510.1480; 1510.1490;
 23 1510.1500; 1510.1510; 1510.1520; 1510.1530; 1510.1540;
 24 1510.1550; 1510.1560; 1510.1570; 1510.1580; 1510.1590;
 25 1510.1600; 1510.1610; 1510.1620; 1510.1630; 1510.1640;
 26 1510.1650; 1510.1660; 1510.1670; 1510.1680; 1510.1690;
 27 1510.1700; 1510.1710; 1510.1720; 1510.1730; 1510.1740;
 28 1510.1750; 1510.1760; 1510.1770; 1510.1780; 1510.1790;
 29 1510.1800; 1510.1810; 1510.1820; 1510.1830; 1510.1840;
 30 1510.1850; 1510.1860; 1510.1870; 1510.1880; 1510.1890;
 31 1510.1900; 1510.1910; and 1510.1920, are repealed.