ILLINOIS DEPARTMENT OF AGRICULTURE

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RULES AND REGULATIONS:

THE HANDLING OF ANHYDROUS AMMONIA AND LOW PRESSURE NITROGEN SOLUTIONS, EQUIPMENT CONTAINERS AND STORAGE FACILITIES

State of Illinois
Department of Agriculture
Bureau of Agricultural Products Inspection

TITLE 8: AGRICULTURE AND ANIMALS
CHAPTER I: DEPARTMENT OF AGRICULTURE
SUBCHAPTER e: FERTILIZERS

PART 215
ANHYDROUS AMMONIA, LOW PRESSURE NITROGEN SOLUTIONS, EQUIPMENT, CONTAINERS, AND STORAGE FACILITIES

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AUTHORITY: Implementing and authorized by Section 14 of the Illinois Fertilizer Act of 1961 [505 ILCS 80/14].

SOURCE: Rules and Regulations Relating to Anhydrous Ammonia, Low Pressure, Nitrogen Solutions, Equipment, Containers and Storage Facilities, filed May 15, 1967, effective May 15, 1967; Rules and Regulations Relating to the Handling of Nitrogen Fertilizer Solutions; filed September 7, 1967, effective September 7, 1967; amended March 31, 1975, effective April 10, 1975; amended March 2, 1976, effective March, 2, 1976; amended December 21, 1977, effective January 1, 1978; codified at 5 Ill. Reg. 10513, effective October 1, 1981; part repealed, new part adopted at 6 Ill. Reg. 2990, effective March 5, 1982; amended at 27 Ill. Reg. 9922, effective July 1, 2003; emergency amendment at 27 Ill. Reg. 10423, effective July 1, 2003, for a maximum of

150 days; amended at 27 Ill. Reg. 18536, effective November 25, 2003; amended at 40 Ill. Reg. 8704, effective July 1, 2016.

SUBPART A: ANHYDROUS AMMONIA, EQUIPMENT, CONTAINERS, AND STORAGE FACILITIES

Section 215.10 Scope

a) This standard is intended to apply to the design, construction, repair, alteration, location, installation and operation of agricultural anhydrous ammonia systems, including refrigerated ammonia storage systems, noncommercial (including on-farm) storage and handling systems, and ethanol plants.

b) This standard does not apply to:

1) any facility manufacturing anhydrous ammonia and associated storage vessels on site;

2) refrigeration systems where ammonia is used solely as a refrigerant;

3) ammonia transportation pipelines;

4) ammonia barges and tankers; and

5) anhydrous ammonia used in power generation plants.

c) Railroad car tanks permanently mounted and used for the storage of anhydrous ammonia shall be removed from service no later than December 1, 2025.

d) Compliance with the requirements of this Subpart shall be achieved through repairs and modifications on or before December 31, 2020.

e) Any storage vessel that does not have a legible data plate or supporting documentation of the information on the data plate shall be removed from service if it is decommissioned from the current site.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.15 Definitions

"Actuation device" means a mechanical device that is manually activated to cause the closing of emergency shutoff valves or internal valves stopping the flow of the product in the system.

"Alteration" means a change in any item described in the original manufacturer's data report that affects the pressure-containing capability of the container. Rerating a container by increasing maximum allowable working pressure or by increasing or decreasing allowable working temperature shall be considered an alteration.

"Ammonia or anhydrous ammonia" means the compound formed by the chemical combination of the elements nitrogen and hydrogen in the molar proportion of one part nitrogen to three parts hydrogen. This relationship is shown by the chemical formula, NH_3. On a weight basis, the ratio is 14 parts nitrogen to three parts hydrogen or approximately 82% nitrogen to 18% hydrogen. Ammonia may exist in either gaseous, liquid or solid state. It is not to be confused with aqua ammonia (ammonium hydroxide) which is a solution of ammonia in water.

"Approved" means listed by a recognized testing laboratory; or recommended by the manufacturer as suitable for use with anhydrous ammonia and so marked or documented; or accepted by the authority having jurisdiction.

"Appurtenance" refers to all devices such as pressure relief devices, liquid level gauging devices, valves, pressure gauges, pressure regulators, fittings, metering or devices designed to be attached to an ammonia container.

"Back check" means a device that allows liquid or vapor in the vessel, equipment or systems to flow in only one direction.

"Capacity" means the total volume of the container measured in standard U.S. gallons unless otherwise specified.

"Cargo tank" is a bulk packaging that is:

a tank intended primarily for the carriage of liquids or gases and includes appurtenances, reinforcements, fittings and closures;

permanently attached to or forms a part of a motor vehicle, or is not permanently attached to a motor vehicle but which, by reason of its size, construction or attachment to a motor vehicle is loaded or unloaded without being removed from the motor vehicle; and not fabricated under a specification for cylinders, portable tanks, tank cars or multi-unit tank car tanks.

"Cargo tank motor vehicle" means a motor vehicle with one or more cargo tanks permanently attached to or forming an integral part of the motor vehicle.

"Certified competent attendant" means a person who has full knowledge of the characteristics of anhydrous ammonia, its safe handling, and safety rules for transfer and application, and has successfully completed an anhydrous ammonia training program conducted by the Department or an equivalent training program approved by the Department. Refresher training shall be at least every three years and documentation of completed training shall be maintained.

"Certified welder" means any welder that is employed by a company that holds an R stamp certificate of authentication.

"Chemical splash goggles" or "goggles" means flexible fitting chemical-protective goggles with a hooded indirect ventilation system to provide primary protection of the eyes and eye sockets from the splash of hazardous liquids. Direct vented goggles do not comply with this definition.

"Commercial" means buying and selling anhydrous ammonia and/or selling the associated services for compensation.

"Container" means all tanks, except cylinders, as defined in Section 215.15, used for the transportation or storage of anhydrous ammonia.

"Cylinder" means a pressure vessel designed for pressures higher than 40 psigand having a circular cross-section. It does not include a portable tank, multi-unit tank car tank, cargo tank or tank car.

"Decommission" means to stop using a pressurized vessel and remove it from service.

"Department" means the Illinois Department of Agriculture, State Fairgrounds, P.O. Box 19281, Springfield IL 62794.

"Design pressure" is identical to the term "Maximum Allowable Working Pressure" used in the ASME Code.

"Emergency shower" means a shower unit permanently connected to a source of clean water that enables the user to have water cascading over the entire body.

"Emergency shutoff valve" or "ESV" means a shutoff valve incorporating a manual means of closure. All approved ESVs shall incorporate a reliable actuation system that will close all of the emergency shutoff valves and/or internal valves of the piping system on the first attempt in the event of an emergency or of testing from a remote location. An emergency shutoff valve shall remain closed except during periods of operation.

"Excess flow valve" means a valve that is designed to close automatically at the rated flow of vapor or liquid as specified by the manufacturer. The piping, including valves, fittings and hose, being protected by an excess flow valve shall have a greater capacity than the rated flow of the protected valve, so the valve will likely close in case of failure of the delivery system at any point in the line or fittings.

"Eye wash unit" means a device used to irrigate and flush the eyes with clean water. Depending upon the requirements set forth in this standard, the device may be a plumbed unit permanently connected to a source of clean water, or it may be a self-contained unit not permanently installed that must be refilled or replaced after use.

"Filling density" means the percent ratio of the weight of the ammonia permitted in a container to the weight of water at 60°F (15.6°C) that the container will hold when full. One pound of water = 27.74 cubic inches (455 ml) at 60°F (15.6°C). For determining the water capacity of the tank in pounds, the weight of one gallon (231 cubic inches) (3.785 L) of water at 60°F (15.6°C) in air shall be 8.328 lb (3.778 kg).

"Grower" means any individual who produces an agricultural commodity on property he or she owns or controls. Grower training is voluntary.

"Hitching point" means the point where a mechanical connection is made between the nurse tank and the tool bar, towing vehicle or another nurse tank.

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

"Immediately Dangerous to Life or Health" or "IDLH" means the maximum concentration from which unprotected persons are able to escape within 30 minutes without escape-impairing symptoms or irreversible health effects. The IDLH for ammonia is 300 ppm by volume in accordance with the NIOSH Pocket Guide to Chemical Hazards.

"Implement of husbandry", for the purpose of this Part, means a system that includes a nurse tank with a capacity of 3000 gallons or less or an application device used for transporting and/or applying anhydrous ammonia exclusively for agricultural purposes.

"Institutional occupancy" means a location where people may be unable to vacate voluntarily and shall be deemed to include nursing homes, hospitals, jails and schools.

"Internal valve" means a storage container primary shutoff valve that can be closed remotely and incorporates an internal excess flow valve with the seat and seat disc located within the container in a manner to remain in place in the event of external damage to the valve and/or associated piping. An internal valve shall incorporate a reliable actuation system that will close all of the emergency shutoff valves and/or internal valves of the piping system on the first attempt in the event of an emergency or of testing from a remote location. An emergency valve shall remain closed except during periods of operation.

"Load" or "loading" means the transfer of anhydrous ammonia, at a commercial facility or noncommercial facility, from facility storage to transportation equipment, application equipment or field nursing transportation equipment.

"Material suitable for use" includes iron, steel and certain non-ferrous alloys that are compatible for use in anhydrous ammonia service. Copper, brass, zinc and certain alloys, especially those containing copper, are not suitable for anhydrous ammonia service.

"Mechanical secure point" means a connection point affixed to the nurse tank or running gear for the attachment of the nurse tank hoses. The mechanically secure point provides resistance allowing the breakaway coupler to operate in the event of detachment of the nurse tank from the towing implement.

"New facility" means an approved location or a facility that has not been previously approved for the storage and handling of anhydrous ammonia.

"Noncommercial facility" means a site, including the land and structures, and the equipment fixed on the land and structures, designed and used for the storage and handling of anhydrous ammonia used in the associated not-for-hire operations.

"Nonmobile" means not readily capable of moving or being moved from place to place.

"Permanent storage installation" means a system employing a stationary (fixed) container used exclusively for storage or supply.

"Personal protective equipment" means adequate clothing and equipment used to ensure personal safety in the workplace.

"Positive pressure self-contaminated breathing apparatus" or "SCBA" means a full face piece respirator approved by NIOSH/MSHA for respiratory protection for both entry into or escape from oxygen-deficient atmospheres or a concentration of gases or vapors that are immediately dangerous to life or health where the supply of air is carried by the wearer. The air pressure inside the face piece is positive in relation to the air pressure of the outside atmosphere during exhalation and inhalation.

"Pressure relief valve" is a device designed to open to prevent an increase in internal vapor pressure in the container in excess of a specified value due to an emergency or abnormal condition and to close and prevent further flow after normal conditions have been restored.

"Private assembly" means a location where people gather together but is not generally open to the public.

"Protective gloves, boots and suits" are items made of rubber or other material impervious to ammonia. Gloves refer to gauntlet-style of sufficient length to allow for cuffing and that provide thermal protection suitable for ammonia exposure.

"psia" means pounds per square inch absolute.

"psig" means pounds per square inch gauge.

"Public assembly" is a location that includes, but is not limited to, churches, manufacturing companies, cemeteries currently in operation, land managed for recreational or conservation purposes, museums, camps, parks, retail and wholesale facilities, and shopping centers. Examples of public assembly include places that operate less than 52 weeks per year, such as businesses or other places that experience seasonal shutdowns and parks, camps and recreational areas that experience seasonal shutdowns or reduced attendance during a portion of the calendar year, provided that these places are frequented by at least 50 persons at least once per week during the portions of the year when seasonal shutdowns or reductions in attendance do not occur. "Reinstallation" means the removal of a storage vessel from the originally approved site to a different site.

"Repair" means the work necessary to restore a container, cylinder or system to a safe and satisfactory operating condition provided there is, in all cases, no deviation from the original design. Repairs include the addition or replacement of pressure nonpressure parts, which do not change the design temperature or pressure of the container, cylinder or system.

"Respirator" means an air-purifying device with full face piece and either chin-style or front- or back-mounted canisters with associated connections approved by NIOSH for use in ammonia contaminated atmosphere in compliance with 29 CFR 1910.134 and selected in accordance with ANSI Z88.2. A respirator of the air-purifying type must be used only in an atmosphere containing 19.5% to 22.0% oxygen by volume.

"System" means an assembly of equipment consisting essentially of the containers, hoses, appurtenances, pumps, compressors and interconnecting piping.

"Tank" means a vessel designed and constructed for the storage and handling of anhydrous ammonia.

"Tool bar" means an implement of husbandry for the field application of ammonia that is used in conjunction with nurse tanks. For purposes of this definition, chisel plows, field cultivators or other conventional tillage equipment that has been manufactured or retrofitted with any ammonia valves, gauges, hoses, application knives, metering devices, safety devices or tool bar refrigeration units for the purpose of ammonia application are considered to be tool bars.

"Tool bar breakaway device" means a self-closing device designed to disconnect anhydrous ammonia hoses upon detachment from the nurse tanks.

"Tool bar refrigeration unit" means a unitized system of ammonia pipe, valves and gauges, with ammonia monitoring, handling, metering and manifold-dispensing devices that are used to process pressurized ammonia into refrigerated ammonia for more accurate metering and distribution during field application.

"Unload" or "unloading" means the transfer of anhydrous ammonia at commercial or noncommercial facilities from the transport vehicle into facility storage.

"Un 1005" means the placard number assigned to anhydrous ammonia by the United Nations Committee of Experts on the Transportation of Dangerous Goods.

"Wet hose" is an anhydrous hose with shutoff valves at each end that is capable of containing liquid product at all times.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.16 Incorporated and Referenced Materials

a) The following regulations and standards are incorporated in this Part:

1) Private and Professional Association Standards:

A) The American National Standards Institute (ANSI), 25 West 43rd Street, 4th Floor, New York NY 10036

ANSI Z88.2 Practices for Respiratory Protection (2015)

B) The American Petroleum Institute (API or API-ASME), 15 Inverness Way East, Englewood CO 80112

i) Code for Unfired Pressure Vessels for Petroleum Liquids and Gases of the American Petroleum Institute and the American Society of Mechanical Engineers (API-ASME) (sometimes known as the API-ASME Code) (The API-ASME Code, as a joint publication and interpretation service, was discontinued after 1956, and construction of containers to the API-ASME Code has not been authorized since 1961.)

ii) API 510 – Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair and Alteration (2014) (After discontinuance of the API-ASME Code (see subsection (a)(1)(B)(i)), a need was seen to assure uniform maintenance and inspection practices continued, which led to the issuance of API 510 beginning in 1958 (available as stated in subsection (a)(1)(B)(i)).)

iii) The Unfired Pressure Vessel Code of the American Society of Mechanical Engineers (Sec. VIII of the ASME Boiler Construction Code), including editions through 1981, or the Joint Code of the American Petroleum Institute and the American Society of Mechanical Engineers (API-ASME Code), including editions through 1981

iv) API 12-C – Specification for Welded Oil Storage Tanks (1958)

v) API Standard 620 (2013) (including addendum 1, 2014), Design and Construction of Large, Welded, Low-Pressure Storage Tanks (including Tables 2.02, R.2.2, R.2.3 or R.2.4 and Appendix R)

C) The American Society of Agricultural and Biological Engineers (ASABE/ASAE), 2950 Niles Road, St. Joseph MI 49085

i) ASABE/ASAE S276.5 (2003)

ii) ASABE/ASAE S338.2 (2006) Field Equipment for Agriculture-Safety Chain for Towed Equipment

D) The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York NY 10016-5990

i) ASME B31.3 Process Piping (2014)

ii) ASME B31.5 Refrigeration Piping and Heat Transfer Components (2013)

iii) U-68 and U-69 ASME Code Containers refer to the ASME Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers (1949), Section VIII, paragraphs U-68 and U-69

iv) UG-125 through UG-136 refer to the ASME Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers (1949), Section VIII, Division 1, paragraphs UG-125 through UG-136

v) U-200 or U-201 refers to the ASME Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers (1949), Section VIII, paragraphs U-200 or U-201

vi) UW-12 is a table in Section VIII, Division 1, of ASME BPBC – viii-1 (2015)

E) American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, PO Box C700, West Conshohocken PA 19428-2959

i) ASTM A47 – Standard Specification for Ferritic Malleable Iron Castings (2014)

ii) ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless (2012)

iii) ASTM A395 – Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures (2014)

iv) Section IX, Welding Qualifications refers to the ASME Boiler and Pressure Vessel Code, IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators, Welding and Brazing Qualifications (2010)

F) The Association for Rubber Product Manufacturers (ARPM), 7321 Shadeland Station Way, Suite 285, Indianapolis IN 46256

ARPM IP-14, Specifications for Anhydrous Ammonia Hose (2003, reaffirmed 2009)

G) The Compressed Gas Association (CGA), 14501 George Carter Way, Suite 103, Chantilly VA 20151

i) CGA G-2 – Anhydrous Ammonia (1995)

ii) CGA G-2.1 – Safety Requirements for the Storage and Handling of Anhydrous Ammonia (2014)

iii) CGA P-7 – Standard for Requalification of Cargo Tank Hose Used in the Transfer of Carbon Dioxide Refrigerated Liquid (2007)

H) The National Board of Boiler and Pressure Vessel Inspectors (NBBI), 1055 Crupper Avenue, Columbus OH 43229-1183

National Board Inspection Code (2015)

I) The National Fire Protection Association (NFPA), 25 West 43rd Street, 4th Floor, New York NY 10036

NFPA 70: National Electrical Code (2014)

J) The Underwriters Laboratory (UL), 47173 Benicia Street, Fremont CA 94538

UL-132, Standard on Safety Relief Valves for Anhydrous Ammonia and LP Gas (2015)

2) Federal Regulations

A) 29 CFR 1910.134 (2016)

B) 49 CFR 105-180 (2015)

i) subchapter A, sections 105-110, Hazardous Materials and Oil Transportation

ii) subchapter B, section 130, Oil Transportation

iii) subchapter C, sections 171-180, Hazardous Materials Regulations

- 49 CFR 173.315(m)(1)(v) (2015) Compressed gases in cargo tanks and portable tanks
- 49 CFR 177.834(a) through (j) (2016), Loading and unloading
- 49 CFR 177. 840 (2015), Class 2 (gasses) materials

3) Federal Government Publications

The National Institute for Occupational Safety and Health (NIOSH), NIOSH Pocket Guide to Chemical Hazards, GPO stock number 017-033-00500-1, available from the Government Printing Office, Washington DC 20402-9325

b) All incorporations by reference of federal regulations and guidelines and the standards of nationally recognized organizations refer to the regulations, guidelines and standards on the dates specified and do not include any amendments or editions subsequent to the date specified.

c) The following State statutes and administrative rules are referenced in this Part:

1) State of Illinois Statutes

Weights and Measures Act [225 ILCS 470]

2) Illinois Department of Agriculture Rules

A) 8 Ill. Adm. Code 1, Administrative Rules (Formal Administrative Proceedings; Contested Cases; Petitions; Public Disclosure)

B) 8 Ill. Adm. Code 600, Weights and Measures Act

C) 8 Ill. Adm. Code 255, Agrichemical Containment

(Source: Added at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.20 Safety

a) Any person at a commercial or noncommercial site who makes or breaks a connection on anhydrous ammonia equipment pertaining to the loading and unloading, as defined in this Subpart, or who maintains or repairs anhydrous ammonia vessels or associated equipment shall be a certified competent attendant.

b) Persons involved with the loading or unloading of anhydrous ammonia as defined in this Subpart, into permanent storage vessels from cargo tanks shall satisfy the safety requirements of this Section if they meet USDOT transportation regulations and are not subject to the requirements of a certified competent attendant.

c) Persons at commercial facilities that hold a current USDOT Special Permit issued by the Pipeline and Hazardous Material Safety Administration pertaining to loading and unloading operations are not subject to the requirements of a certified competent attendant.

d) Any individual who conducts anhydrous ammonia safety training to certify individuals as certified competent attendants shall:

1) Train with a Department approved equivalent training program and associated materials;

2) Submit a roster of the attendees with the name, company name, company address and date of the training; and

3) Attend a Department sponsored training program annually.

e) Grower Training – Grower training shall be offered through programs approved by the Department. All participation in grower training shall be on a voluntary basis. Grower training programs shall be approved every three years.

f) All permanent storage installations shall have on hand, at minimum, the following equipment for safety and emergency purposes:

1) One full-faced respirator with one spare ammonia canister that has not exceeded its expiration date in a readily accessible location. A self-contained breathing apparatus (SCBA) can meet this requirement only when the facility is trained in accordance with OSHA for rescue or emergency response to a release as defined by OSHA.

2) One pair of protective gloves impervious to anhydrous ammonia.

3) One pair of protective boots impervious to anhydrous ammonia.

4) One protective slicker and/or protective pants and jacket, all impervious to anhydrous ammonia.

5) Chemical splash goggles.

6) An easily accessible emergency shower and a plumbed eyewash unit or at least 150 gallons of clean potable or potable quality water in a single open top container that is readily accessible.

g) Each cargo tank transferring agricultural anhydrous ammonia, except an implement of husbandry, shall carry:

1) At least 5 gallons of clean water in a container designed to provide ready access to the water for flushing any area of the body contacted by ammonia.

2) One pair of protective gloves impervious to ammonia.

3) One full-faced respirator with one spare ammonia canister, in a readily accessible location, that has not exceeded its expiration.

4) Chemical splash goggles.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.25 Basic Rules

This Section applies to all Sections of this Part unless otherwise noted.

a) These provisions shall not be construed as prohibiting the continued use or reinstallation of containers constructed and maintained in accordance with the 1949, 1950, 1952, 1956, 1959, 1965, 1968, 1971, 1974, 1977, 1980, 1983, 1986, 1989, 1992, 1995 and 1998 editions of the ASME Code or any revisions thereof in effect at the time of fabrication. Reinstalled stationary pressure vessels with a design capacity greater than 3000 gallons shall comply with CGA G-2.1, Section 5.1. If a storage tank is currently being used and does not have a U-1A form or a build sheet or a legible data plate, it must be taken out of service by January 1, 2030.

1) Containers in use or operation on or after July 1, 2016, and any storage vessel that is not in service within the State of Illinois, or any storage vessel greater than 3000 gallons to be reinstalled, shall comply with one or more of the following:

A) The storage vessel has been stress relieved during fabrication in accordance with the Code in effect at the time of fabrication; or

B) The storage vessel has cold-formed heads that have been heat stress relieved; or

C) The storage vessel has been fabricated with hot-formed heads.

2) Welded attachments to pads may be made after post-weld heat treatment. However, implements of husbandry do not require post-weld heat treatment if they are fabricated with hot-formed heads or with cold-formed heads that have been stress relieved.

b) Requirements for new construction and original test, repair, and alterations of containers (including USDOT portable tanks), other than refrigerated storage tanks must comply with the following:

1) Containers used with systems covered in Sections 215.85, 215.110, and 215.115 shall be made of steel or other material compatible with ammonia and tested in accordance with the currently incorporated ASME Code (see Section 215.16). An exception to the ASME Code requirements is that construction under Table UW 12 at a basic joint efficiency of under 80% is not authorized.

2) Containers designed and constructed in accordance with the ASME Code, other than refrigerated storage containers, shall comply with the following additional requirements:

A) The entire container shall be postweld heat treated after completion of all welds to the shells and heads. The method employed shall be as prescribed in the ASME Code, except that the provisions for extended time at a lower temperature for postweld heat treatment shall not be permitted. Welded attachments to pads may be made after postweld heat treatment. Exception: implements of husbandry will not require postweld heat treatment if they are fabricated with hot-formed heads or with cold-formed heads that have been stress relieved.

B) Steels used in fabricating pressure containing parts of a container shall not exceed a specified tensile strength of 70,000 psi. Exception: implements of husbandry may be fabricated from steel having a specified tensile strength of 75,000 psi.

C) Containers shall be inspected by a person who holds a valid National Board Commission. Exception: refrigerated storage tanks with a design pressure of 15 psig or less and containers covered in Section 215.90.

D) Repair or alteration of pressure-containing parts of a container shall be performed in compliance with the applicable provisions of the current edition of the National Board Inspection Code. Where specific procedures are not given, it is intended that, subject to acceptance of the inspector, all repair or alteration shall conform as much as possible to the ASME Code section and edition to which the container was constructed.

c) Except for pneumatic testing, all containers shall only be pressured with ammonia vapor except for dual usage involving the storage of liquid propane. Any device used for the introduction of atmospheric air into any part of anhydrous ammonia storage, transportation or application systems is prohibited. Any introduction of any substance other than anhydrous ammonia into the closed loop anhydrous ammonia system shall be approved by the Department prior to implementation, except when required to comply with the ASME Code or USDOT regulations.

d) Any firm that completes any repair or alteration to a pressure vessel or any piping and associated appurtenances shall be performed by a firm that holds a valid certificate of authorization, commonly referred to as an R stamp holder.

e) A written record of all inspections and maintenance shall be kept at the facility for a period of 5 years or until sold or removed from service.

f) Railroad car tanks permanently mounted and used for storage of anhydrous ammonia shall be removed from a service no later than December 1, 2025.

g) Compliance with the requirements of this Subpart shall be achieved through repairs and modifications on or before December 31, 2020.

h) Any storage vessel that does not have a legible data plate or supporting documentation of the information on the data plate shall be removed from service if it is decommissioned from the current site.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.30 Location of Storage Tanks

a) Tanks shall be located outside of buildings unless the building is especially constructed for the safe handling and storage of anhydrous ammonia. Permanent storage shall be located outside of densely populated areas and subject to the approval of the Department as follows: If located within the corporate limits of a village, town, or city, written approval of the municipality's governing body or a county zoning permit shall be submitted to the Department before tentative approval to begin construction of a permanent storage facility will be given. The intended storage must be completed and approved by the Department within one year from the date written tentative approval was given. Final approval will be given if the facility and equipment complies with this Part.

b) Containers shall be located at least 50 feet from a dug well or other source of potable water.

c) Nurse tank load out risers and containers for newly approved sites after July 1, 2003 shall be a minimum distance of 200 feet from the property line. Installation of additional load out risers or containers at sites approved prior to July 1, 2003 shall be a minimum distance of 75 feet from the property line.

d) Container locations shall comply with the following distance requirements:

	Minimum Distance (feet) from Container		
Nominal capacity of containers (gallons)	**Railroad mainline property**	**Place of private or public assembly**	**Institutional occupancy**
001-3000	100	200	750
over 3000	100	400	1000

e) Offices or buildings integral to the agrichemical business are exempt from the minimum distance requirement. Excluded from the distance requirement are those installations installed prior to July 1, 2003. The Department will approve replacement storage tanks to be installed. A replacement tank may be of a larger capacity. Replacement tanks must meet all requirements of this Part with the exception of subsection (d). The provisions concerning replacement of tanks applies specifically to installations installed prior to July 1, 2003. Notwithstanding the other provisions of this Section, the Department shall not require evidence of a county zoning permit or approval of the municipal governing body in the case of replacement of anhydrous ammonia storage vessels of equal or lesser static volume.

f) A nurse tank of not more than 3000 gallons or less than 1000 gallons water capacity may be used as temporary storage in instances where anhydrous ammonia is used in the manufacturing of liquid or suspension fertilizers provided that written approval of the municipality's governing board or a county zoning permit shall be submitted to the Department before site approval will be given. Approval will be given based upon compliance with the requirement of this subsection (f). The distance of the temporary storage nurse tank shall not be less than 50 feet from the property line or source of drinking water, not less than 200 feet from existing places of private or public assembly, or not less than 750 feet from any place of institutional occupancy. The draw bar must be securely fastened to an anchoring device so as to render the nurse tank immovable while being used in the manufacturing of fertilizer. During the time the site is unattended, all liquid and vapor valves must be plugged or capped.

g) Container storage areas shall be accessible to emergency vehicles and personnel.

h) Storage container areas shall be maintained clear of dry grass and weeds and other combustible materials.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.35 Markings of Non-Refrigerated Containers and Systems other than DOT Containers

a) Each system nameplate shall be made of a non-corroding metal permanently attached to the system by continuous welding around its perimeter and located so as to be readily accessible for inspection. Nameplates shall be maintained in legible condition and include markings as prescribed.

b) Each container or system covered in Sections 215.85, 215.90, 215.110 or 215.115 shall be marked as follows:

1) With a mark identifying compliance with and other markings required by the Code under which the container is constructed, with the capacity of the container in pounds or gallons (U.S. Standards), with the working pressure in psig for which the container is designed, and with the thickness of the shell and heads.

2) With the name and address of the supplier of the system or the trade name of the system and the date of manufacture. This information shall appear on the system nameplate for aboveground containers.

3) With markings indicating the maximum level to which the container may be filled with liquid at temperatures between 20°F and 100°F, except on containers provided with fixed maximum level indicators or that are filled by weighing. Markings shall be in increments of not more than 20°F and shall appear on the system nameplate or on the liquid level gauging device on both underground and aboveground containers. Refrigerated storage tanks shall be exempt from these requirements but shall be marked to show the maximum permissible liquid level (see Section 215.60).

4) With the overall length and outside diameter of the container.

c) All main operating valves on permanently installed storage containers having a capacity of over 3000 water gallons shall be identified to show whether the valve is in liquid or vapor service. The method of identification shall be by label or color code as follows:

1) Label: The label LIQUID (or LIQUID VALVE) or VAPOR (or VAPOR VALVE), as appropriate, shall be placed on or within 12 inches of the valve by means of a stencil tag or decal; or

2) Color Code: Liquid valves shall be painted orange and vapor valves shall be painted yellow. The legend ORANGE − LIQUID or YELLOW − VAPOR shall be displayed in a conspicuous place at each operating point utilized for loading or unloading at each permanent storage location. The legend shall have letters at least two inches high and shall be placed against a contrasting background.

d) Containers manufactured after January 1, 2003 shall bear a National Board of Boiler and Pressure Vessel Inspectors stamp indicating registration of the container with that organization.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.40 Tank Appurtenances

a) All tanks and appurtenances of each system shall be approved by the Department prior to initiation of operations, including the receipt of anhydrous ammonia.

b) All appurtenances shall be designed for no less than the maximum working pressure of the portion of the system on which they are installed. All appurtenances shall be fabricated from materials proved suitable for anhydrous ammonia service.

c) All connections to containers except connections for pressure relief devices, thermometer well, liquid level gauging devices, or connections fitted with No. 54 (0.055 inches) drill size orifice or those plugged shall have shutoff valves located as close to the container as practical.

d) Excess flow valves or approved systems shall close automatically at the rated flows of vapor or liquid as specified by the manufacturer. The piping, including valves and fittings in the same flow path as the excess flow valve, shall have a greater capacity than the rated flow of the excess flow valve or approved system.

e) Liquid level gauging devices that require bleeding of the product to the atmosphere and that are so constructed that outward flow will not exceed that passed by a No. 54 (0.055 inches) drill size opening need not be equipped with excess flow valves.

f) An opening in a container to which a pressure gauge connection is made need not be equipped with an excess flow valve if the opening is not larger than No. 54 (0.055 inches) drill size.

g) Each facility shall provide the minimum protection at each non-refrigerated storage tank opening utilized for the transfer of product as follows:

1) The installation of an:

A) internal valve in the tank with a manual shutoff valve located immediately outside of the opening; or

B) approved excess flow valve or a back check valve inside of the tank, a manual shutoff valve located immediately outside of the opening and an approved emergency shutoff valve (ESV) located within 3 feet of the opening side of the manual shutoff valve.

2) Approved ESVs or internal valves shall incorporate a reliable actuation system that will close all of the ESVs or internal valves of the piping system on the first attempt in the event of emergency or of testing from a remote location. A minimum of 2 remote actuation devices shall be located no less than 25 feet reasonably opposed to each other.

3) If using a pressure source for activation of the ESVs or internal valves, nitrogen, compressed air or carbon dioxide is deemed acceptable. If using compressed air as a pressure source, the air shall be clean and kept at a moisture level that will not prevent the system from operating. Propane or other flammable materials shall be prohibited for use to activate an ESV or an internal valve.

4) ESVs and internal valves shall be tested annually for the functions required. A record of each test result shall be kept at the facility for a minimum of 5 years.

h) Excess flow valves shall be designed with a by-pass, not to exceed a No. 60 (0.040 inches) drill size opening, to allow equalization of pressure.

i) All excess flow valves shall be plainly and permanently marked with the name or trademark of the manufacturer, the catalog number, and the rated capacity.

j) Each filling connection on non-refrigerated containers shall have a positive shutoff valve in conjunction with either an approved internal back-pressure check valve or an approved internal excess flow valve. Vapor connections on non-refrigerated containers shall have a positive shutoff valve together with an approved internal excess flow.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.45 Piping, Tubing and Fittings

a) All piping, tubing and fittings shall be made of steel or other material suitable for anhydrous ammonia service. Brass, copper or galvanized steel pipe or tubing shall not be used. Cast iron fittings shall not be used. Those parts of valves that are subjected to gas pressure shall be made of steel, ductile (nodular) iron, or malleable iron. Ductile iron shall meet the requirements of ASTM A395 and malleable iron the requirements of ASTM A47.

b) All piping, tubing, and fittings shall be designed for a pressure no less than the maximum pressure to which they will be subjected in service.

c) All piping shall be supported to prevent damage to the pipes. Provisions shall be made for expansion, contraction, jarring, vibration and settling. All refrigeration system piping shall conform to the Refrigeration Piping Code (ASME B31.5) as it applies to anhydrous ammonia.

d) Piping used on non-refrigerated systems shall be at least ASTM A53 Grade B seamless or electric resistance welded pipe. Pipe joints shall be threaded, welded or flanged. Pipe shall be at least Schedule 40 when joints are welded or welded and flanged. Pipe shall be at least Schedule 80 when joints are threaded. Threaded nipples shall be seamless. Welding shall be done by a certified welder.

e) Metal, flexible connections may be used for permanent installations to provide for expansion, contraction, jarring, vibrating and settling. In no case shall the angle of the connection exceed 15 degrees. The connection used for non-refrigerated installations shall have a minimum working pressure of 350 psig and a minimum burst pressure of 1750 psig.

f) Adequate provisions shall be made to protect all exposed piping from physical damage that might result from impact by moving machinery, automobiles or trucks, or any other equipment at the facility. Underground piping is allowable.

g) Joint compounds shall be resistant to ammonia at the maximum pressure and temperature to which they may be subjected in service.

h) After assembly, all piping, fittings, and tubing shall be tested and proved to be free from leaks at a pressure no less than the normal operating pressure of the system.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.50 Hose Specifications

a) Hose used in ammonia service and subject to container pressure shall conform to ARPM IP-14. Dual usage hoses for propane and anhydrous ammonia shall be prohibited.

b) Hose subject to container pressure shall be designed for a minimum working pressure of 350 psig and a minimum burst pressure of 1750 psig. Hose assemblies, when made up, shall be capable of withstanding a test pressure of 500 psig.

c) Hose and hose connections located on the low-pressure side of flow control, or pressure-reducing valves on devices discharging to atmospheric pressure, shall be designed for the maximum low-side working pressure. All connections shall be designed, constructed and installed so that there will be no leakage when connected. Shutoff valves on the end of liquid and vapor transfer hoses shall be equipped with bleed valves to enable the operator to bleed off pressure prior to disconnecting the hoses except when using minimum loss valve.

d) When a liquid transfer hose is not drained of liquid upon completion of transfer operations, that hose shall be equipped with an approved shutoff valve at the discharge end. Provision shall be made to prevent excessive hydrostatic pressure in the hose.

e) On all hose 0.5 inch O.D. and larger used in ammonia service and subject to container pressure, there shall be etched, cast or impressed at 5 ft. intervals on the outer hose cover the following information:

Anhydrous Ammonia
XXX psig (Maximum Working Pressure)
Manufacturer's Name or Trademark
Year of Manufacture

f) Hose in service shall be requalified periodically in accordance with requirements specified in CGA P-7.

g) Hoses used for transferring material (both liquid and vapor) to and from nurse tanks shall be restricted to a 30 feet maximum length and shall be secured when not in use to prevent undue damage to hose.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.55 Safety Relief Devices

a) Every container used in systems covered by Sections 215.85, 215.110, and 215.115 without permanent supply piping to another source of excess pressure shall be protected from excess pressure by one or more pressure relief valves of the spring loaded type conforming with applicable requirements of ASME UG-125(c)(3), UL-132 or other equivalent pressure relief valve standard.

b) Pressure relief valves shall be in direct communication with the vapor space of the container. All pressure relief discharge openings shall have suitable rain caps that will allow free discharge of the vapor and prevent the entrance of water. Provision shall be made for draining condensate that may accumulate.

c) The discharge from pressure relief valves shall be vented away from the container, upward and unobstructed to the atmosphere.

d) Container relief device pressure shall be set to discharge at no more than 125% maximum allowable working pressure for containers built by the 1949 ASME Code Sections U-68 and U-69, and no more than 100% for those built by all subsequent ASME Codes. Set pressure tolerance is +10% to 0% for non-refrigerated containers.

e) Pressure relief valves used on containers covered by Sections 215.85, 215.110 and 215.115 shall be constructed to discharge at not less than the rates required in Appendix B before the pressure is in excess of 121% of the maximum allowable working pressure of the container. Relief protection for any other reason shall use ASME UG-125 through UG-136.

f) Pressure relief valves shall be so arranged that the possibility of tampering will be minimized. If the pressure setting adjustment is external, the relief valves shall be provided with means for sealing the adjustment.

g) Shutoff valves shall not be installed between the pressure relief valves and the containers or systems covered by Sections 215.85, 215.110 and 215.115.

h) Relief valves shall be installed in a manifold that has a required rate of discharge and so installed to allow either of the pressure relief valves to be closed off but does not allow both pressure relief valves to be closed off at the same time, or other suitable device so that they can be replaced while the container remains pressurized. Containers designed with internal pressure relief systems are exempt from this requirement.

i) Each pressure relief valve used with systems covered by Sections 215.85, 215.110 and 215.115 shall be plainly and permanently marked as follows:

1) With the letters "AA" or the symbol "NH_3";

2) The pressure in psig at which the valve is set to start-to-discharge;

3) The rate of discharge of the valve in cubic feet per minute of air at 60°F and atmospheric pressure;

4) Year of manufacture; and

5) The manufacturer's name and catalog number.

j) Piping or connections on either the upstream or downstream side shall not restrict the flow capacity of the relief valve.

k) The manufacturer or supplier of a pressure relief valve manifold shall publish complete data showing the flow rating through the combined assembly of the manifold with pressure relief valves installed. The manifold flow rating shall be determined by testing the manifold with all but one valve discharging. If one or more openings have restrictions not present in the remaining openings, the restricted opening or openings, or those having the lowest flow, shall be used to establish the flow rate marked on the manifold nameplate. The marking shall be similar to that required in Section 215.55 for individual valves.

l) A hydrostatic relief valve, venting into the atmosphere at a safe location, shall be installed in each section of piping (including hose) in which liquid can be isolated between shutoff valves to relieve pressure that could develop from the trapped liquid. If an equivalent pressure relieving device is used, the maximum accumulative pressure possible within the system shall not exceed the limits of the system.

m) The discharge opening from any pressure relief valve shall not terminate inside any building or below the highest roof line of the building.

n) A pressure relief device shall be subject to a systematic, periodic, visual external inspection at least annually to determine that it:

1) Meets the applicable requirements specified in this Section;

2) Is free of evidence of tampering, damage, corrosion or foreign matter that might prevent proper operation;

3) Is free of leakage when subject to pressures below the minimum allowable start-to-discharge setting;

4) Has a properly installed rain cap or other device to avoid entry of moisture or other matter into the relief valve outlet; and

5) Has an open weep hole to permit moisture to escape.

o) Any deficiency as may be found in subsection (n) shall require immediate corrective action, replacement or repair of the pressure relief device as may be appropriate.

p) No container pressure relief device shall be used over 5 years past the manufactured date. Records shall be maintained that identify each container and indicate the date of installation for the pressure relief devices. If no date is specified, a pressure relief valve shall be replaced no later than five years following the date of its manufacture or last repair unless it has first been disassembled, inspected, repaired and tested by the manufacturer, or by a qualified repair organization, in a manner such that the valve's condition and performance is certified as being equivalent to the standards for the original valve. The data regarding repairs or reassembly shall be indicated by stamping the body or attaching a tag pertaining to the valve with the month and year to replace or recertify. All facilities shall be in compliance with this subsection no later than December 31, 2020.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.60 Filling Densities

a) Filling density is limited to 85% capacity by volume at 60°F.

b) The filling densities for non-refrigerated containers shall not exceed the following:

1) Uninsulated aboveground 56%;

2) Insulated aboveground 57%.

c) US Department of Transportation containers shall be filled in accordance with49 CFR 173.315(m)(5).

d) If containers are to be filled according to liquid level by any gauging method other than a fixed length dip tube gauge, each container shall have a thermometer well and thermometer so that the internal liquid temperature can be easily determined and the amount of liquid and vapor in the container corrected to a 60°F basis.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.65 Transfer of Liquids

a) If it is found necessary to dispose of anhydrous ammonia, it shall be discharged into a vessel containing water sufficient to absorb it. Sufficient water shall be at least ten parts of water per one part anhydrous ammonia. The anhydrous ammonia shall be injected into the water as near the bottom of the vessel as practical. Provision must be made to prevent bleeding of transport and railroad tank car liquid lines or hoses into the atmosphere when disconnecting. This shall be done through the use of a wet hose with a shutoff valve at each end of the hose, by bleeding into water at no greater rate than one gallon of anhydrous ammonia to 10 gallons of ammonia-free water to prevent discharge of fumes into the atmosphere, or with a recovery system.

b) A certified competent attendant shall supervise the transfer of liquids from the time the connections are first made until the railroad tank car is finally disconnected or the transport truck is completely unloaded and finally disconnected. Any time the site is unattended, the railroad tank car shall not be connected to the unloading riser. During the transfer operations of the transport, chock blocks shall be so placed as to prevent rolling of the vehicle.

c) Containers shall be filled or used only upon authorization of owners.

d) Containers shall be gauged and charged only in the open air or in a building especially provided for that purpose.

e) Pumps used for transferring anhydrous ammonia shall be recommended for anhydrous ammonia service by the manufacturer or documented for such service by the owner/operator using recognized and accepted good engineering methods.

1) Liquid pumps may be piston, rotary, centrifugal or regenerative type for 250 psig working pressure.

2) Positive displacement pumps shall be equipped with a pressure actuated by-pass valve on the discharge side of the pump. This valve shall operate to limit the pressure developed by the pump to the maximum for which the pump is rated. Piping or tubing sized to carry the full capacity of the pump at the actuation pressure of this valve shall connect the discharge of this valve with the container from which ammonia is being pumped. If this line is capable of being closed off by a valve, an additional by-pass device shall be incorporated in the pump to by-pass back to the suction port. The pressure actuated by-pass valve and the return piping or tubing shall be installed in accordance with the pump manufacturer's recommendations or documented for such service by the owner/operator using recognized and generally accepted good engineering methods.

3) A pressure gauge graduated from at least 0 to 400 psig shall be installed before the relief valve line on the discharge side of the pump.

4) Centrifugal or regenerative pumps do not require a bypass valve, but the installation shall incorporate a line from the discharge side of the pump to the vapor space of the supplying tank and a shutoff valve shall be installed in this line.

f) Plant piping shall contain shutoff valves located as close as practical to the pump connections.

g) Compressors used for transferring or refrigerating ammonia shall be recommended for ammonia service by the manufacturer or documented for that service by the owner/operator using recognized and generally accepted good engineering methods.

1) Compressors, except those used for refrigeration, shall be designed for at least 250 psig working pressure. Crank cases of compressors not designed to withstand system pressure shall be protected with a suitable pressure relief valve.

2) Plant piping shall contain shutoff valves located as close as practical to compressor connections.

3) A relief valve large enough to discharge the full capacity of the compressor shall be connected to the discharge before any shutoff valve. The discharging pressure of this valve shall not exceed 300 psig and shall be installed so that it will be vented in a safe location if discharged.

4) Compressors, except those used in refrigeration, shall have pressure gauges graduated from 0-400 psig at suction and discharge.

5) Adequate means, such as a drainable liquid trap, shall be provided on the compressor suction to minimize the entry of the liquid into the compressor.

h) Piping shall be designed not to restrict flow rates to the extent that protective devices will not function.

i) Dedicated lines for loading and separate dedicated lines for unloading are recommended. Minimum protection shall be provided as follows:

1) Loading systems shall be protected by properly rated excess flow valves or approved systems to prevent the emptying of the storage containers in the event of severance of the hose or swivel type piping.

2) The liquid unloading line shall be protected by a back check valve located within 5 lineal feet of pipe from the bulkhead.

3) The minimum protection for all bypass lines shall consist of an excess flow valve and a manual shutoff valve. The bypass shall be located at the highest elevation of the storage tank.

4) System piping shall be designed to prevent the introduction of debris that could impede the action of valves and other components of the piping system. All systems in operation on or before July 1, 2016 shall be in compliance no later than December 1, 2017. Any piping system installed after July 1, 2016 shall comply prior to initiation of any operations.

j) Transport trucks shall not be utilized for bulk storage of anhydrous ammonia. It must be transferred into permanent storage of a capacity equal to or greater than the transport truck.

k) Railway tank cars must be transferred into permanent storage of a capacity equal to 50% of the railway tank car.

l) All storage tank system liquid and vapor valves must be closed and locked during the time the plant is unattended. Either hose end lock boxes or locking caps or chains may be used on the risers. In lieu of locking the valves, a security fence with two gates on opposite sides shall be installed and kept locked during the time the plant is unattended.

m) The transfer of anhydrous ammonia from a tank car or transport to any other unit for the purpose of converting anhydrous ammonia to aqueous ammonia shall only be done upon a railway spur owned or leased to the operator of the transferring facility where the railway tank car can be retained for an indefinite period and where an aqueous converter is installed at a site. The transfer must be done in one continuous operation. The requirements of Section 215.30 must be met before the site and facility will be approved by the Department. Approved anhydrous ammonia installations designed for converting aqueous ammonia must have sufficient permanent storage to permit continuous and uninterrupted unloading from railway tank cars or trucks.

n) Provision must be made to prevent bleeding of transport and rail car liquid lines or hoses into the atmosphere when disconnecting. This shall be done through the use of a wet hose with a shutoff valve at each end of the hose, by bleeding into water at no greater rate than one gallon of anhydrous ammonia to 10 gallons of ammonia-free water to prevent discharge of fumes into the atmosphere, or with a recovery system.

o) A certified statement shall be filed on forms furnished by the Department stating that all the requirements of this Section, safety equipment and requirements of this Part have been met. This statement must be filed with the Department before final approval of the facility will be given by the Department. No operation shall begin until final approval has been issued.

p) The filling of mobile containers with a capacity of 3000 gallons or less with anhydrous ammonia is permissible only at a permanent storage facility approved by the Department for this purpose. Anhydrous ammonia may be transferred from a cargo tank motor vehicle with a maximum capacity of 6000 gallons into containers of 3000 gallons capacity or less mounted on farm vehicles or containers of 6000 gallons mounted on motor-driven applicators. This transfer operation is limited to rural areas and only on the premises of the consignee. This transfer operation must meet all safety requirements of Section 215.20. Department approved anhydrous ammonia meters or on board scales shall be employed for this operation. Meters or on board scales shall conform with the Weights and Measures Act [225 ILCS 470] and 8 Ill. Adm. Code 600. The selling price quotation, actual billing, and reporting to the Department shall be done in pounds or tons.

q) All stationary storage installations with systems for filling nurse tanks or cargo vessels with container capacity of 6000 water gallons or less shall have all vapor and liquid risers protected against any break resulting from a pull-away. Each vapor and liquid hose shall be protected with an individually properly rated excess flow valve, a manual control valve, and a break-away or shear fitting designed to conform with good engineering practices.

r) Meters used for the measurement of liquid anhydrous ammonia shall be recommended for ammonia service by the manufacturer and approved by the Department. When dual purpose meters are used and when changing from LPG to anhydrous ammonia or vice versa, it is necessary to adjust the coefficient of the expansion scale to the proper setting for the product being metered. This adjustment will require the removal of the Illinois Weights and Measures Seal. Section 42 of the Weights and Measures Act requires that the person who breaks such seal be registered pursuant to that Act.

s) Liquid meters shall be designed for a minimum working pressure of 250 psig.

t) The metering system shall incorporate devices that will prevent the inadvertent measurement of vapor.

u) Transferring of anhydrous ammonia from a DOT cargo tank motor vehicle must comply with Transportation Regulations (see Section 215.16).

v) Bulkheads shall provide protection during unloading events and shall be accomplished with the following good engineering practices:

1) All valves shall be protected from any possible pull-away incidents while connected between the mobile container and the transfer station in such a manner that any break resulting from a pull-away will occur on the hose or swivel-type piping side of the connection while retaining intact the valves and piping on the plant side of the connection;

2) Installation of reinforced concrete and structural steel bulkheads or equivalent anchorage, strong enough not to break and sufficiently massive not to be uprooted by the motor vehicle;

3) A manual shutoff valve shall be installed on the liquid and vapor line and located at the bulkhead;

4) The use of approved breakaway devices, specifically designed for this purpose;

5) Bulkhead protection shall not be attached to the container piers; and

6) At least one caution sign at the bulk heads shall be permanently displayed instructing the cargo tank driver to chock the cargo tanks wheels prior to loading or unloading. The signs shall be of metal or other comparable material, at least 8½ inches high by 11 inches wide, and shall state:

CAUTION
DRIVER MUST CHOCK WHEELS

The signs shall have a yellow background and the letters shall be at least 1½ inches in height.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.70 Liquid Level Gauging Devices

a) Each container, except those filled by weight, shall be equipped with an approved liquid level gauging device.

b) Each container or system covered in Sections 215.85, 215.110, and 215.115 shall be fitted with a liquid level gauge indicating the maximum level to which the container may be filled with liquid anhydrous ammonia at temperatures between 20°F and 100°F, except on containers provided with fixed maximum level indicators, such as fixed length dip tubes or containers that are filled by weight. Marks shall be in increments of not more than 20°F. See Section 215.60 regarding the requirement for thermometer well and thermometer.

c) Gauging devices that require bleeding of the product to the atmosphere, such as the rotary tube, fixed tube, and slip tube devices, shall be designed so that the maximum opening of the bleed valve is not larger than No. 54 (0.055 in.) drill size unless provided with an excess flow valve. (This requirement does not apply to farm vehicles used for the application of ammonia as covered in Section 215.115.)

d) Gauging devices shall have a design pressure equal to or greater than the design pressure of the container on which they are installed.

e) Fixed maximum liquid level gauges shall be designed and installed to indicate a volumetric level not to exceed 85% of the container's water capacity.

Note: This does not apply to refrigerated storage.

f) Gauge glasses of the columnar type shall be restricted to stationary non-refrigerated storage installations. They shall be equipped with shutoff valves having metallic hand wheels, excess flow valves, and extra heavy glass adequately protected with a metal housing applied by the gauge manufacturer. They shall be shielded against the direct rays of the sun.

(Source: Amended at 27 Ill. Reg. 9922, effective July 1, 2003)

Section 215.75 Painting of Containers

All uninsulated containers shall be painted white or a light reflecting color.

(Source: Amended at 27 Ill. Reg. 9922, effective July 1, 2003)

Section 215.80 Electrical Equipment and Wiring

a) Electrical equipment and wiring for use in ammonia installations shall be general purpose or weather resistant as appropriate.

b) Where concentrations of ammonia in air in excess of 16% by volume are likely to be encountered, electrical equipment and wiring shall be installed to comply with the requirements specified for use in hazardous locations, Class I, Group D, of ANSI/NFPA 70, National Electrical Code, Articles 500 and 501.

(Source: Amended at 27 Ill. Reg. 9922, effective July 1, 2003)

Section 215.85 Systems Utilizing Stationary, Pier-Mounted or Skid-Mounted Aboveground Non-Refrigerated Storage

a) This Section applies to stationary, pier-mounted, skid-mounted, aboveground non-refrigerated storage installations using containers other than those constructed in accordance with DOT specifications. Section 215.25 applies to this Section unless otherwise noted. Underground storage tanks are prohibited.

b) The minimum design pressure for non-refrigerated containers shall be 250 psig. U-68 and U-69 ASME Code containers with a design pressure of 200 psig are acceptable for reinstallation if re-certified to 250 psig in accordance with . CGA G-2, 1 Basic Rules 5.1.

c) All vapor and liquid connections, except for pressure relief valves and those specifically exempted in Section 215.40, shall be equipped with approved excess flow valves (back-pressure check valves are acceptable for filling connections) or, may be fitted with approved quick-closing internal valves that, except during operating periods, shall remain closed.

d) Each storage container shall be provided with a pressure gauge graduated from 0 psig to 400 psig. Gauges shall be designated for use in ammonia service.

e) All containers shall be equipped with a suitable vapor equalizing connection.

f) All containers shall be equipped with a fixed maximum liquid level gauge.

g) Every container shall be provided with one or more pressure relief valves of spring-loaded or equivalent type that shall comply with the following specifications:

1) Relief valves shall be installed in a manifold or other suitable device so that they can be replaced while the container remains pressurized. Internal relief valves are exempt from this requirement.

2) The discharge from pressure relief valves shall be vented away from the container, upward and unobstructed to the open air to an area such that persons, property and the environment will not be harmed. Vent pipes shall not be restrictive or smaller in size than the pressure relief valve outlet connection. All pressure relief valves shall have suitable rain caps that will allow free discharge of the vapor and prevent the entrance of water. Suitable provision shall be made for draining condensate that may accumulate.

3) If desired, vent pipes from two or more pressure relief devices located on the same unit, or similar lines from one or more different units, may be run into a common header, provided the cross-sectional area of the header is at least equal to the sum of the cross-sectional areas of the individual vent pipes.

h) Internal relief valves shall not be used on any tank manufactured after July 1, 2003.

i) Containers shall be provided with substantial reinforced concrete footings and foundations or structural steel supports mounted on reinforced concrete foundations. In either case, the reinforced concrete foundations or footings shall extend below the established frost line and shall be of sufficient width and thickness to support the total weight of the containers and contents adequately. Where required by local codes, seismic loads shall be considered in the design of the footings and foundations. The foundation shall maintain the lowest point of the tank not less than 36 inches above the ground. Floating type foundations shall also be acceptable providing the foundations are designed to adequately support tank, contents, and piping. (See Section 215.45.) Skid-mounted units shall include all piping and pumps or compressors as one unit. If the design of the a unit precludes a minimum of 24 inches ground-to-tank clearance, bottom-side inlet, outlet valves and piping are prohibited. Skid-mounted anhydrous ammonia storage tanks must be installed on permanent concrete footings or adequate floating reinforced concrete slabs.

j) Horizontal aboveground containers shall be mounted on foundations in such a manner as to permit expansion and contraction. Every container shall be supported so as to prevent the concentration of excessive loads. If supports of the saddle type are employed, the bearing afforded by the saddles shall extend over at least one-third of the circumference of the shell. Suitable means for preventing corrosion shall be provided on that portion of the container in contact with the foundations or saddles.

k) Secure anchorage or adequate pier height shall be provided against container flotation wherever sufficiently high flood water might occur.

l) All anhydrous ammonia storage locations shall have a permanent working platform installed at each nurse tank or applicator loading location. The working platform shall be designed to allow for connecting and disconnecting of transfer hoses without standing on equipment being loaded. This Section does not apply to nurse tanks or applicators with a working surface designed for loading purposes.

m) All on-site structures constructed after July 1, 2016, shall be a minimum of 15 feet in all directions from the aforementioned storage tanks.

n) The horizontal distance between aboveground containers of over 3000 gallon capacity shall be at least 5 feet.

o) Each container or group of containers shall be marked on at least two sides that are visible with the words ANHYDROUS AMMONIA or CAUTION – AMMONIA in sharply contrasting colors with letters not less than 4.0 inches high. Two diamond type, non-flammable gas, UN 1005, USDOT placards may be displayed with letters not less than 4.0 inches high.

p) Containers and appurtenances shall be located or protected by suitable barriers so as to avoid damage by trucks or other vehicles. Main container shutoff valves shall be kept closed and locked when the installation is unattended.

q) Storage containers need not be electrically grounded. When an electrical system exists, such as for lights or pump motors, the electrical system shall be installed and grounded in a manner as required by the National Electrical Code or local ordinance.

r) A sign with letters of a minimum height of two inches giving the name and telephone number, including area code, of owner, manager or agent of the anhydrous ammonia storage location shall appear at the site entrances to the property or apart from the storage tanks.

s) Railroad tank cars shall not be utilized for permanent anhydrous ammonia storage. Railroad tank cars that are currently in use for ammonia storage shall not be reinstalled for ammonia use once the container has been removed from the original saddle. All railroad tank cars used for permanent storage shall be removed from service pursuant to Section 215.10(c).

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.90 Refrigerated Storage

a) This Section applies specifically to systems using tanks for storage of anhydrous ammonia under refrigerated conditions. Section 215.25 applies to this Section unless otherwise stated.

b) Tanks may be designed for any storage pressure desired as determined by economical design of the refrigerated system.

c) The design temperature shall be the minimum temperature to which the container will be refrigerated and shall be so designated.

d) Containers with a design pressure exceeding 15 psig shall be constructed in accordance with Section 215.25 and the material shall be selected from those listed in API Standard 620, Design and Construction of Large, Welded, Low-Pressure Storage Tanks, Tables 2.02, R.2.2, R.2.3, or R.2.4.

e) Tanks with a design pressure of 15 psig or less shall be constructed in accordance with the general requirements of API Standard 620, including Appendix R.

f) When austenitic stainless steels or nonferrous metals are used, the ASME Code shall be used as a guide in selection of materials for use at the design temperature.

g) Tanks shall be supported on suitable noncombustible foundations designed to accommodate the type of tank being used.

h) Adequate protection against flotation or other water damage shall be provided wherever high flood water might occur.

i) Tanks storing product at less than 32°F shall be supported in such a way, or heat shall be supplied, to prevent the effects of freezing and subsequent frost heaving of the soil.

j) The area surrounding a refrigerated tank, or group of such tanks, shall be provided with drainage, diked, or provided with other secondary containment systems to prevent accidental discharge of liquid from spreading to uncontrolled areas.

k) When drainage is employed, a slope of not less than 1% shall be provided. The drainage system shall terminate in an impounding basin having a capacity as large as the largest tank served.

l) Provision shall be made for the drainage of rain water from the dike or impounding area. Such drainage shall be provided with a positive means to stop the flow.

m) Where a dike is employed, the capacity of the diked enclosure shall be 110% of the capacity of the largest tank served. When computing the volume of the dike, allowance shall be made for the volume displaced by all other containers in the diked area.

n) The walls of a diked enclosure or the wall of an impounding basin used in a drainage system shall be of earth, steel, concrete, or other suitable material designed to be liquid tight and to withstand the hydrostatic pressure and temperature. Earth walls shall have a flat top at least 2 feet wide. The slope shall be stable and consistent with the angle of repose of the earth used.

o) The ground in an impounding basin or with a diked enclosure should be graded so that small spills or the early part of a large spill will accumulate at one side or corner, thereby contacting only a relatively small area of ground and exposing a relatively small area for heat gain. Shallow channels in the ground surface or low curbs of earth can help guide the liquid to these low areas without contacting a large ground area.

p) Each refrigerated container shall be marked with a nameplate on the outer covering in an accessible place as specified in the following:

1) With the name and address of the builder and the date of fabrication;

2) With the maximum volume or weight of the product, whichever is most meaningful to the user;

3) With the design pressure;

4) With the minimum temperatures in degrees Fahrenheit (°F) or degrees Celsius (°C) for which the container was designed;

5) With the maximum allowable water level to which the container may be filled for the test purposes;

6) With the density of the product in pounds per cubic foot or kilograms per cubic meter for which the container was designed; and

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

q) Each refrigerated container shall be marked on two directly opposite sides at near eye level with the words ANHYDROUS AMMONIA or CAUTION – AMMONIA in sharply contrasting colors with letters not less than 4.0 inches high.

r) Each refrigerated container shall be conspicuously marked with a hazard warning label complying with 29 CFR 1910.1200.

s) Shutoff valves shall be:

1) Provided for all connections except those with a No. 54 (0.055 inches) drill size restriction, plugs, pressure relief valves, and thermometer wells; and
2) Located as close to the tank as practical.

t) A check valve shall be installed on the tank liquid fill connection if it is located below the maximum liquid level. A remotely operated shutoff valve shall be installed on other connections located below the maximum liquid level. See Section 215.65.

u) Each refrigerated container shall be equipped with an approved liquid level gauging device and high liquid level alarm.

v) The tank shall be provided with a system of one or more pressure relief valves that can limit the tank pressure below 115% (110% if only one pressure relief valve is used) of the design pressure during operational emergency conditions other than fire and below 121% of the design pressure during operational emergency conditions that include fire. One of the pressure relief valves shall be set to start to discharge at a pressure not in excess of the design pressure of the tank, and all other pressure relief valves needed to limit the tank pressure below 115% (110% if only one pressure relief valve is used) of the design pressure during operational emergency conditions other than fire shall be set to discharge at a pressure not in excess of 105% of the design pressure. All additional pressure relief valves needed to limit the tank pressure below 121% of the design pressure during operational emergency conditions, including fire, shall be set to start to discharge at a pressure not in excess of 110% of the design pressure.

w) The pressure relief valve set to discharge below 105% of the design pressure of the tank shall have a total relieving capacity in excess of the relieving capacity required to handle operating emergency conditions listed in subsection (x). The total relieving capacity of all the pressure relief valves in the system shall be the larger requirement of subsection (x) or (y).

x) Possible refrigeration system upsets are cooling water failure; power failure; instrument air or instrument failure; mechanical failure of any equipment; excessive pumping rates; and changing atmospheric conditions.

y) Use either of the following formulas for fire exposure. Relief valve sizing for fire protection may be adjusted to protect against the worst possible fire exposure.

1) For valve manufacturers who classify valves on the basis of the weight of the vapors to be relieved:

$$W = {34\ 500 F\ A^{0.82}}/{L}$$

2) For valve manufacturers who classify valves on the basis of air flow:

$$Q_a = {633\ 000\ F\ A^{0.82}}/{LC\sqrt{ZT/M}}$$

3) Where:

W	=	weight of vapors to be relieved in pounds/hour at relieving conditions
Qa	=	air flow in cubic feet per minute at standard conditions 60°F and 14.7 psi
F	=	fireproofing credit. Use F = 1.0 except when an approved fireproofing material of recommended thickness is used, in which case use F = 0.2
A	=	total surface area in square feet up to 25 feet above grade or to the equator of a sphere, whichever is greater
Z	=	compressibility factor of ammonia at relieving condition (if not known, use Z = 1.0)
T	=	temperature in degrees R (460 + temperature in °F of gas at relieving conditions)
M	=	molecular weight = 17 for ammonia
L	=	latent heat of ammonia at relieving conditions in Btu per pound
C	=	constant based on relation of specific heats (C may be obtained from the following table)

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

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

4) Where

$$K = \frac{\text{Cp at atmospheric conditions}}{Cv}$$

Cp = specific heat of vapor at constant pressure
Cv = specific heat of vapor at constant volume

z) Shutoff valves of adequate flow capacity may be provided and used to facilitate inspection and repair of pressure relief valves. When a shutoff valve is provided, it shall be so arranged that it can be locked or sealed open, and it shall not be closed except by an authorized person who shall remain stationed there while the valve remains closed and who shall again lock or seal the valve open when leaving the station.

aa) Pressure relief valves shall comply with the following:

1) If stacks are used they shall be suitably designed to prevent obstruction by rain, snow, ice, or condensate.

2) The outlet size shall not be smaller than the nominal size of the pressure relief valve outlet connection.

bb) Discharge lines may be used if desired. Multiple pressure relief valves on the same storage unit may be run into a common discharge header. The discharge line and header shall be designed to accommodate the maximum flow and a back pressure not exceeding 10% of the design pressure of the storage container. This back pressure shall be included to limit total tank pressure below 121% of the design pressure given in subsection (v). No other container or system shall exhaust into this discharge line or header. The vent lines shall be installed to prevent accumulation of liquid in the lines.

cc) The discharge from pressure relief valves shall be vented away from the container, upward and unobstructed to the open air to an area such that persons, property, and the environment will not be harmed. All pressure relief valves shall have suitable rain caps that will allow free discharge of the vapor and prevent the entrance of water. Suitable provision shall be made for draining condensate that may accumulate.

dd) Atmospheric storage shall be provided with vacuum breakers of adequate capacity to respond to anticipated rates of liquid withdrawal and to rapid atmospheric changes so as to avoid damage to the container. Ammonia gas may be used to provide a pad.

ee) Pressure relief valves used to protect other systems at refrigerated storage installations shall discharge to the open air unless connected to a control device as defined in Section 215.55.

ff) Because emergency venting for a double-wall refrigerated storage tank is complex, no calculation method is presented here. A thorough analysis of the fire relief for a double-wall refrigerated storage tank should be conducted.

gg) Refrigerated storage containers and appurtenances shall comply with the provisions of Section 215.40.

hh) Containers of such size as to require a field fabrication shall, when moved and reinstalled, be reconstructed and re-inspected in complete accordance with the original requirements under which they were constructed. The containers shall be subjected to a pressure retest, and if re-rating is necessary, it shall be done in accordance with the applicable pressure of the original requirements.

ii) The total refrigeration load shall be computed as the sum of the following:

1) Load imposed by heat flow into the container caused by the temperature differential between the ambient temperature and the storage temperature;

2) Load imposed by heat flow into the tank caused by maximum sun radiation; and

3) Maximum load imposed by filling the tank with ammonia warmer than the design storage temperature.

jj) More than one storage tank may be handled by the same refrigeration system.

kk) A minimum of two compressors shall be provided, either of which is of sufficient size to handle the loads listed in subsections (ii)(1) and (ii)(2), except as provided in subsection (mm). Where more than two compressors are provided, minimum standby equipment equal to the largest normally operating equipment shall be installed. Compressors required for subsection (ii)(3) may be used as standby equipment for compressors required in subsections (ii)(1) and (ii)(2).

ll) Compressors shall be sized to operate with a suction pressure at least 10% below the minimum setting of the pressure relief valves on the storage tank and shall withstand a suction pressure at least equal to 121% of the design pressure of the tank. Discharge pressure will be governed by condensing conditions.

mm) Where facilities are provided to safely dispose of vented vapor to an automatic flare or to a process unit, a single compressor of sufficient size to handle the load listed in subsections (ii)(1) and (ii)(2) shall be allowed.

nn) Each compressor shall have its own drive unit.

oo) Any standard drive consistent with good design may be used.

pp) An emergency source of power of sufficient capacity to handle the loads listed in subsections (ii)(1) and (ii)(2) shall be provided unless facilities are provided to safely dispose of vented vapors while the refrigeration system is not operating.

qq) The refrigeration system shall be arranged with suitable controls to govern the compressor operation in accordance with the load as evidenced by the pressure in the containers.

rr) An emergency alarm system shall be installed to function in the event the pressure in the containers rises to the maximum or falls to the minimum allowable operating pressure.

ss) An emergency alarm and shutoff shall be located in the condenser system to respond to excess discharge pressure caused by failure of the cooling medium.

tt) All automatic controls shall be installed in a manner to preclude operation of alternate compressors unless the controls will function with the alternate compressors.

uu) An entrainment separator of suitable size and design pressure shall be installed in the compressor suction line. The separator shall be equipped with a drain and gauging device. A maximum liquid level control with alarm should be installed.

vv) An oil separator of suitable size shall be installed in the compressor discharge line. It shall be designed for at least 250 psig and shall be equipped with a gauging device and drain valve. A maximum oil level control with alarm should be installed.

ww) A separator shall be equipped with a pressure relief valve if the separator can be isolated with shutoff valves.

xx) The condenser system may be cooled by air or water or both. The condenser shall be designed for at least 250 psig. Provision shall be made for purging noncondensibles either manually or automatically.

yy) The condenser shall be equipped with a pressure relief valve if the condenser can be isolated with shutoff valves.

zz) A condenser effluent receiver shall be provided that is equipped with automatic level controls and valving designed to discharge the liquid ammonia to storage, or with a high-pressure liquid drain trap of suitable capacity. The receiver shall be designed for at least 250 psig operating pressure and be equipped with the necessary connections, pressure relief valves, and gauging device.

aaa) Refrigerated containers and pipeline that are insulated shall be covered with a material of suitable quality and thickness for the temperatures encountered. Insulation shall be suitably supported and protected against the weather. Weatherproofing and insulation shall be of a type that will not support flame propagation and will not cause corrosion when wet.

bbb) Each refrigerated storage installation shall have on hand the minimum safety equipment required in Section 215.20.

ccc) In addition to the safety equipment requirement in Section 215.20, each refrigerated storage installation shall have on hand at least two independently supplied, positive-pressure SCBAs and at least two approved encapsulating corrosive chemical suits that are impervious to ammonia. Each shall be designed to accommodate an SCBA.

ddd) A sign with letters of a minimum height of two inches giving the name and telephone number, including area code, of owner, manager or agent of the anhydrous ammonia storage location shall appear at the site entrances to the property or apart from the storage tanks.

(Source: Amended at 27 Ill. Reg. 9922, effective July 1, 2003)

Section 215.95 Tank Car Operations

a) Anhydrous ammonia tank cars shall be transferred only at permanent storage locations into permanent storage containers.

b) Transfer operations shall be performed by a certified competent attendant.

c) Rail track at tank car transfer positions shall be essentially level.

d) Brakes shall be set and the wheels blocked in both directions on all tank cars being loaded or unloaded.

e) Caution signs shall be so placed on the track or car to give necessary warning to persons approaching the car from the open end or ends of the siding. The signs must be of metal or other comparable material at least 12 inches high by 15 inches wide in size, and bear the words, STOP – TANK CAR CONNECTED or STOP – MEN AT WORK, the word STOP being in letters at least 4 inches high. Other words should be in letters at least 2 inches high. The letters must be white on blue background. A car so protected must not be coupled or moved. The signs must remain in place until the tank car valves have been closed and the transfer lines have been disconnected.

f) A standard derail must be properly set and secured in the derailing position between the railroad tank car being loaded or unloaded and other cars being moved on the same track.

g) After a transfer, all valves shall be closed and transfer lines disconnected. Caps or plugs on railroad tank car sample valves, liquid valves, vapor valves, and gauging device valves shall be replaced and made wrench tight. Slip tube gauging devices shall be secured and gauge housings screwed in place. Protective housing covers must be secured and pinned and proper seals put in place when required. Leaks from any source on a tank car shall be stopped before a car may be released to the carrier.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.100 Systems Utilizing Stationary, Pier-Mounted or Skid-Mounted Aboveground or Underground Non-Refrigerated Storage (Repealed)

(Source: Repealed at 27 Ill. Reg. 18536, effective November 25, 2003)

Section 215.105 Systems Mounted on Farm Wagons (Implements of Husbandry) for the Transportation of Anhydrous Ammonia (Repealed)

(Source: Repealed at 27 Ill. Reg. 18536, effective November 25, 2003)

Section 215.110 Systems Mounted on Implements of Husbandry for the Transportation of Anhydrous Ammonia

All of Section 215.25 shall apply to this Section unless otherwise stated.

a) This Section applies to containers of 3000 gallons water capacity or less and related equipment mounted on nurse tanks that are used for the transportation of ammonia.

1) Any nurse tank that does not have a legible data plate and has not been recertified in conformance with Transportation Regulations (see Section 215.16) shall be removed from service.

2) Any container or combination of containers on a single running gear, greater than 3000 gallons, that are used for the transportation of anhydrous ammonia and to supply the application device shall be prohibited. This shall exclude cargo tanks used for transportation only.

b) Containers shall be constructed in accordance with Section 215.25. The shell or head thickness of any container shall not be less than $^{3}/_{16}$ of an inch. All containers over 500 gallons capacity should be equipped with semi-rigid baffle plates.

c) A suitable "stop" or "stops" shall be mounted on the farm wagon or on the container in such a way that the container shall not be dislodged from its mounting due to the farm wagon coming to a sudden stop. Back slippage shall also be prevented by proper methods.

d) A suitable "hold-down" device shall be provided that will anchor the container to the farm wagon at one or more places on each side of the container.

e) When multiple containers are mounted on a running gear, the weight shall be distributed appropriately over the axles. Multiple containers mounted on the same running gear must be of the same capacity. All manual shutoff valves shall be located behind the steel bulkhead or permanently affixed in a secure point to provide equivalent protection of the piping from that point to the front of the tank.

f) When the cradle and the container are not welded together, suitable material shall be used between them to reduce abrasion.

g) All containers shall be equipped with a fixed maximum liquid level gauge.

h) All containers shall be equipped with a pressure gauge having a dial graduated from 0 psi to 400 psi.

i) The filling connection of each container shall comply with the requirements of Section 215.40(j).

j) All containers shall be equipped with an approved vapor-equalizing valve unless equipped for spray loading.

k) All vapor and liquid connections, except pressure relief valves and those specifically exempt in Section 215.40(e) and (f) shall be equipped with approved excess flow valves or may be fitted with quick-closing internal valves that shall remain closed except during operating periods. Every tank withdrawal valve shall be protected by an excess flow valve matched to the designed flow rate. Flow capacity of the excess flow valve shall not exceed 45 GPM for 1¼" connections and 60 GPM for 1½" connections. When using an open yoke type excess flow withdrawal valve in a tank opening, the opening shall not be reduced with bushings to accommodate the withdrawal valve. Each valve shall be removed and inspected at an interval not to exceed 5 years. Records of the maintenance and inspections shall be kept at the facility for review. All valves shall be in compliance no later than December 31, 2020.

l) Fittings shall be protected from physical damage by means of a rigid guard designed to withstand static loading in any direction equal to twice the weight of the container and lading using a safety factor of 4 based upon the ultimate strength of the material used. If the guard encloses the pressure relief valve, the valve shall be properly vented through the guard.

m) If a liquid withdrawal line is installed in the bottom of a container, the connections to that line, including hose, shall not be lower than the lowest horizontal edge of the farm wagon axle. The hose shall be drained and depressurized prior to the container being moved or towed on a public road.

n) Provision shall be made to secure both ends of the hose in transit.

o) All containers shall be painted white or a light reflecting color.

p) All containers shall be marked as follows:

1) Placard: Four diamond type, nonflammable gas, UN 1005, USDOT placards shall be displayed (one on each side and one on each end).

2) Marking: The words ANHYDROUS AMMONIA shall appear on each side and each end in letters no less than two inches high.

3) Each container shall be marked with the words INHALATION HAZARD in two inch letters on two opposing sides.

4) The words LIQUID or VAPOR shall be placed on or within 12 inches of the appropriate valve by means of stencil, tag, decal or color coding with a legible legend ORANGE LIQUID and YELLOW VAPOR on the tank.

5) The container need not be marked or placarded on one end if that end contains valves, fittings, regulators or gauges when those appurtenances prevent the markings and placard from being properly placed and visible.

q) Nurse tanks operating on public roads shall be provided with a slow-moving vehicle (SMV) emblem consisting of a fluorescent orange triangle with a red reflective border. On and after September 1, 2004, the specifications of the SMV shall be the type recommended by ASAE S276.5.

r) All nurse tanks shall be securely attached to the vehicle drawing them by means of drawbars supplemented by suitable hitch pins with clips and safety chains permanently attached to the farm wagon.

s) A nurse tank shall be constructed so that it will follow substantially in the path of the towing vehicle and will prevent the towed farm wagon from whipping or swerving dangerously from side to side.

1) Nurse tanks require two safety chains with a combined breaking strength of at least the weight of the laden nurse tank.

2) All nurse tanks shall be securely attached to the vehicle drawing them by means of drawbars supplemented by suitable hitch pins and safety chains that meet the requirements of ASAE S338.2, Safety Chain for Towed Equipment. Reliable keepers for the hitch pin shall be used to prevent its loss. The hitch pin and keeper shall be permanently attached to the nurse tank towbar.

t) A nurse tank shall not be towed or parked in public places such as school yards, malls or hospital grounds.

u) Each person operating, repairing appurtenances to, or inspecting a nurse tank must comply with the following requirements:

1) Any person required to handle, transfer, transport or otherwise work with ammonia shall be a certified competent attendant to understand the properties of ammonia, to become competent in safe operating practices, and to take appropriate actions in the event of a leak or an emergency; and

2) Any person making, breaking or testing any ammonia connection, transferring ammonia, or performing maintenance or repair on an ammonia system under pressure shall wear protective gloves impervious to ammonia and chemical splash goggles. A full face shield may be worn over the goggles; however, a face shield shall not be worn as a substitute for a primary eye protection device ; and

3) Training for growers shall be voluntary as described in Section 215.20(e).

v) For first aid purposes each nurse tank shall be equipped with at least 5 gallons of clean water in a container mounted on top or side of the tank designed to provide ready access to the water for flushing any area of the body contacted by ammonia.

w) Prior to the addition of a chemical additive, its compatibility with system components shall be verified by the manufacturer of the additive.

x) Storage of Containers: When a nurse tank containing 10% or more of anhydrous ammonia is at an unattended approved storage site, the manually controlled valves shall be plugged or capped or locked or the nurse tank shall be stored inside a locked, fenced enclosure. Nurse tanks shall be stored no less than 50 feet from the edge of the adjacent road, 200 feet from place of private or public assembly and 750 feet from place of institutional occupancy. All pressure and liquid gauges must be in working order.

y) A back check valve shall be installed on each inlet of each fitting (including, but not limited to, tees and crosses) to prevent the back feed of anhydrous ammonia from an undamaged line to a damaged/severed line.

z) Excess flow valves shall be designed to close automatically at the rated flows of vapor or liquid as specified by the manufacturer. Excess flow valves shall be selected based on the piping, including valves, fittings and hoses being protected by an excess flow valve, and shall have a greater capacity than the rated flow of the excess flow valve, so the valve will likely close in case of delivery system failure at any point in the line or fittings. Any installation of a device that may cause a reduction in pressure to impede the operation of the excess flow valve is prohibited.

aa) All liquid and vapor service valves shall be protected by a threaded cap that must be affixed to the valve housing.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.115 Systems Mounted on Equipment for the Application of Anhydrous Ammonia

a) This Section applies to systems mounted on farm equipment and used for the field application of ammonia. Section 215.25 applies to this Section unless otherwise noted.

b) The shell or head thickness of any container shall not be less than $^{3}/_{16}$ of an inch.

c) All containers shall be securely mounted. Applicators must be secured with hold-down devices the same way as systems mounted on farm wagons transporting anhydrous ammonia.

d) Fixed maximum liquid level gauges shall be used that are designed to indicate when the container has been filled to 85% of its water capacity. The dip tube of this gauge shall be installed in such a manner that it cannot be readily removed.

e) The filling connection of each container shall comply with the requirements of Section 215.40(k).

f) An excess-flow valve is not required in the vapor connection, provided the controlling orifice is not in excess of $^{5}/_{16}$ inch in diameter and the valve is a hand-operated (attached hand wheel or equivalent) shutoff valve. To assist in filling applicator tanks, it is permissible to bleed vapors to the open air, provided the preceding requirements are met.

g) Applicators shall be filled at least 100 yards from any occupied building not on an approved site.

h) Metering devices may be connected directly to the tank withdrawal valve. A union-type connection is permissible between the tank valve and the metering device. Remote mounting of metering devices is permissible using hoses that meet specifications.

i) When the applicator or nurse tank is trailed and the metering device is remotely mounted, such as on the tractor tool bar, an automatic break-away, self-closing coupling device shall be used. The coupling device shall be made from or coated with a corrosion resistant material. The coupling device shall be mounted in a manner that will permit the device to swivel freely. A coupling device shall be maintained. An angle valve shall not be used as a hose end valve connecting to the coupling device.

j) No excess-flow valve is required in the liquid withdrawal line provided the controlling orifice between the contents of the container and the outlet of the shutoff valve (see Section 215.40(c)) does not exceed $^{5}/_{16}$ in diameter.

k) Any control valve installed between the regulator and the break-away coupling device shall indicate whether the valve is open or closed.

l) Where a ball valve is used to control flow to the metering device, the ball shall be drilled with an opening smaller than No. 54 (0.055 inches) drill size on the downstream side to prevent trapping ammonia in the ball when in the closed position.

m) Each person operating, repairing appurtenances, or inspecting an applicator tank shall comply with the following requirements:

1) Any person required to handle, transfer, transport, or otherwise work with ammonia shall be trained to understand the properties of ammonia, to become competent in safe operating practices, and to take appropriate actions in the event of a leak or an emergency; and

2) Any person making, breaking, or testing any ammonia connection, transferring ammonia, or performing maintenance or repair on an ammonia system under pressure shall wear protective gloves impervious to ammonia and chemical splash goggles. A full face shield may be worn over the goggles; however, a face shield shall not be worn as a substitute for a primary eye protection device (goggles).

n) Each applicator tank shall be equipped with the following safety equipment and features: for first aid purposes, at least 5 gallons of clean water in a container designed to provide ready access to the water for flushing any area of the body contacted by ammonia and a legible decal depicting step-by-step ammonia transfer instructions.

o) Instructions for connecting and disconnecting the coupling device shall be displayed in a manner as to be readily visible near the break-away coupling device.

(Source: Amended at 27 Ill. Reg. 9922, effective July 1, 2003)

Section 215.120 Equipment for the Application of Anhydrous Ammonia

a) No liquid transfer hose shall be joined between any nurse tank unit and any tool bar during transport upon a public right-of-way.

b) The following requirements apply when liquid transfer hoses are permanently attached to nurse tank units or tool bars:

1) Only the end of the liquid transfer hose, that is attached to a male acme-threaded fitting of the tool bar breakaway device shall be equipped with a straight-type hose end valve with a bleeder valve on its coupling side.

2) The hose end valve specified in subsection (b)(1) shall not be attached to a container fill valve of the same nurse tank unit.

3) A dummy acme adapter or parking plug shall be provided on the nurse tank or tool bar. The dummy acme adapter or parking plug shall be affixed into a position that prevents either end of the hose from being kinked or stowed under undue strain. The hose end valve of the liquid transfer hose shall be connected to the dummy acme adapter or parking plug at all times, except when the transfer hose is used for field application or other active transfer of ammonia through the hose end valve.

c) When nurse tanks are utilized to supply an application device, some means of break-away protection shall be provided, including, but not limited to, the following:

1) The nurse tank hose that crosses the hitching point and attaches to the application device requires installation of the appropriate equipment to protect against an accidental unhitching event. Deployment of the equipment designed to achieve this protection shall be installed and maintained in accordance with the manufacturer's instructions.

2) Multiple breakaway coupling devices mounted on a tool bar shall not interfere with one another in a turn or an unhitching event.

3) When nurse tanks are pulled in tandem, a breakaway coupling device or other means of protection shall be installed at each point where the hose crosses a hitching point. Deployment of the equipment designed to achieve this protection shall be installed and maintained in accordance with the manufacturer's instructions. Compliance with this subsection (c)(3) shall be achieved on or before December 31, 2020.

d) The manufacturer of a tool bar refrigeration unit shall provide with each unit documentation of recommended operation and maintenance procedures for any refrigeration unit manufactured after July 1, 2016.

1) The tool bar refrigeration unit shall be installed, maintained and operated in accordance with the manufacturer's specifications and limitations of use.

2) A manual shutoff valve shall be installed directly upon the inlet of the heat exchanger so that the operator may close the shutoff valve to prevent any backflow of refrigerated ammonia through the delivery line from the heat exchanger unit while connecting, disconnecting or otherwise servicing the tool bar breakaway device.

e) Hose and hose connections located on the low-pressure side of flow control, or pressure-reducing valves on devices discharging to atmospheric pressure, shall be designed for the maximum low-side working pressure. EVA hoses for tool bars shall be inspected for leaks and documented prior to each application season. The hoses shall not exceed the service life specified by the tubing manufacturer and shall comply with the properly rated operating pressure specified by the equipment manufacturer.

f) Any application device designed to tow two nurse tanks with a total static capacity greater than 4000 gallons shall employ the following:

1) The device shall include two separate distribution systems on the tool bar, one for each nurse tank.

2) The device and/or nurse tanks shall have enhanced protection systems that include the capability for emergency shutoff with immediate response. In addition, other systems may be deployed pending approval by the Department.

g) The hose length from the towed implement mechanically secure point to the break-away coupler on the towing implement shall have sufficient length to allow break-away couplers to articulate freely but prevent the hose from contact with the nurse tank tongue. This shall be achieved without securing the hose mechanically through the use of chains, elastomeric straps, wire ties or other means, by December 31, 2020.

(Source: Section 215.120 renumbered to Section 215.125 and new Section 215.120 added at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.125 Administrative Hearings

Decisions of the Department in implementing this Part are subject to the Illinois Administrative Procedure Act [5 ILCS 100] and the Department's rules pertaining to administrative hearings (8 Ill. Adm. Code 1).

(Source: Section 215.125 renumbered from Section 215.120 at 40 Ill. Reg. 8704, effective July 1, 2016)

SUBPART B: NITROGEN FERTILIZER SOLUTIONS

Section 215.200 General

a) Nitrogen fertilizer solutions are divided into subcategories as follows:

1) Aqua ammonia solution (Ammonium Hydroxide) is an aqueous solution of anhydrous ammonia generally containing from 18 to 30 percent of ammonia (NH_3) by weight and having a vapor pressure usually varying from 0 to 10 psig at 104 degrees Fahrenheit (F). Aqua ammonia may be handled in free-vented nurse and applicator tanks provided the time between filling and application into the ground is held to a minimum. Freezing point of a 25 percent aqua ammonia solution is approximately -67 degrees F. while higher percentages will have lower freezing points. Specific gravity usually ranges from .89 to about .93 depending upon temperature and concentration.

2) Low pressure nitrogen fertilizer solution is an aqueous solution of ammonia nitrate and/or urea and/or sodium nitrate and/or other nitrogen carriers, containing various quantities of free ammonia exceeding 2 percent by weight. Vapor pressure usually ranges from 0 to 30 psig at 104 degrees F. although for direct application the range is usually from 0 to less than 20 psig. These solutions shall be stored in pressure-vented tanks equipped with safety pressure relief and vacuum relief valves. Application and nurse tank equipment may be free vented for some of these solutions provided the time between filling and application is held to a minimum. Saturation temperature usually ranges from below -40 degrees F. to +65 degrees F. Specific gravity usually varies from 0.90 to 1.20.

b) In the interest of safety, personnel storing and handling nitrogen fertilizer solutions should be knowledgeable in the safe control and handling of these solutions. The Department conducts a training program in nitrogen safety procedures.

c) Ammonia vapor has a pungent odor which serves as its own warning agent. Ammonia vapor is lighter than air. Out-of-doors handling and adequate ventilation are best means of preventing accumulation. The flammable limits to free ammonia are from 16 to 25 percent by volume in air. Experience has shown that ammonia is extremely hard to ignite in spite of these theoretical limits and is generally considered to be a non-flammable gas. Ammonium nitrate starts to decompose at temperatures above 410 degrees F. Welding should not be attempted on any system which has contained nitrogen fertilizer solutions without proper preparation (see 8 Ill. Adm. Code Section 215.Table D).

Section 215.205 Definitions

a) The terms defined in 8 Ill. Adm. Code Section 215.15 shall pertain to the rules in this Subpart. The term "nitrogen fertilizer solution" should be substituted in lieu of the term "anhydrous ammonia" where it appears in those definitions.

b) In addition to terms defined in 8 Ill. Adm. Code Section 215.15, the following terms shall apply to this Subpart:

1) "Closed system" refers to a transfer system which will return displaced vapor to the tank from which the liquid is being discharged.

2) "Filling volume" is defined as the percent ratio of the liquid in a container to the volume of the container.

3) "Free vented" as used means the system is permanently open to the atmosphere. No shutoff or check valve is allowed in such opening.

4) "Hold-down devices" refers to chains or metal straps or cables.

5) "Hold to a minimum" means the product should be loaded in anticipation of sale into the nurse tanks and delivered to the consumer for use without being stored in nurse tanks waiting for a consumer order.

6) "Nitrogen fertilizer solutions" refers to compounds (ammonium nitrate, urea, sodium nitrate, and other nitrogen carriers) formed by the combination of free ammonia and water with or without other nitrogen salts. Nitrogen fertilizer solutions includes all liquid containing more than 2% free ammonia and/or having 5 psig. It does not include material containing over 1% of phosphorous and/or potassium which is used as plant food.

7) "Pressure vented" is a system equipped with a pressure relief valve or a combination pressure-vacuum relief valve.

8) "Vacuum" refers to ounces per square inch of pressure below atmospheric pressure.

9) "Vapor pressure," unless otherwise specified, shall refer to the pressure developed by the solution at temperature specified.

Section 215.210 Application of Rules

a) These rules apply to the design, location, construction, installation and operation of distribution systems utilizing nitrogen fertilizer solutions or aqua ammonia converters.

b) 8 Ill. Adm. Code Sections 215.215 through 215.260 apply to all sections unless otherwise specified.

c) 8 Ill. Adm. Code Section 215.265 applies to storage installations for nitrogen fertilizer solutions.

d) 8 Ill. Adm. Code Section 215.270 applies to systems mounted on tank trucks, semi-trailers and trailers for transportation of nitrogen fertilizer solutions.

e) 8 Ill. Adm. Code Section 215.275 applies to systems mounted on vehicles and implements of husbandry for the transportation of nitrogen fertilizer solutions.

f) 8 Ill. Adm. Code Section 215.280 applies to systems mounted on farm vehicles for the application of nitrogen fertilizer solutions.

Section 215.215 Requirement of Construction and Original Test of Containers

a) Containers shall be constructed of a material suitable for use with nitrogen fertilizer solutions.

b) Nitrogen fertilizer solution containers shall be designed to withstand at least the maximum pressure to which they may be subjected.

c) Containers in excess of 3,000 gallons and designed for 15 psig or greater shall be constructed in accordance with The Code.

d) Pressure-vented containers not covered by The Code shall be tested by the manufacturer at one and one-half (1½) times the design working pressure.

e) Nitrogen fertilizer solution containers of 3,000-gallon capacity or less shall be clearly and permanently labeled as follows:

1) Name and location of manufacturer.

2) Design pressure (if pressure vented).

f) Nitrogen fertilizer solution containers in excess of 3,000 gallons shall be clearly and permanently labeled as follows:

1) Name and location of manufacturer.

2) Design pressure (if pressure vented).

3) Serial number.

4) Nominal water capacity in U.S. gallons.

5) Year of manufacture.

Section 215.220 Capacity of Containers

Individual container capacity shall be limited only by good engineering practice (according to The Code).

Section 215.225 Container Valves and Accessories

a) Shutoff valves and appurtenances shall be of material suitable for use with the nitrogen fertilizer solution being handled and designed for not less than the maximum pressure to which they may be subjected.

b) Except for safety pressure and vacuum relief connections and vents, connections to pressure-vented containers shall have shutoff valves located as close to the container as practicable.

Section 215.230 Piping, Tubing and Fittings

a) All piping, including tubing, fittings, gaskets, and packing, shall be made of material suitable for use with nitrogen fertilizer solutions and designed for the maximum pressure to which they may be subjected.

b) Screwed joints are permissible provided they are able to withstand maximum pressures to which they are subjected. Pipe joint compounds shall be resistant to nitrogen fertilizer solutions and compatible with materials employed.

c) Provisions shall be made in the piping system to compensate for expansion, contractions, jarring, vibration and settling.

d) After assembly, all piping and tubing shall be tested and proved to be free from leaks at a pressure not less than the normal operating pressure of the system. Test procedures shall be conducted in accordance with the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers (The Code) and conducted by a person registered with the Society.

Section 215.235 Hose Specifications

a) Hose and hose connectors shall be fabricated of materials that are resistant to the action of the nitrogen fertilizer solution being used.

b) Hose and hose connectors shall be designed for at least the maximum pressure to which they may be subjected.

Section 215.240 Safety Devices

a) Every pressure-vented container shall be provided with one or more safety pressure relief valves. The rate of discharge shall be in accordance with the provisions of 8 Ill. Adm. Code Section 215.Table E.

b) Container safety pressure relief valves shall be set to start-to-discharge at a pressure not to exceed 110 percent of the design pressure of the container.

c) Safety pressure relief valves shall be arranged so the possibility of tampering will be minimized. If the pressure setting adjustment is external, the relief valves shall be provided with means for sealing the adjustment.

d) Shutoff valves shall not be installed between the safety pressure relief valves or the vacuum relief valve and the container. A safety relief valve manifold which allows one valve of two, three, four, or more to be closed and the remaining valve(s) will provide not less than the rate of discharge to allow the proper cubic feet per minute of air in relation to tank capacity as shown in 8 Ill. Adm. Code Section 215.Table A.

e) Each safety pressure relief valve and vacuum relief valve used shall be clearly and permanently marked as follows:

1) The relief setting.

2) The rate of discharge (see 8 Ill. Adm. Code Section 215.Table E).

3) The manufacturer's name and identification number.

f) Connections for venting, such as couplings, flanges, nozzles, and discharge lines, to which relief valves are attached, shall have internal dimensions at least as large in diameter as the relief valve to avoid restriction of flow through the relief valves.

g) Discharge from safety pressure relief devices of permanent storage containers shall be directed in such a manner as to prevent any impingement of escaping gas.

Section 215.245 Transfer of Liquids

a) A competent attendant shall supervise the transfer of liquids from the time the connections are first made until they are disconnected.

b) Pumps shall be of a material suitable for use with the solution being handled and designed to withstand the working pressure.

c) Air compressors may be used for transfer of nitrogen fertilizer solutions.

1) The air compressor shall be protected with a back flow check valve in the air line to prevent the flow of nitrogen fertilizer solutions or vapor from the container into the air compressor.

2) A relief valve large enough to discharge the full capacity of the compressor shall be connected to the discharge before any shutoff valve.

d) All storage installations shall be equipped with devices so as to minimize tampering while installation is unattended.

e) Containers shall be filled or used only upon authorization of owner or owner's agent.

Section 215.250 Tank Car Loading and Unloading Points and Operations

a) A sign reading, "Stop – Tank Car Connected" or "Stop – Men at Work," shall be displayed at the active end or ends of the siding while the car is connected for loading or unloading.

b) While tank cars are on siding for loading or unloading, the wheels at both ends shall be blocked on the rails.

c) Tank car loading or unloading site shall be substantially level.

Section 215.255 Liquid Level Gauging Devices

a) Gauging devices shall be arranged so that the maximum liquid level to which the container may be filled is readily determinable.

b) Gauging devices shall have a design working pressure at least equal to the design pressure of the container on which they are used.

c) Tube type liquid level gauging devices on containers in excess of 3,000 gallons shall be equipped with shutoff valves at the lower connection.

Section 215.260 Indicating Devices

Because of explosion and extreme corrosion hazard, no thermometers or other devices containing mercury shall be used where there is slightest probability of introducing mercury into nitrogen fertilizer solutions.

Section 215.265 Storage Installations for Nitrogen Fertilizer Solutions

a) Location of Storage Containers. Permanent storage shall be located outside of densely populated areas. If located within the corporate limits of a village, town or city, written approval of the municipality's governing body shall be submitted to the Department, accompanied by a plot plan, drawn to scale, prior to installing said equipment. Storage tanks installed outside of corporate limits after the effective date of these rules shall not be less than 10 feet from the lot line of the property that has been or may be built on or not less than 400 feet from any school, hospital or other existing places of public and private assembly. A copy of the county's zoning permit or municipality's approval and plot plan shall be submitted to the Department prior to site inspection. The Department will approve sites based upon compliance with this Subpart.

b) Installation of Storage Containers

1) All installation shall be permitted and shall comply with the requirements of 8 Ill. Adm. Code 255.

2) Aboveground containers shall rest on the ground or on foundations in such a manner as to permit expansion and contraction. Every container shall be supported so as to prevent the concentration of excessive loads on the supporting portion of the shell. That portion of the container in contact with the foundation or the ground shall be protected against corrosion in accordance with the Code.

3) Wherever high flood water might occur, the container shall be securely anchored or placed on a pier of a height above the normal high water mark.

c) Protection of Storage Containers and Accessories

1) Containers need not be electrically grounded. When an electrical system exists, such as for lighting or pump motors, the electrical system shall be installed and grounded as recommended by the National Electrical Code (January 1, 1982).

2) Storage container sites shall be kept free of debris and weeds.

3) Information Sign. A sign with letters of a minimum height of 2 inches shall be displayed in a conspicuous place stating the name, address and telephone number of the owner, manager or local agent of the storage location.

d) Safety Equipment. All stationary, pressure-vented storage plants shall have on hand as a minimum the following equipment:

1) A respirator.

2) One pair of rubber or plastic gloves.

3) Readily accessible shower or at least 75 gallons of clean water in an open top container.

4) Tight-fitting, vent-type chemical goggles or a full face shield.

e) Transfer of Nitrogen Fertilizer Solutions

1) In the handling and transfer of nitrogen fertilizer solutions at the storage site, a closed system or an equally effective system that will control objectionable free vapors shall be provided.

2) Transfer of nitrogen fertilizer solutions from trucks, semi-trailer or trailers in excess of 3000-gallon capacity shall be made only at sites approved by the Department (Section 215.255) or at the site of application.

f) Filling Volume. The filling volume of pressure-vented nitrogen fertilizer solution storage containers shall not exceed 95 percent.

(Source: Amended at 40 Ill. Reg. 8704, effective July 1, 2016)

Section 215.270 Systems Mounted on Trucks, Semi-trailers and Trailers for Transportation of Nitrogen Fertilizer Solutions

a) 8 Ill. Adm. Code Section 215.215 applies to this section.

b) Mounting Containers on Trucks.

1) Stops (wood or metal blocks) shall be mounted on the truck, semi-trailer, trailer, or on the container in such a way that the container shall not be dislodged from its mounting due to the vehicle coming to a sudden stop. Back slippage shall also be prevented.

2) Hold-down devices shall anchor the container to the cradle, frame, or chassis in a manner to prevent the container from rolling or bouncing off the vehicle and that will not create undue concentration of stress.

3) Any truck or trailer designed so that the container or containers constitute in whole or part the stress member of the chassis of the vehicle in lieu of a frame shall be constructed to withstand the additional stresses which are imposed. Cradles, when welded, shall be welded to the container by a welder who is registered under The Code and shall be designed to withstand a force in any direction equal to two (2) times the weight of the container when filled with nitrogen fertilizer solution.

4) If a liquid withdrawal line is installed in the bottom of a container, the connections thereto, including hose, shall not be lower than the lowest horizontal edge of the trailer axle.

5) Both ends of the hose shall be secured while in transit.

6) When the cradle and the tank are not welded together, material which will not deteriorate with weather or create a friction shall be used between them to eliminate metal-to-metal friction.

Section 215.275 Systems Mounted on Vehicles and Implements of Husbandry for the Transportation of Nitrogen Fertilizer Solutions

a) This section applies to containers of 3,000-gallon capacity or less and pertinent equipment (piping, valves and gauges attached to the container) mounted on vehicles and implements of husbandry used for the transportation of nitrogen fertilizer solutions. 8 Ill. Adm. Code Section 215.215 applies to this section.

b) Mounting Containers.

1) A hold-down device shall be provided which will anchor the container at one or more places on each side of the container to the vehicle to prevent its dislodging in event of any sudden stop or start.

2) When containers are mounted on four-wheel trailers, care shall be taken to insure that the weight is evenly distributed over both axles.

3) When the cradle and the tank are dissimilar metals, material which will not deteriorate with weather or create friction shall be used between to eliminate metal-to-metal contact.

c) Container, Valves and Accessories.

1) Each container shall be equipped with a liquid level gauging device.

2) If a liquid withdrawal line is installed in the bottom of the container, the connections thereto, including hose, shall not be lower than the lowest horizontal edge of the vehicle axle.

3) Both ends of the hose shall be secured while in transit.

d) Implements of Husbandry.

1) Implements of husbandry are defined in the Illinois Vehicle Code, Ch. 95½, Para. 1-130.

2) All trailers shall be securely attached to the vehicle drawing them supplemented by safety chains of sufficient size and strength to prevent the towed vehicle parting from the drawing vehicle in the case the drawbar should break or become disengaged.

3) A trailer shall be constructed so that it will follow in the path of the towing vehicle and will prevent the towed vehicle from slipping or swerving dangerously from side to side.

4) All nitrogen fertilizer system vehicles shall carry at least 5 gallons of clean water.

Section 215.280 Systems Mounted on Vehicles and Implements of Husbandry for the Application of Nitrogen Fertilizer Solutions

a) Working Pressure and Classifications of Containers. Containers shall be constructed in accordance with 8 Ill. Adm. Code Section 215.215.

b) Mounting of Containers.

1) Each container shall be supported so as to prevent the concentration of excessive loads on the supporting portion of the shell.

2) A hold-down device shall be provided which will anchor container to vehicle at one or more places on each side.

3) When the cradle and the tank are of dissimilar metals, material which will not deteriorate with weather or create friction shall be used between to eliminate metal-to-metal contact.

c) Container, Valves and Accessories.

1) Each container shall be equipped with a liquid level gauging device.

2) Flow control equipment may be connected directly to the tank coupling or flange, in which case a flexible connection shall be used between such control equipment and the remainder of the liquid withdrawal system. Flow control equipment not so installed may be connected to the container with a flexible connection.

Section 215.285 Administrative Hearings

Decisions of the Department in implementing these rules are subject to the Administrative Procedure Act (Ill. Rev. Stat. 1991, ch. 127, par. 1001-1 et seq.) and the Department's rules pertaining to administrative hearings as promulgated thereunder (8 Ill. Adm. Code Part 1).

Section 215.TABLE A Rate of Discharge

Minimum required rate of discharge in cubic feet per minute (CFM) of air for safety relief valves. Discharge measured at 60 degrees F. and atmospheric pressure (14.7 pounds per square inch).

Surface Area Sq. Ft.	CFM	Surface Area Sq. Ft.	CFM	Surface Area Sq. Ft.	CFM
20	258	185	1,600	900	5,850
25	310	190	1,640	950	6,120
30	360	195	1,670	1,000	6,380
35	408	200	1,710	1,050	6,640
40	455	210	1,780	1,100	6,900
45	501	220	1,850	1,150	7,160
50	547	230	1,920	1,200	7,410
55	591	240	1,980	1,250	7,660
60	635	250	2,050	1,300	7,910
65	678	260	2,120	1,350	8,160
70	720	270	2,180	1,400	8,410
75	762	280	2,250	1,450	8,650
80	804	290	2,320	1,500	8,900
85	845	300	2,380	1,550	9,140
90	885	310	2,450	1,600	9,380
95	925	320	2,510	1,650	9,620
100	965	330	2,570	1,700	9,860
105	1,010	340	2,640	1,750	10,090
110	1,050	350	2,700	1,800	10,330
115	1,090	360	2,760	1,850	10,560
120	1,120	370	2,830	1,900	10,800

125	1,160	380	2,890	1,950	11,030
130	1,200	390	2,950	2,000	11,260
135	1,240	400	3,010	2,050	11,490
140	1,280	450	3,320	2,100	11,720
145	1,310	500	3,620	2,150	11,950
150	1,350	550	3,910	2,200	12,180
155	1,390	600	4,200	2,250	12,400
160	1,420	650	4,480	2,300	12,630
165	1,460	700	4,760	2,350	12,850
170	1,500	750	5,040	2,400	13,080
175	1,530	800	5,300	2,450	13,300
180	1,570	850	5,590	2,500	13,520

Surface area = Total outside surface area of container in square feet. When the surface area is not stamped on the name plate or when the marking is not legible, the area can be calculated by using one of the following formulas:

a) Cylindrical container with hemispherical heads area = (overall length in feet times outside diameter in feet times 3.1416)
b) Cylindrical container with semi-ellipsoidal heads. Area = (overall length in feet plus 0.3 outside diameter in feet) times diameter in feet times 3.1416.
c) Spherical Container. Area = Outside diameter in feet squared times 3.1416

Flow Rate SCFM Air = cubic feet per minute of air required at standard conditions, 60 degrees F. and atmospheric pressure (14.7 psia).

The rate of discharge may be interpolated for intermediate values of surface area. For container with total outside surface area greater than 2,000 sq. ft., the required flow rate can be calculated using the formula, Flow Rate SCFM Air = 22.11A degrees .82, where A= outside surface area of the container in square feet.

Section 215.TABLE B Guide for Selection of Materials for Refrigerated Ammonia Storage Tanks

a) Materials for shell and bottom for tanks of all design pressures shall have ductility at low temperatures equal to or superior to those listed in 8 Ill. Adm. Code Section 215.Table C.

b) When austenitic steels or non-ferrous materials are used, the Code shall be used as a guide for temperature requirements.

c) Materials for nozzles, attached flanges, structural members which are in tension, and other such critical elements shall be selected for the design temperature. This selection shall be based on impact test requirements, or on probabilites such as used for the plate materials listed in 8 Ill. Adm. Code Section 215.Table C.

Section 215.TABLE C Minimum Material Requirements for Shells and Bottoms of Refrigerated Storage Tanks for Various Temperatures and Thicknesses

Design Temperature	Thickness	Material Spec.	Qualifications to be Added to the Basic Specification
65 F to 25 F, incl. (See Note 1)	Up to ½", incl.	Any approved steel with specified min. T.S. not exceeding 60,000 psi	None
	Over ½" to 1", incl.	A-131B (or C)	None
		Case 1256	None
		A-201 A & B	FGP (Fine grain practice)
	Over 1" to 1⅜", incl.	A-131C, Case 1256-	None
		A-201 A & B	None
			FGP
.	Over 1⅜"	A-131C	Normalized
		Case 1256	Normalized
		A-201 A & B	FGP, Normalized
Below 25 F to 5 F, incl. (See Note 2)	Up to ½", incl.	Case 1256	None
		A-201 A & B	None
	Over ½" to 1⅜ ", incl.	A-131B (to 1" max.)	FGP
		A-131C	FGP
		Case 1256	FGP
		A-201 A & B (to 1" max)	FGP, High Mang.*
		A-201 A & B (over 1")	FGP, High Mang., Normalized
	Over 1⅜ "	A-131C	Normalized

		Case 1256	Normalized
		A-201 A & B	FGP, High Mang., Normalized
Below -5F to -30F (See Note 3)	Up to ½" incl.	Case 1256	FGP
		A-201 A & B	FGP, High Mang.
	Over ½" to 1⅜" incl.	A-131B (to 1" max)	FGP, Normalized
		A-131C	Normalized
		Case 1256	FGP, Normalized
		A-201 A & B	FGP, High Mang., Normalized
	Over 1⅜"	A-300 Class 1	A-201 A & B only

*Manganese content of 0.70% to 1.0% is preferred in lieu of usual content of 0.80% maximum.

Note 1: The design temperature shall be taken as the lower of the following:

a) The minimum temperature to which the tank contents will be refrigerated.

b) The minimum estimated tank shell temperature due to atmospheric temperatures, considering the effectiveness of the insulation in keeping shell temperatures above expected minimum atmospheric temperature (if expected to be below the refrigerated temperature).

Note 2: For this thickness, temperature category approved steels include all those listed in API 12-C and API 620. Materials for vessels must comply with requirements of the Code and any additional requirements of this table. A-131 steel is not approved by ASME and some Code cases have not been approved by local jurisdictions. All specific materials listed in table are satisfactory for all designs based on API 12-C or API 620.

Note 3: For vessels constructed under the Code with a design temperature below -20F., the impact requirements shall comply with 8 Ill. Adm. Code Section 215.Table B.

Section 215.TABLE D Repair Welding

a) All containers, piping and appurtenances which have contained or have been in direct contact with nitrogen fertilizer solutions containing ammonium nitrate must be thoroughly cleaned and washed with water (or steam) to eliminate all solid ammonium nitrate before welding or torch cutting may be attemped. Extreme caution should be taken before attempting to weld or torch cut any container when ammonium nitrate could be trapped, for example, in the area between tank shell and a reinforcing plate.

b) All containers, piping, and appurtenances which have contained aqua ammonia (ammonium hydroxide) must be thoroughly vented and thoroughly washed with large quantities of water. After washing, they shall be filled with water to a level higher than area to be welded or repaired.

c) All containers shall be welded in accordance with the Code.

Section 215.TABLE E Safety Pressure Relief Valves

a) The rate of discharge shall be stamped on the safety relief valve in cubic feet of air per minute at:

1) 60 degrees F.,

2) 14.7 pounds per square inch absolute, and

3) 120 percent of the stamped start-to-discharge setting.

b) Safety pressure relief valves in systems utilizing air compressors for the transfer of nitrogen fertilizer solutions shall have a minimum rate of discharge in cubic feet per minute of air of 120 percent of the compressor manufacturer's maximum rated capacity.

c) Safety pressure relief valves in systems utilizing pumps for transfer of nitrogen fertilizer solutions shall have a minimum rate of discharge of 120 percent of the liquid inflow rate. This can be computed as follows: Liquid pump maximum rated capacity in GPM times 0.16 equals vapor flow in CFM.