

California Code of Regulations Title 8 CCR

Subchapter 1 Unfired Pressure Vessel Safety Orders Article 6

Anhydrous Ammonia Sections

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Please note the regulations contained within this document were current as of February 1st 2013. As with any State or Federal Regulations they may be subject to change without notice. For a current copy of the State of California's Anhydrous Ammonia Regulations Please go to:

<http://www.dir.ca.gov/title8/sb1a6.html>

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§501. Installation of Aboveground Storage Tanks for Other Than Refrigeration Service.

(a) Stationary tanks shall be installed aboveground on firm masonry or concrete foundations, or on full length skids providing a bearing area limiting foundation loadings to not more than 2,000 pounds per square foot. Unless supported by continuous skids welded to pads on the tank shell, aboveground horizontal storage tanks shall have no more than 2 points of support longitudinally. Where necessary, tanks shall be securely anchored or weighed to prevent floating.

A tank may be installed on saddles, directly on concrete foundations, or it may be supported by properly designed metallic structural supports. When the tank is installed directly on concrete foundations, a corrosion pad shall be provided at three points of contact with the foundation. These corrosion pads shall be at least 3/16 inch thick, and shall have a width at least equal to the width of the foundation at the point of contact with the tank, but in no case shall they be less than 8 times the shell thickness in width.

When corrosion pads or pad-type steel supports are used, the pad shall have rounded or semielliptically shaped ends, and shall be attached to the shell with a continuous seal weld. Corrosion pads shall be not less than 1/4 the circumference of the shell in length.

Unless installed on concrete pads, skid tanks shall be placed on engineered soil or road base topped with well-drained gravel or oiled sand, capable of supporting 2,000 pounds per square foot.

Sufficient space shall be provided between stationary storage tanks to permit access for fire fighting. This space shall not be less than 5 feet for tanks over 1,200-gallon capacity. Tanks exceeding 1,200-gallon capacity shall be so installed that the bottom outside surface of the tank is at least 12 inches above ground level.

(b) All tanks over 1,200-gallon capacity shall be installed on foundations in such a manner as to permit expansion and contraction. Every tank shall be so supported as to prevent the concentration of excessive loads on the tank at the points of support. All foundations and fastenings shall be designed to provide reasonable safety under imposed loadings, including wind, earthquake, vibrations, etc.

(c) Containers shall be located outside of buildings, or in buildings or sections thereof especially equipped for this service. Consideration shall be given to the adverse health effects of ammonia, as well as the adjacent fire hazards, when selecting the location for a storage container.

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

Stationary storage tanks shall be located with relation to property lines, residential buildings, highways, etc., in accordance with the following table:

<i>Capacity of tank in U.S. gallons</i>	<i>Line of property adjoining which may be built upon</i>	<u><i>Minimum distance (feet) from tank to</i></u>	
		<i>Highway or main track of railroad</i>	<i>Residential building</i>
1,200 and less	50	25	50
Over 1,200 to and including 30,000	50	50	50
Over 30,000 to and including 70,000	65	50	65
Over 70,000 to and including 500,000	100	50	100
Over 500,000	150	50	150

<i>Capacity of tank in U.S. gallons</i>	<i>Any Building or area used by the public for deliberation, worship, education, entertainment, amusement, or awaiting transportation</i>	<u><i>Minimum distance (feet) from tank to</i></u>	
		<i>Hospital, jail or or other similar institutions</i>	<i>Open well, reservoir, or other source of potable water</i>
1,200 and less	250	750	50
Over 1,200 to and including 30,000	400	1,000	100

Over 30,000 to and including 70,000	520	1,300	100
Over 70,000 to and including 500,000	800	2,000	200
Over 500,000	1,000	2,500	200

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

Electrical systems shall be installed and maintained in accordance with the Electrical Safety Orders.

(d) Where vehicle impact is possible or likely stationary tanks shall be protected against vehicle damage by a rugged fence, suitable crash posts, curbs, or other acceptable protection. All storage tanks located where unauthorized tampering is possible shall be surrounded with a rugged steel fence or equivalent, or all liquid and vapor outlets shall be kept effectively locked when not in use.

(e) All stationary storage tanks exceeding 1,200 gallons capacity shall have the loading and unloading connections secured to a concrete bulkhead or equivalent designed to withstand a horizontal pull of not less than 2,000 pounds in any direction, unless other suitable protection is provided. This bulkhead shall not be located underneath the tank. The loading and unloading connections shall be firmly secured to this bulkhead and the piping between the bulkhead and tank shall be installed in a manner to provide for expansion, contraction, jarring, vibrations, settling, etc. For skid tanks exceeding 1,200 gallons capacity, such loading and unloading connections shall be securely fastened to the skid or to the tank supports.

NOTE: 2,000 pounds may not be adequate for all sizes of loading and unloading hoses and connections.

(f) Where excess-flow valves [See Section 507(e)] are used, liquid and vapor lines shall be at least full size from the excess-flow valve in the tank to the point of discharge or an additional excess-flow or equivalent shall be located as close to the point of pipe size reduction or other restriction as is practical, unless the excess-flow valve in the tank is designed to operate at the reduced flow condition, in which case the excess-flow valve in the tank may suffice.

Where excess-flow valves are used and 2 or more tanks are installed in battery, with common loading and/or unloading lines, the common liquid and vapor lines shall be fitted with excess-flow valves or equivalent (unless the common line has a cross-sectional area equal to or in excess of the combined areas of the individual tank lines; or unless the excess-flow valves are designed to operate at the reduced flow condition, in which case the excess-flow valve in the tank may suffice). Where additional excess-

flow valves are used in common loading and/or unloading lines, the additional excess-flow valve or equivalent shall be located as close to the point of restriction as practical.

NOTE: A quick-closing manually operated valve may be considered equivalent to an excess-flow valve at the point of pipe size reduction or other restriction providing:

(1) It is equipped with a means of closing the valve manually from a point remote from the delivery connection.

(2) The loading and/or unloading line in which is located is secured to a bulkhead complying with Section 501 (e).

(3) The quick-closing valve is in the pipeline on the tank side of the bulkhead.

(g) Tanks installed in battery shall be so installed that the top surfaces of the tanks are substantially in the same horizontal plane.

(h) The following minimum equipment shall be installed, properly maintained, and readily available for use at all stationary storage tanks in readily accessible locations.

(1) At least two full face respiratory devices in compliance with Section 5144; preferably one self contained breathing apparatus, and one NH(3) gas mask with spare canister.

(2) One pair NH(3) resistant gloves.

(3) One pair NH(3) resistant boots.

(4) NH(3) resistant pants and jacket and/or slicker.

(5) One quick-acting deluge shower and bubble fountain or other method of simultaneously washing both eyes with clean water.

The minimum water supply shall be a 50-gallon container of clean water.

(6) One first-aid kit in compliance with Section 3400 or 3439.

(7) One fire extinguisher conforming to the provisions of California Administrative Code, Title 19, Chapter 1, Subchapter 3, and having a rating of not less 40B-C.

The employer shall have a program of periodic inspection of the above emergency equipment to maintain it in serviceable condition.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Amendment of subsections (a), (c), (d), and (h) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).
3. Amendment of subsection (a) filed 8-6-76; effective thirtieth day thereafter (Register 76, No. 32).
4. Amendment of subsection (f) filed 4-1-77; effective thirtieth day thereafter (Register 77, No. 14).

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§502. Warning Signs.

(a) Except as noted in Section 502 (b), all anhydrous ammonia tanks 60 gallons capacity or more shall have warning signs provided on at least 2 sides with the words

"Caution -- Ammonia" in sharply contrasting colors, with letters at least 1/12 of the tank diameter in height, but need not be in excess of 1 1/2 inches for tanks 500 gallons capacity or less or 4 inches for tanks exceeding 500 gallons capacity.

(b) All tanks used for the transportation of ammonia on the highways shall be marked as specified by the DOT and adopted by Section 1222, California Administrative Code, under authority to the Division in lieu of the markings required under Section 502 (a) for such tanks in off-highway service.

(c) Uninsulated containers shall have a highly reflective surface maintained in good condition.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).

2. New subsection (c) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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§503. Portable Tanks.

(a) Portable tanks installed as permanent installations for periods of time exceeding 90 days shall be in compliance with Section 501.

Portable tanks filled at point of use shall be installed substantially level. A safe and accessible source of clean water (minimum 5 gallons) shall be immediately available to enable an employee to wash his eyes in case of accidental sprays or spillage. If a container is used, it shall have a suitable opening to permit the application of water to flush the eyes.

(b) Portable tanks shall comply with these orders, and legs or other supporting structures shall be secured to tanks in accordance with the code or rules under which the tank is designed and built, and shall be designed to withstand a loading in any direction equal to the loaded weight of the tank when filled to the maximum permissible level with a factor of safety of at least 8.

(c) Fittings on all portable tanks shall be installed in recessed wells or otherwise protected to prevent damage to the fittings during transportation and use.

(d) When portable tanks are transported from 1 location to another, they shall be securely fastened to the transporting vehicle.

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

(f) When the cradle and the tank are not welded together suitable material shall be used between them to eliminate metal-to-metal friction.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. New subsections (e) and (f) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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§504. Installation of Tanks on Transportation and Bulk Delivery Vehicles.

(a) Transportation tanks mounted on truck or trailer frames shall be placed on saddles or bolsters with the center of gravity as low as possible. Such saddles, bolsters, and/or other fastenings shall be designed to withstand a loading in any direction equal to the loaded weight of the tank when filled to the maximum permissible level with a factor of safety of at least 8. Transportation tanks of the so-called "frameless-type" shall not be used in anhydrous ammonia service until the design of the tank and tank supports has been submitted to the Division and found acceptable. The installation must also comply with DOT requirements.

All transportation trailers shall be firmly and securely attached to the vehicle drawing them by means of suitable drawbars supplemented by a safety chain (or chains) or safety cables.

Every transportation trailer or semitrailer shall have a reliable system of brakes, and adequate provision shall be made to operate the brakes from the driver's seat.

Every transportation trailer shall be equipped with self-energizing brakes.

Transportation trailers shall be so designed that the towed vehicle will follow substantially in the path of the towing vehicle and will not whip or swerve dangerously from side to side.

Where a fifth wheel is employed, it shall be ruggedly designed, securely fastened to both units, and equipped with a positive locking mechanism which will prevent separation of the two units except by manual release.

(b) Every transportation tank shall be protected by a suitable steel bumper attached to the vehicle chassis or equivalent.

(c) All fittings on transportation tanks not protected by the vehicle frame shall be located in recessed wells or otherwise suitably guarded. Any such guards shall be designed to minimize the possibility of rupturing the tank head or shall in case of vehicular accident. The recessed well, if used, shall be of sufficient size and depth that the top of all fittings will be located below the tank shell or head line. The recessed well for safety relief valves shall be located at the top center of the tank and shall be equipped with an unlocked hinged cover or equivalent.

(d) No anhydrous ammonia piping or valves shall be installed within the cab or driver's compartment of a truck.

(e) All piping and fittings on the bottom of transport and bulk delivery tanks shall be adequately guarded.

(f) All tank trucks and all trucks pulling tank trailers used to transport anhydrous ammonia over 1,200 gallons water capacity shall be equipped with the following minimum safety equipment which shall be properly maintained and readily available for use:

(1) One pair of NH(3) resistant gloves.

(2) Full face mask for ammonia service.

(3) One fire extinguisher conforming to the provisions of Article 157 of the General Industry Safety Orders and having a rating of not less than 20B-C.

(4) A container of not less than 5 gallons of fresh water, so located as to permit immediate application. This container shall have a suitable opening to permit rinsing of eyes.

(g) Each liquid withdrawal opening 2 inches nominal pipe size or larger on transportation tanks and bulk delivery vehicles over 1,200 gallons capacity shall be fitted with a remotely controlled internal shutoff valve of the type listed in Sections 507(e)(3) through (5). Such tanks over 3,500 gallons capacity shall have 2 remote stations for the valve controls, 1 at each end of the tank and diagonally opposite each other.

One control mechanism at each control station may be used to operated all such remotely controlled valves.

All replacement valves for the above service shall comply with these Orders, if the openings in the tank are adaptable for conversion.

(h) Where excess-flow valves [See Section 507 (e)(2)] are used, all liquid and vapor lines shall be at least full size from the excess-flow valve or equivalent shall be located as close to the point of pipe size reduction or other restriction as is practical, unless the excess-flow valve in the tank is designed to operate at the reduced flow conditions, in which case the excess-flow valve in the tank may suffice.

Where excess flow valves are used on tank trucks having 2 or more tanks with common loading and/or unloading lines, the common liquid or vapor lines shall be fitted with an excess-flow valve in the tank opening (unless the common line has a cross-sectional area equal to or in excess of the combined areas of the individual tank lines or unless the excess flow valves in the tank are designed to operate the tank may suffice). Where additional excess-flow valves are used in common loading and/or unloading lines, the additional excess-flow valve or equivalent shall be located as close to the point of restriction as is practical.

NOTE: A quick-closing manually operated valve may be considered equivalent to an excess-flow valve at the point of pipe size reduction or other restriction providing:

(1) It is equipped with a means for closing the valve manually from a point remote from the transfer hose connection.

(2) The loading and/or unloading line in which it is located is secured to the tank or vehicle framework as required by Section 504 (i).

(3) The quick-closing valve is located on the tank side of the structure used to secure the line or lines to the tank or vehicle frame.

(i) All liquid and vapor lines shall be adequately secured to the vehicle frame or tank. The device used to secure the lines shall be so designed that it will withstand the load imposed by the strongest hose and hose fitting to be used in the transfer operations without breaking, or 2,000 pounds, whichever is greater.

(j) All piping and fittings on transport and bulk delivery tanks shall be adequately guarded. The use of anhydrous ammonia hose between the tank and the transfer hose connection shall be limited to not more than 3 sections of metallic hose not over 24 inches in length in each liquid and vapor line. Such lengths of hose shall be used only where necessary to provide flexibility and shall not have 1 section of hose connected to

another section of hose. Each section shall be so installed that it will be protected against mechanical damage and be readily visible for inspection. The manufacturer's identification required in Section 510 (b) shall be retained on each section.

(k) All transportation tanks shall be equipped for spray loading (filling in the vapor space), with an approved vapor return valve of adequate capacity.

HISTORY:

1. Amendment of subsections (g), (h) and (j) filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Amendment of subsections (a) and (f) and new subsection (k) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).
3. Repealer and new subsection (f) filed 8-6-76; effective thirtieth day thereafter (Register 76, No. 32).

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§505. Installation of Mobile Storage Tanks.

(a) Mobile storage tanks shall meet the requirements of Section 504 except that:

(1) The design of saddles, bolsters, and/or other fastenings may be based on the empty weight of the tank for other than vertical loadings.

(2) In addition to the requirements of Section 504 (f), there shall be available a container of not less than 50 gallons of fresh water unless there is immediately available another safe, reliable, and accessible source of water.

(b) When containing NH(3) liquid, mobile storage tanks shall be located in accordance with Section 501(c).

(c) Mobile storage tanks shall be maintained substantially level and be securely blocked against accidental movement and shall be adequately supported independently of the wheels when containing NH(3) liquid.

(d) Only flexible connections shall be made to mobile storage tanks. No permanent piping to other installations is permitted. The loading and unloading connections shall be securely fastened to the vehicle frame or to the tank supports.

(e) All liquid shall be removed from mobile storage tanks before being moved to a new location.

(f) Unless surrounded by a rugged steel fence or equivalent, all liquid and vapor outlets shall be kept effectively locked when unattended.

(g) Transportation tanks shall not be used as mobile storage tanks without written permission from the Division, unless they are in full compliance with both Sections 504 and 505.

HISTORY:

1. Amendment of subsection (b) filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).

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§506. Installation of Tanks Mounted on Farm Machinery.

(a) Tanks or cylinders used to furnish anhydrous ammonia to agricultural applicator tanks and tanks used on applicators, etc., shall be so installed that the bottom of the container and/or any outlet connection, including hose, shall not be lower than the lowest horizontal edge of the vehicle axle when fully loaded. These tanks shall be secured to prevent jarring loose, slipping, or rotating of the tanks while in service. Such supports and fastenings shall be designed to withstand a loading in any direction equal to the loaded weight of the tank when filled to the maximum permissible level with a factor of safety of at least 8.

Field welding where necessary, shall be made only on nonpressure parts that were installed by the manufacturer of the tank.

(b) The connections between the applicator tank and pressure-reducing valve shall be extra heavy fittings and Schedule-80 pipe, high-pressure anhydrous ammonia hose (1750 psi minimum bursting pressure), or equivalent, and where exposed, shall be protected against physical damage. All main shutoff valves shall be readily accessible while the unit is in normal operation. All shutoff valves shall be suitably protected against physical damage.

(c) While in use on farm machinery, each skid tank, applicator tank, or combination thereof shall have securely attached a container holding not less than 5 gallons of fresh

water. This container shall have a suitable opening to permit the application of water to flush the eyes.

The container of fresh water required by this subsection may be attached to the tractor or other source or power used to tow the vehicle or device on which the tank is used.

(d) All trailers shall be securely attached to the vehicle drawing them by means of drawbars supplemented by suitable safety chains.

(e) A trailer shall be constructed so that it will follow substantially in the path of the towing vehicle and will not ship or swerve dangerously from side to side.

HISTORY:

1. Amendment of subsection (a) and new subsections (d) and (e) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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§507. Piping, Valves, and Fittings for Liquid and Vapor Lines.

(a) All pipe between the tank and first shutoff valve shall be at least Schedule 80.

All fittings between the tank and the first shutoff valve shall be steel as required by Section 507 (c), first paragraph.

Aboveground piping in excess of 1 1/2-inch pipe size may be Schedule 40 when used beyond the first shutoff valve provided welded, or welded and flanged connections are used.

All other piping shall be Schedule 80.

All piping shall be tested after assembly and proved free of leaks at a pressure of not less than its normal operating pressure or 150 psi, whichever is greater.

Flammable material shall not be used for the installation acceptance pressure test.

All welded piping shall be fabricate and tested in accordance with the ANS Standards Code for Pressure Piping, Section 3, Petroleum Refinery Piping B-31.3, 1966 Edition or equivalent.

All refrigerated piping shall conform to the Refrigeration Piping Code, American National Standards Institute, B-31.5-1966 with addenda B-31.1a-1968 as it applies to ammonia.

Hose shall not be used in lieu of piping between the tank and loading and/or unloading connection, except that a section of metallic hose, not to exceed 24 inches in length may be used in each pipeline to provide flexibility and except as provided in Section 504 (j). The manufacturer's identification required in Section 510 (b) shall be retained on each section.

(b) All piping shall run as directly as practical, with suitable provision for expansion, contraction, jarring, vibrations, and settling. Piping may be either buried or installed aboveground, and shall be well supported and protected against physical damage. All underground piping shall be buried not less than 18 inches below the surface of the ground unless otherwise protected, and shall be adequately coated or otherwise protected against corrosion. Pipe coated as follows will be considered acceptable.

- (1) Clean and prime.
- (2) Coat with asphalt enamel.
- (3) Wrap with forty-pound felt.
- (4) Coat with asphalt enamel.
- (5) Wrap with forty-pound felt.
- (6) Coat with asphalt enamel.
- (7) Wrap with Kraft paper.

Equivalent wrapping will be accepted at the discretion of the Division.

(c) All steel fitting used with Schedule 80 pipe shall be Schedule 80 if butt welded, 3,000 pound WOG if socket welded, and 2,000 pound WOG forged steel if threaded.

All other steel fittings shall have a rating of at least Schedule 40 if butt welded and 2,000 pound WOG if socket welded or threaded. Threaded connections shall not be seal welded.

Joint compounds shall be resistant to ammonia.

All other valves and fittings shall be of a type suitable for use with anhydrous ammonia and shall have a pressure rating of at least 400 psi WOG. Valve seat material, packing, gaskets, etc., shall be suitable for anhydrous ammonia service.

(d) The use of the following is prohibited:

(1) Valves, cocks, and pipe fittings of semisteel other than ASTM Specification Nos. A 536-67, Grade 60-40-18; A 395-68; A 445-66; A 47-68, Grade 35018; unless they have a pressure rating of not less than 600 psi WOG. In no case shall valves of semisteel other than the 4 ASTM Specifications listed above be used for primary stop valves.

Cast iron fittings made specifically for anhydrous ammonia service, meeting ASTM A-126-66 class B or C, may be used for secondary service if they have a service rating of at least 600 psi.

(2) Street ells and screwed service tees unless they are extra-heavy forged construction.

(3) Valves of a design that will allow the valve stem to be removed without removal of the complete valve bonnet, unless the flow is restricted by an inlet orifice to not more than 5/4 drill gage size.

(4) Ordinary solid-wedge-type gate valves unless there is another stop valve of acceptable type between the gate valve and tank.

(5) Valves with valve stem packing glands which cannot be repacked under pressure, unless there is another valve of acceptable type between it and the tank.

(6) Threaded aluminum fittings and/or adapters that are required to be connected or disconnected as part of the filling or transfer operation.

(7) Copper and brass pipe, fittings, valves, etc.

(8) Pipe, fittings, etc. that are galvanized or otherwise plated with material which is attacked by ammonia where such plating or galvanizing is exposed to ammonia.

(e) Except for service valves, safety relief valves, and gaging connections, all liquid and vapor connections shall have 1 of the following installed directly in the tank connections:

(1) Connections up to and including 4-inch pipe size:

(A) A back-pressure check valve.

(B) An excess-flow valve.

Excess flow valves shall be designed with a bypass, not to exceed a No. 60 drill-size opening to allow equalization of pressures.

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.

(C) A manually operated check valves (internal valve) equipped with means for closing the valve from a point remote from the delivery connection and with such control mechanism fitted with a fusible section having a melting point of 208 degrees Fahrenheit to 220 degrees Fahrenheit which will cause the valve to close automatically in case of fire.

(D) A positive check valve (internal valve) which can be operated manually and which will close automatically on excess-flow conditions and which can be closed manually from a point remote from the delivery connections. Such valve shall also incorporate a fusible section as required in Section 507 (e) (1) (C) which will cause the valve to close automatically in case of fire.

(E) A positive check valve (internal valve) which is normally closed and which is opened by pump discharge pressure and which can be closed manually from a point remote from the delivery connections. Such valve shall close automatically with a reduction of pump discharge pressure and shall also incorporate a fusible section as required in Section 507 (e) (1) (C) which will cause the valve to close automatically in case of fire.

NOTE: Service valve as used in this order is limited to vapor valves screwed into vessel outlets not larger than 3/4-inch pipe size and having an inlet internal diameter in the valve body not exceeding the internal diameter of a 1/2-inch Schedule 80 pipe.

(2) Valves larger than 4 inch pipe size need not be installed directly in a tank connection, under the following conditions:

(A) The valve must be installed at the first flange or welded joint immediately outside the container in such a manner that any undue strain beyond the valve will not cause breakage between the tank and the valve.

(B) Automatically or remotely controlled valves, or both, of the fail safe type, shall be used. They must also be capable of manual operation.

(C) Piping between the tank and the valve shall be at least Schedule 120.

(D) Acceptance of the valves by the Division must be requested prior to installation.

(E) Where cables are used for remote operation, the control must be fitted with a fusible section having a melting point of 208° Fahrenheit of 220° Fahrenheit, which will cause the valve to close automatically in case of fire.

(f) In addition to the valves required in Section 507 (e), all liquid and vapor connections other than safety relief valve and gaging connections shall be fitted with a manually operated shutoff valve located:

(1) As close to the tank as practicable in all pipelines on connections not included in Section 507 (f) (2) or (3).

(2) In the loading and/or unloading pipelines between the tank and the pump, compressor, meter, or bulkhead, whichever is nearest the tank and in each branch line where it leaves a loading and/or unloading line. This applies only to pipelines on stationary tanks having the loading and/or unloading lines secured to bulkheads specified in Section 501 (e) and having valves complying with Section 507 (e) (1) (D) or (E) installed in the tank connections of such pipelines.

When a pump is attached directly to a valve complying with Section 507 (e) (1) (D) or (E), the manually operated shutoff valve required by this Order may be located between said pump and the meter or bulkhead, whichever is nearest the tank.

(3) In the loading and/or unloading pipelines between the tank and the device used to secure the pipeline as required in Section 504 (i). This applies only to pipelines on transportation tanks having valves complying with Section 507 (e) (1) (D) or (E) installed in tank connections of such pipelines.

507(g)

(g) Every liquid pipeline or hose that can be isolated by 2 or more stop valves shall have a safety relief valve installed in the pipeline or hose to prevent excessive hydrostatic pressure. The safety relief valve required by this subsection shall start to discharge at not less than 300 psi, nor more than 400 psi, and it must relieve to the atmosphere at a safe point of discharge.

(h) All valves, regulators, gaging, and other tank accessory equipment shall be protected against physical damage.

(i) All tank connections requiring manually operated shutoff valves shall be labeled or tagged to indicate whether they communicate with the liquid or vapor space.

(j) The liquid fill line used to transfer anhydrous ammonia from transportation tanks exceeding 3,500 gallons capacity to storage tanks exceeding 2,000 gallons capacity shall be equipped with a backflow check valve to prevent discharge of anhydrous ammonia from the receiving tank in case of hose rupture. This is not intended to

prevent transferring anhydrous ammonia from containers, other than transportation tanks exceeding 3,500 gallons capacity, into storage tanks through the load-out line.

(k) All tanks shall be equipped with vapor return valves.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Repealer of subsection (e) and new subsection (e) filed 8-30-74; effective thirtieth day thereafter (Register 74, No. 35).
3. Amendment of subsection (a), (c), (d), (e), (g) and new subsection (k) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).
4. Repealer and new subsections (e) and (f) filed 8-6-76; effective thirtieth day thereafter (Register 76, No. 32).

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§508. Gaging Devices.

(a) A permanent dip pipe shall be installed in all tanks designed to be filled by volume, and shall be of such length that it will indicate when the tank is 86 1/2 percent full. The fixed dip pipe required in this order shall be permanently installed in the tank.

Each applicator container shall have a fixed liquid-level gage.

(b) Each tank filled by volume shall be equipped with a liquid level gaging device, such as a rotary gage, a slip tube, an automatic gage, a magnetic gage, or a series of fixed dip pipes, to show the liquid level in the tank at any time. This gaging device shall be in addition to the fixed dip pipe required in Section 508 (a).

A thermometer well shall be provided in all storage tanks over 1,200 gallons capacity not equipped with a fixed dip pipe, and in all transportation tanks.

(c) Liquid level gaging devices that require bleeding of the product to the atmosphere, such as rotary gages, dip pipes, or slip tubes, shall be so designed that the maximum opening of the bleeder valve is not larger than No. 54 drill size.

(d) Liquid level gaging devices shall be designed for a working pressure of not less than 300 psi ANS rating.

(e) Tubular-type gage glasses shall not be used.

(f) Each transportation tank exceeding 1,200 gallon capacity shall have a pressure gage installed with the dial graduated to approximately double the operating pressure but in no case less than 1.2 times the pressure at which the pressure relieving device is set to function.

Each farm vehicle tank over 250 gallons and each storage container shall be provide with a pressure gage graduated from 0 to 400 psi. Gages shall be designated for use in ammonia service.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Amendment of subsections (a), (b) and (f) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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§509. Transfer of Liquids.

(a) No anhydrous ammonia shall be vented to the atmosphere during the transfer operation unless the vent is led to a safe point of discharge.

Anhydrous ammonia shall not be stored in or transferred into a container at a temperature lower than that shown on the nameplate.

Containers shall be charged or used only upon authorization of the owner.

(b) No gas other than anhydrous ammonia vapor shall be used to displace anhydrous ammonia during the transfer operation.

(c) All filling connections and/or permanently installed transfer hoses shall be equipped with a shutoff valve at the discharge end and shall be kept effectively capped when not in use. These caps or plugs may be plastic or metallic, but must be so designed that they will be vented to the atmosphere while at least 3 full threads are engaged.

(d) During the transfer of anhydrous ammonia, at least 1 attendant familiar with the installation shall remain in attendance at the controls necessary to stop the transfer operation. This attendant shall be considered familiar with the installation only after he has been provided with a set of operating instructions for the unloading operation and has been instructed through a minimum of 3 full cycles of operation. During the transfer of anhydrous ammonia into or from a transportation tank, the brakes of the transporting vehicle shall be set and the wheels blocked.

Provisions for unloading tank cars shall conform to the applicable recommendations contained in the DOT regulations. See 560 (e) for Railroad Tank Car Loading and Unloading.

(1) Caution signs shall be so placed on the track or car as to give necessary warning to persons approaching the car from open end or ends of siding and shall be left up until after the car is unloaded and disconnection from discharge connections. Signs shall be of metal or other suitable material, at least 12 by 15 inches 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 and the other words in letters at least 2 inches high. the letters shall be white on a blue background.

(2) The track of a tank car siding shall be substantially level.

(e) No anhydrous ammonia shall be transferred with the point of delivery less than 10 feet from any residential building, street, public highway, or sidewalk unless the failure to transfer would create a hazard.

(f) All pumps and compressors used for the transfer of anhydrous ammonia shall be suitable for this service and shall be equipped with a pressure-actuated bypass valve and/or other acceptable device to prevent pressure in the transfer equipment of more than 400 psi unless the piping system is specifically designed for higher pressures. In no case shall safety relief valves used for this purpose be set to open at pressures of less than 325 psi or more than 400 psi.

(1) Pumps shall be designed for at least 250 psi working pressure. Positive displacement pumps shall have, installed off the discharged port, a constant differential relief valve discharging into the suction port of the pump through a line of sufficient size to carry the full capacity of the pump at relief valve setting, which setting and installation shall be according to the pump manufacturer's recommendations.

On the discharge side of the pump, before the relief valve line, there shall be installed a pressure gage graduated from 0 to 400 psi.

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

(2) Compressors used for transferring or refrigerating ammonia shall be recommended for ammonia service by the manufacturer.

Compressors shall be designed for at least 250 psi working pressure.

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

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

Compressors shall have pressure gages at suction and discharge graduated to at least one and one-half times the maximum pressure that can be developed.

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

Where necessary to prevent contamination, an oil separator shall be provided on the discharge side of the compressor.

(g) The filling densities for containers that are not refrigerate shall not exceed the following:

<i>Type of Container</i>	<i>Percent By Weight</i>	<i>Percent By Volume</i>
Uninsulated	56	82
Uninsulated (see 509(h))		87.5
Insulated	57	83.5

D.O.T. In accordance with D.O.T. Regulations

(h) Uninsulated containers may be charged 87.5 percent by volume provided the temperature of the anhydrous ammonia being charged is determined to be not lower than 30° F. or provided the charging of the container is stopped at the first indication of frost or ice formation on its outside surface and is not resumed until such frost or ice has disappeared.

Any container, including DOT cargo and portable tanks, shipped under DOT jurisdiction shall be filled according to DOT regulation.

(i) Every portable unloading facility shall comply with the following additional requirements:

(1) A set of written instructions shall be posted at the location or supplied to the operating personnel, describing in detail the proper procedures to follow in operating the transfer equipment.

(2) A container of at least 5 gallons of fresh water shall be located at this facility. This container shall have a suitable opening to permit the application of water to flush the eyes. (A suitable deluge-type, fresh-water shower may be installed in lieu of the above if connected to a reliable source of supply.)

(3) The point of delivery from portable transfer facilities shall be in compliance with the requirements for stationary tanks, as listed in Section 501 (c); except that such point of delivery may be less than 50 feet but not less than 25 feet, from a highway or main track of a railroad.

(4) The working area at the portable transfer facility shall be kept clear of debris, and all compressors, pumps, hoses, valves, etc., shall be protected from vehicle impact. Such equipment shall also be suitably locked or otherwise confined when unattended, to prevent the release of ammonia to the atmosphere by unauthorized persons.

(5) The portable unloading facility must be secured at the end of each period of operation; i.e., the point at which it becomes unattended, the end of a workday, etc.

The facility will be considered secured when all ammonia liquid is confined in the pressure vessel and the gas pressure in any hose is less than 25 psi.

(6) All pressure vessels, hoses, piping, fittings, etc., shall be as required elsewhere in these orders for anhydrous ammonia in the liquid state (high pressure).

NOTE: Portable transferring facilities for anhydrous ammonia is defined as any site at which anhydrous ammonia is transferred from one pressure vessel to another in which the compressor and receiving vessel are not permanently installed on concrete in accordance with Safety Section 501.

(j) Compressors, excepting those on farm vehicles, shall be equipped with manually operated shutoff valves on both suction and discharge connections. Pressure gages of bourdon-tube type shall be installed on the suction and discharge of the compressor before the shutoff valves. The compressor shall not be operated if either pressure gage is removed or is inoperative. A spring-loaded safety-relief valve capable of discharging to atmosphere the full flow of gas from the compressor discharge and the discharge shutoff valve.

(k) Valve functions shall be clearly and legibly identified by metal tags or nameplates permanently affixed to each valve.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Amendment filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).
3. Amendment of subsection (d) filed 5-6-77; effective thirtieth day thereafter (Register 77, No. 19).

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§510. Hose Specifications.

(a) Hose and hose connections shall be fabricated of materials that are resistant to the action of anhydrous ammonia. Hose used in ammonia service shall conform to ANI-RMA (or TFI-RMA) Standard No. M-5 for anhydrous ammonia hose. (TFI-RMA stands for The Fertilizer Institute-Rubber Manufacturers Association.)

Metallic hose is a hose which the strength depends primarily upon the strength of its metallic parts, but it may have nonmetallic liners and/or covers. The metal used in this hose shall be stainless steel or other suitable materials acceptable to the Division.

All hose and hose connections subjected to tank pressure shall be designed for a minimum working pressure of 350 psi with a factor of safety of at least 5.

After the hose connections are made up, they shall withstand without leakage a test pressure of twice the working pressure for which the hose is designed.

Hose and hose connections located on the low-pressure side of pressure-reducing valves or devices and discharging to atmospheric pressure shall be designed for a working pressure of at least 125 psi with a factor of safety of at least 5.

(b) All hose 1/2 inch in diameter and larger used for either liquid or vapor service shall be permanently and clearly marked at intervals of not more than 5 feet with the following information:

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Article 7. Compressed and Liquefied Natural Gas System

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§515. Systems Utilizing Portable DOT NH 3 Containers.

(a) Cylinders shall comply with DOT specifications and shall be maintained, filled, packaged, marked, labeled, and shipped to comply with 49 CFR Chapter 1 and Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z48.1-1954 (R1970).

(b) Cylinders shall be stored in an area free from ignitable debris and in such manner as to prevent external corrosion. Storage may be indoors or outdoors.

(c) Cylinders filled in accordance with DOT regulations will become liquid full at 145o F. Cylinders shall be protected from heat sources such as radiant flame and steampipes. Heat shall not be applied directly to cylinders to raise the pressure.

(d) Cylinders shall be stored in such manner as to protect them from moving vehicles or external damage.

(e) Any cylinder which is designed to have a valve protection cap shall have the cap securely in place when the cylinder is not in service.

NOTE

*For Appendix A, refer to end of Subchapter 1.

The provisions of Article 7 apply to the storage, dispensing and use of natural gas as a motor fuel except in vehicles that are licensed to travel on highways, for which the standards of the California Highway Patrol apply.

Authority cited: Section 142.3, Labor Code.

HISTORY

1. New section filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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- (1) The words "Anhydrous Ammonia" or "NH(3)"
- (2) The designed working pressure
- (3) The manufacturer's name or trademark
- (4) The year of manufacture

Hose smaller than 1/2 inch in diameter need only be marked with items (1) and (2) above.

(c) All anhydrous ammonia hoses and hose connections subjected to tank pressure shall be tested at least once each year to twice the tank working pressure but not less than 500 psi. While in transit all hoses and hose connections shall be protected from wear or injury.

All low-pressure hose shall be constructed for ammonia service with a factor of safety of at least 5, but in no case shall hose be used for this service unless designed for a working pressure of at least 125 psi with a factor of safety of at least 5.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Amendment of subsections (a) and (c) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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§511. Safety Relief Valves.

(a) Every vessel used in anhydrous ammonia service shall be fitted with 1 or more safety relief valves in direct communication with the vapor space. These safety relief valves shall be of the spring-loaded type suitable for anhydrous ammonia service. The discharge from safety relief valves shall be full size and be directed away from the vessel, and shall discharge upward and unobstructed to the open air.

All relief-valve discharge openings shall have suitable loose-fitting rain caps that will allow free discharge of the vapor and prevent entrance of water. Provision shall be made for draining condensate which may accumulate in the discharge pipe.

The safety relief valves for anhydrous ammonia service shall be set to start to discharge with relation to the allowable working pressure of the vessel as follows:

<i>Pressure vessels constructed in accordance with:</i>	<i>Minimum</i>	<i>Maximum</i>
Code paragraphs U-68 and U-69	110%	125%
Code paragraphs U-200, through 1974 edition	100%	110%
API-ASME Code	100%	110%
DOT Cylinders	As required by DOT Regulations	

(b) Except for code paragraphs U-68 and U-69 tanks, the discharge capacity of safety relief valves for anhydrous ammonia tanks shall be sufficient to prevent pressure in the tank from exceeding 120 percent of the allowable working pressure of the tank. ASME code paragraphs U-68 and U-69 tanks shall have safety valve capacity sufficient to prevent pressure in the tank from exceeding 135 percent of the allowable working pressure of the tank. All safety relief valves required by this Order shall be ASME rated and stamped. The minimum required rate of discharge of safety relief valves for anhydrous ammonia tanks shall be in accordance with the following table:

<i>Surface area</i> <i>sq. ft</i>	<i>Flow rate</i> <i>CFM air</i>	<i>Surface area</i> <i>sq. ft</i>	<i>Flow rate</i> <i>CFM air</i>	<i>Surface area</i> <i>sq. ft</i>	<i>Flow rate</i> <i>CFM air</i>
20 or less	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 nameplate or when the marking is not legible, the area can be calculated by using one of the following formulas:

(1) Cylindrical container with hemispherical heads.

Area = overall length in feet times outside diameter
in feet times 3.1416

(2) Cylindrical containers with other than hemispherical
heads.

Area = (overall length in feet plus 0.3 outside
diameter in feet) time outside diameter in feet times
3.1416

(3) Spherical container.

Area = outside diameter in feet squared times 3.1416

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

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

The minimum required rate of discharge of safety relief valves for anhydrous ammonia DOT
cylinders shall be in accordance with the regulations of the Bureau of Explosives.

(c) Safety relief valves shall be so designed and installed that the possibility of tampering will
be minimized. If the pressure setting is external, the relief valves shall be provided with
acceptable means for sealing the adjustment.

(d) Shutoff valves shall not be installed between the safety relief valve and tank, except that a
shutoff valve may be used where the arrangement of this valve is such as always to provide
full required capacity flow through sufficient relief valves to properly protect the tank. [This
exception is intended to permit 3-way valves, mechanically interconnected valves, etc., to be
installed between the tank and safety valve where the installation and arrangement will always
permit the required number of valves to be in communication with the tank to provide the
relief capacity required by (b) above.]

The flow capacity of the relief valve shall not be restricted by any connection to it on either
the upstream or downstream side.

(e) Each safety relief valve used on anhydrous ammonia tanks shall be plainly marked with
the following information:

- (1) With the letters "AA".
- (2) The pressure in pounds per square inch gage (psig) at which the valve is set to start to discharge.
- (3) The rate of discharge of the valve at its full open position in cubic feet per minute (cfm) of air.
- (4) The manufacturer's name and catalog number.
- (5) The symbol of the ASME Code.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).
2. Amendment of subsections (a) and (d) filed 3-28-75; effective thirtieth day thereafter (Register 75, No. 13).

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§512. Repairs and Alterations.

- (a) Field welding, where necessary, shall be made only on nonpressure parts that were installed by the manufacturer of the tank.
- (b) No repairs or alterations involving flame, arc, or other method of welding shall be made to any tank until such tank has first been certified as free of anhydrous ammonia by competent personnel.
- (c) No repair or alteration affecting the safety of the tank shall be made until the contemplated repair or alteration has been authorized by a qualified inspector. Nothing in this order shall prohibit the exchange or interchange of valves, fittings, and appurtenances intended for the same purpose.
- (d) No tank that has been subjected to a fire shall be returned to service until it has been inspected by a qualified inspector and found to be safe.
- (e) Any vessel requiring repair or alteration or that has been subjected to a fire shall be prepared for hydrostatic test by the owner when such test is deemed necessary by the qualified inspector.
- (f) All repairs affecting the safety of the tank shall be reported to the Division within 21 days by the qualified inspector authorizing such repairs. The qualified inspector shall stamp his certificate of competency number adjacent to all welded repairs authorized

by him, except that in the case of repairs to quenched and tempered steels, this number need not be stamped. This exception shall be noted on the inspector's report.

(g) Any welding necessary when making repairs or alterations to tanks shall be done by welders and welding procedures qualified in accordance with Section IX of the ASME Code in the position or positions used in making the repair.

HISTORY:

1. Amendment filed 12-8-72 as procedural and organizational; effective upon filing (Register 72, No. 50).

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