



**MISSOURI DEPARTMENT OF  
AGRICULTURE**  
*WEIGHTS, MEASURES, & Consumer Protection*

**Shop Fabricated AST Inspection Regulations**

# Installation of aboveground storage tanks

4.1 Apparatus dispensing Class I liquids into the fuel tanks of motor vehicles of the public shall not be located at a bulk plant unless separated by a fence or similar barrier from the area in which bulk operations are conducted. Aboveground tanks located at a bulk plant shall not be connected by piping to service station tanks. (NFPA 30A 1996, 2-1.3)

4.2 Tanks shall rest on the ground or on foundations made of concrete, masonry or steel. Tank foundations shall be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation.  
(NFPA 30 1996, 2-6.1)

**Note: All tanks installed on the ground must be installed in a manner to minimize corrosion. It is wise to install each tank on a surface, such as “pea gravel”, that will promote drainage and allow the tank to**





**DIKE AND TANK STABILITY**

**22 11:13 AM**

4.3 Steel supports for tanks storing Class I, Class II, or Class IIIA liquids shall be protected by materials having a fire resistance rating of not less than 2 hour, except that steel saddles need not be protected if less than 12 in. (0.3 m) high at their lowest point.

**Note:** Unprotected steel supports are prohibited. Experience has shown that they soften and fail after only a brief exposure to fire resulting in damage to piping and a possible spill of tank contents.



SOUTH RULER  
100% COTTON  
MADE IN THE USA



4.4 At service stations where tanks are at an elevation, which produces a gravity head on the dispensing device, the tank outlet shall be equipped with a device, such as a solenoid valve, positioned adjacent to and downstream from the valve specified in the following section (4.5), so installed and adjusted that liquid cannot flow by gravity from the tank in case of piping or hose failure when the dispenser is not in use. (NFPA 30A 1996, 2-1.7)

**Note: Underground storage tanks installed above grade of dispensers/pumps produce a gravity head on dispensing devices and require such a device.**

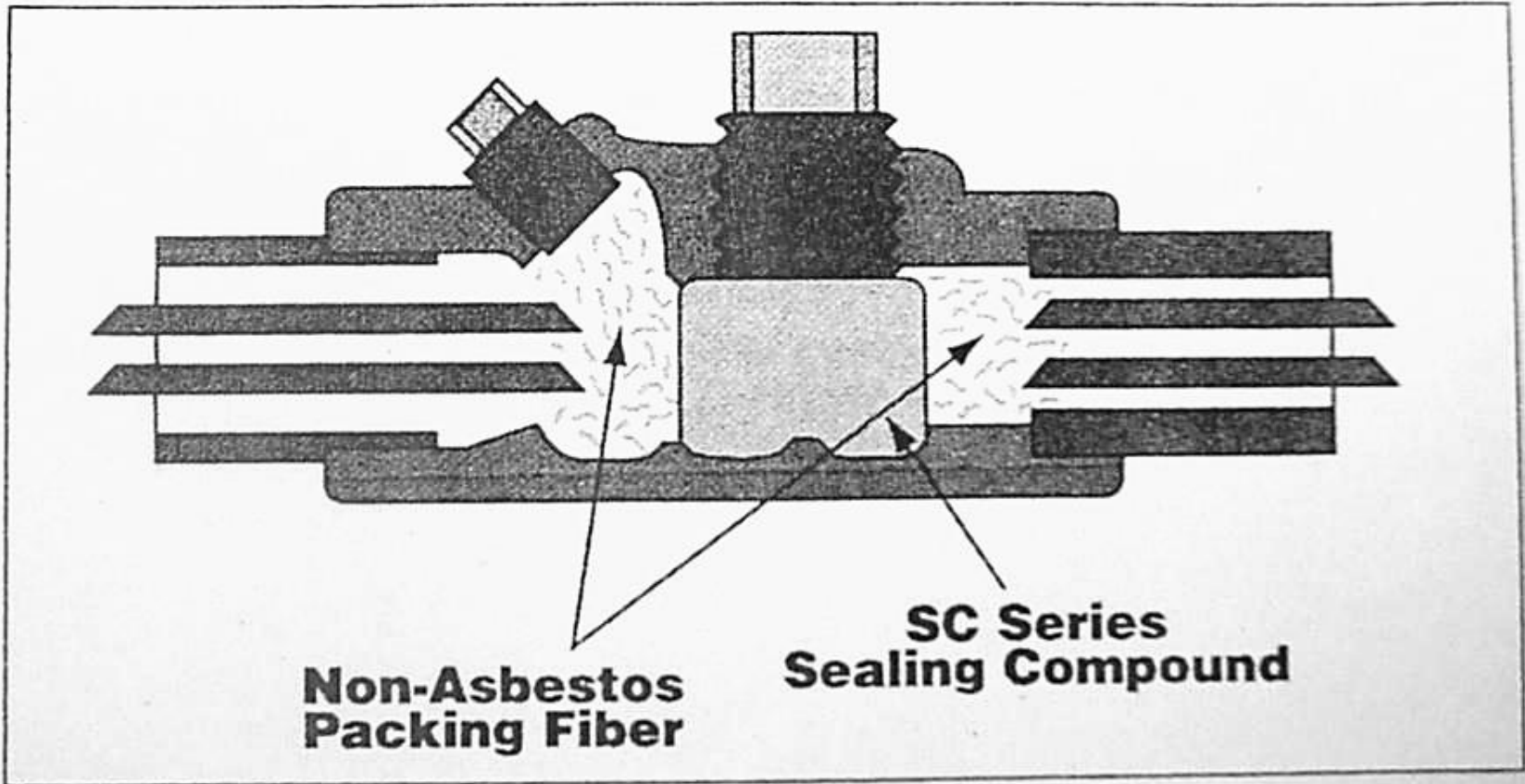








# #1 violation



4.5 Each connection to an aboveground tank through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank. (NFPA 30 1996, 2-3.8.1)

**Note:** It is recommended that in systems utilizing submersible pumps that are installed in “day tanks”, that an internal fire valve be installed in the tank outlet to shut off the flow of liquid in the event of a fire involving both the storage and day tanks.



4.6 Only aboveground storage tanks shall be utilized for aboveground use. Tanks designed and built for underground use shall not be used for aboveground use.

(NFPA 30A 1996, 2-4.1.1)

**Grandfather is getting old!**

# CONVERTAZONTALS





Ozark tank farm featuring the UL 142/58  
convertizional side draft. Very rare

24 10:36 AM

UNL 142/58



4.7 Tanks storing Class I and Class II liquids at an individual site shall be limited to a maximum individual capacity of 12,000 gallons and an aggregate capacity of 40,000 gallons unless amended by the Director of Agriculture if justification for the need for additional is provided in writing and the level of safety to public and property will not be diminished. (NFPA 30A 1996, 2-4.2.1 & 2 CSR 90-30.050 (13))

## 4.8 Aboveground tanks shall be located:

- (a) 50 feet from the nearest important building on the same property;
- (b) 50 feet from any fuel dispenser;
- (c) 50 feet from the nearest side of a public way; and
- (d) 100 feet from any property line that is or might be built upon, including the opposite side of a public way. (NFPA 30A 1996, 2-4.2.2)

**\*Exception: all distances shall be permitted to be reduced by 50 percent if the tanks are fire-resistant tanks, which is a listed tank that provides fire-resistive protection from exposures to a high intensity liquid pool. (i.e. UL 2085) &(SWRI Flameshield)**

## 4.9 Fire-resistant tanks shall be listed for the use intended and shall comply with the following:

(a) The construction that provides the required fire-resistive protection shall prevent the release of liquid, failure of the primary tank, failure of the supporting structure, and impairment of venting for a period of not less than two hours when tested using fire exposure that simulates a high intensity pool fire, such as described in UL 2085, Standard for Insulated Aboveground Tanks for Flammable and Combustible Liquids, or the equivalent test procedure.

(b) There shall be no openings except those necessary for access to, inspection of, filling, emptying, and venting of the tank. All openings shall be located in the top of the tank.



Serial No. FS 010548  
FLAMESHIELD™

SwRI I.D. 00077-01/100-01

Listed by:  
**Southwest Research Institute**  
**San Antonio, Texas**

SwRI is recognized as a testing  
laboratory and quality  
assurance/inspection agency by the  
National Evaluation Service, Inc.  
and ICBO ES.

- Follow Installation Instructions.
- Tank is intended for stationary installation.
- This tank is built in accordance with UL 142 (1994) and complies with the requirements of Section 2-4.5(a) of NFPA 30A, 1996 edition as a Fire Resistant Tank.

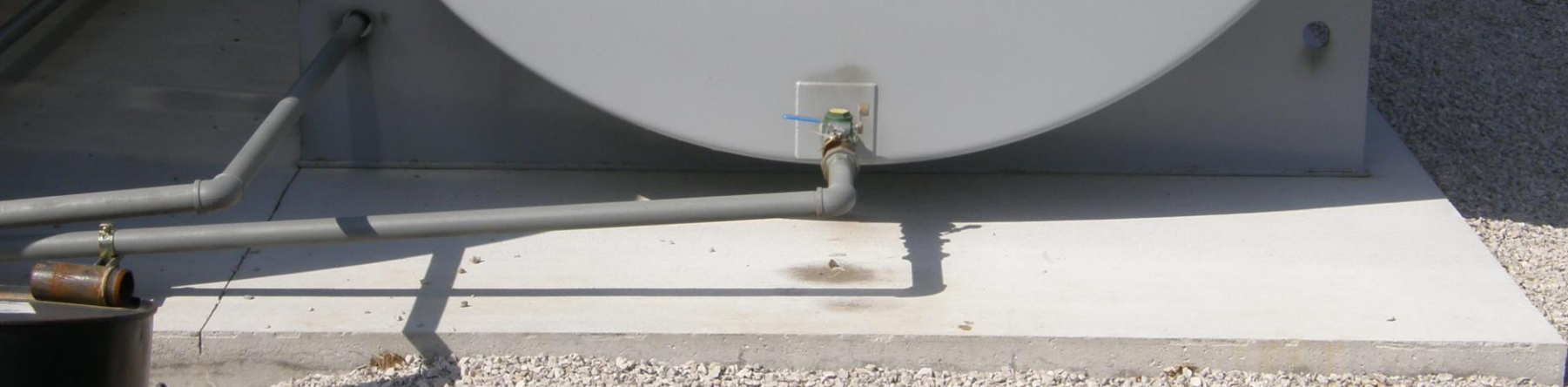


**FLAMESHIELD**

Tested to NFPA 30A-2000  
Fire-Resistant Tank  
Requirements



All nozzle penetrations must be on the top of the tank for secondary containment compliance



(c) Each fire-resistant tank shall be suitably anchored to withstand uplifting by groundwater or flooding, including when the tank is empty.

(d) Each fire-resistant tank shall be resistant to damage from impact of a motor vehicle or shall be protected by suitable collision barriers.

(e) Vent pipes that are provided for normal tank venting shall terminate at least 12 feet above ground level.

(f) Section 2-3.6.7 contained in the 1996 edition of NFPA 30 shall not be used to reduce the size of the emergency vent. (NFPA 30A 1996, 2-4.5) Fixed suppression ect.

4.10 Spill control facilities shall be provided so that any accidental discharge of any Class I, II or IIIA liquids will be prevented from endangering important facilities, adjoining property or waterways. (NFPA 30 1996, 2-3.4.1)

**Note: Spill control is required by both the State of Missouri (NFPA 30, 1987 Section 2-3.4.1) and the United States Environmental Protection Agency (USEPA) 40 CFR 112.**

Many state requirements may duplicate those mandated by the USEPA. To insure compliance with both USEPA and Missouri requirements, information should be obtained from USEPA prior to the design and construction of any spill control facility.

**Differences: Mo / USEPA**

USEPA requires that any spill plan be certified by a professional engineer. It is recommended that a professional engineer be consulted regarding the location and design of any spill control facility.

Note: All spill control facilities must be **“substantially liquid tight”**. Any facility that is found not to have contained a product release, is in violation of state regulations and subject to legal action.

Missouri / STI definition: **“substantially liquid tight”**



**Open cell block, gravel or rock containment facilities are not considered to be liquid tight and cannot be used (2 CSR 90-30.050 (29))**



26 4:33 PM

## 4.12 Remote Impounding –

where protection of adjoining property or waterways is by means of drainage to a remote impounding area. Such systems shall comply with the following:

- (a) A slope of not less than 1 percent away from the tank shall be provided for at least fifty feet toward the impounding area.
- (b) The impounding area shall have a capacity not less than that of the largest tank that can drain into it.
- (c) The route of the drainage system shall be so located that, if the liquids in the drainage system are ignited, the fire will not seriously expose tank or adjoining property.
- (d) The confines of the impounding area shall be located so that, when filled to capacity, the liquid will not be any closer than 50 feet from any property line that is or can be built upon or from any tank. (NFPA 30 1996, 2-3.4.2)

## 4.13 Impounding by diking

When protection of adjoining property or waterways is by means of impounding by diking around the tanks, such system shall comply with the following:

(a) A slope of not less than 1 percent away from the tank shall be provided for at least 50 feet or to the dike base, whichever is less. (NFPA 30 1996, 2-3.4.3)

(b) The capacity of the diked area shall not be less than the greatest amount of liquid that can be released from the largest tank within the diked area, including the volume displacement of other tanks within the diked area.

(c) To permit access, the outside base of the dike at ground level shall be no closer than 10 feet to any property line that is or can be built upon.

(NFPA 30 1996, 2-3.4.3)

(d) Walls of the diked area shall be of earth, steel, concrete, or solid masonry designed to be liquid tight and to withstand a full hydrostatic head.

Diked areas for tanks containing Class I liquids located in extremely porous soils might require special treatment to prevent seepage of hazardous quantities of liquids to low-lying areas or waterways in case of spills. (NFPA 30 1996, 2-3.4.3)

**Note: The porous soil conditions in many areas of Missouri make earthen dikes unacceptable unless liner systems are used to insure liquid tightness of the containment system. Because of fire exposure, liners must be protected adequately when installed.**

**Earthen containments in Missouri must be approved by an engineer to meet the definition of “substantially liquid tight”**

(e) Where provision is made for draining water from diked areas, such drains shall be controlled in a manner so as to prevent flammable or combustible liquids from entering natural water courses, public sewers, or public drains, if their presence would constitute a hazard. Control of drainage shall be accessible under fire conditions from outside of dike (NFPA 30 1996, 2-3.4.3)

**Note: Drain piping and drain valves must be of metal construction.**



Non-metallic drain not accessible  
From outside dike wall

(f) Storage of combustible materials, empty or full drums, or barrels, shall not be permitted within the diked area. (NFPA 30 1996, 2-3.4.3)

4.14 Where a tank is located in an area subject to flooding, provisions shall be taken to prevent tanks, either full or empty, from floating during a rise in water level up to the established maximum flood stage. ((NFPA 30 1996, 2-6.6)





# PIPING, VALVE & FITTING REQUIREMENTS FOR BULK PLANTS AND SERVICE STATIONS

5.1 The design, fabrication, assembly, test and inspection of piping systems containing liquids shall be suitable for the expected working pressure and structural stresses.

(NFPA 30 1996, 3-2.1)

5.2 Piping systems shall be maintained liquid tight. A piping system that has leaks that constitutes a hazard shall be emptied of liquid or repaired in a manner acceptable to the authority having jurisdiction. (NFPA 30 1996, 3-2.2) MDA requirements.

5.3 Valves at storage tanks shall be permitted to be other than steel or nodular iron.

Where installed externally to the tank, the material shall have a ductility and melting point comparable to steel or nodular iron so as to withstand reasonable stresses and temperatures involved in fire exposure or otherwise be protected, such as by materials having a fire resistance rating of not less than 2 hours **or otherwise approved by the AHJ.**

(NFPA 30 1996)

# Piping

5.10 Each connection to piping by which equipment such as tank cars, tank vehicles or marine vessels discharge liquids into storage tanks shall be provided with a check valve for automatic protection against back-flow if the piping arrangement is such that back-flow from the system is possible. (NFPA 30 1996, 3-8)

5.11 All piping, before being covered, enclosed or placed in use, shall be tested.

(NFPA 30 1996, 3-9)

**Swing check valves should be installed far enough away from  
The fill point to prevent opening the valve with a stick.**



# Piping

5.12 Each loading and unloading riser for liquid storage shall be identified by color code or marking to identify the product for which the tank is used. (NFPA 30 1996, 3-10)

# Location of Fill Lines

Tank vehicle and tank car loading and unloading facilities shall be separated from aboveground tanks, warehouses, other plant buildings, or the nearest line of adjoining property that can be built upon by a distance of at least 25 ft. for class I liquids, and at least 15 ft. for class II and class III liquids measured from the nearest fill spout or transfer connection.

It is our policy to apply the 25 ft. rule to any tank in a containment where class one liquids are stored.



Vent lines must be removed and capped.



# Normal venting

All aboveground storage tanks shall be equipped with adequate normal venting to prevent the development of vacuum or pressure sufficient to distort or damage the tank structure.

The vent must be as large as the fill or withdrawal connection, whichever is larger but in no case smaller than 1 1/4 inches inside diameter. (NFPA 30 1996, 2-3.5)

**Note: Storage tanks containing different classes of petroleum products must never be connected to a common fill, withdrawal or venting system. Serious and hazardous fuel contamination can result from this practice**

3.6 If any tank or pressure vessel has more than one fill or withdrawal connection and simultaneous filling or withdrawal can be made, the vent size shall be based on the maximum anticipated simultaneous flow. (NFPA 30 1996, 2-3.5.4)

3.7 Tanks storing Class IA products shall be equipped with venting devices that will be normally closed, except when venting to pressure or vacuum conditions.  
(NFPA 30 1996, 2-3.5.6)

Tanks storing Class IA products shall be equipped with venting devices that will be normally closed, except when venting to pressure or vacuum conditions.

(NFPA 30 1996, 2-3.5.6)

**Note: Care should be exercised when selecting a pressure/vacuum vent to meet this requirement. Some vents are more prone to “freeze ups” during the winter. This condition can cause the tank to **implode** when product is dispensed from the tank. Care should also be exercised when using “right angle” type or “directional vents”. If the vent is installed pointing toward an ignition source, such as a transformer, air conditioner compressor, transport unloading area, etc., ignition of the vapors can occur. This is especially true in the event of a tank overflow**









8 9:43 AM





Some of the new CARB  
approved vents are reduced  
from the nominal pipe size



Vent is reduced down from it's nominal size.



# Vent manifolds



**EMERGENCY VENTING**

**21 12:39 PM**



21 12:38 PM







EMARDO  
LEVER TYPE  
STACK VALVE  
17016







A photograph of a white cylindrical tank, possibly a water tower or storage tank, with a dark, jagged opening at the top. The opening appears to be a hole in the roof or shell. The background shows bare trees and a clear sky. The text "Weak Roof-to-Shell" is overlaid in blue, bold font at the bottom of the image.

**Weak Roof-to-Shell**







# Overfill Alarms

- Must be accessible to delivery personnel 24 hours a day.
- Must have a functional test button to check the alarm.
- Must be properly calibrated to 90% or below.

# Overfill Alarms





These two don't mix



Tape/float style gauges / overfill alarms must be maintained when storing class one liquids to prevent vapor loss.



Cables tend to swirl around with the vortex created when the tank is being filled.



Emergency vent opens at 8 oz.

16 oz



Overfill alarm requires 10 oz plus to be audible





meccalim

GREENLEAF GAUGE™

SOLAR GAUGE™

MODEL EPG-2008 SERIAL # AA993371

0805

GALLONS

PEI

Gauge has been sealed by the manufacturer. There are no user serviceable parts inside. Any attempt to open voids warranty.

HIGH LEVEL ALARM  
LOW LEVEL ALARM

1-888-88-GAUGE  
(1-888-88-2442)

Carlton E

PVC

Carlton E

EADED PL  
POWERSCRUB™ DETERGENT A



**Small diameter piping must  
Be adequately supported**



# Tank Repairs

- All shop or field repairs to aboveground storage tanks shall comply with STI SP032.
- 2 CSR 90-30.085 (2)
  - Any person who manufactures an aboveground or underground fuel storage tank for use in Missouri, or piping for such tank; or any person who installs or repairs all or part of a fuel storage tank system in Missouri shall annually apply for a registration from the Department of Agriculture's Weights and Measures on an application for Annual Registration.









Pole barn screws











SOLVENT



**As usual, a few humorous  
tank pictures from the  
Ozarks**

UNLEAD

**NO  
SMOKEING**



PERM

Thank you

