



City of Sioux Falls, Fire Prevention Aboveground Storage Tank (AST) For Flammable and Combustible Liquids

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NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

SECTION 1—APPROVAL PROCESS

- **Flammable and combustible liquids.** A construction permit is required:
 1. To install, repair, or modify a pipeline for the transportation of flammable or combustible liquids.
 2. To install, construct, or alter tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries, and similar facilities where flammable and combustible liquids are produced, processed, transported, stored, dispensed, or used. **Change of Stored Liquid.** Storage tanks that undergo any change of stored liquid shall be reevaluated for compliance with NFPA 30, as applicable.
 3. To install, alter, remove, abandon, place temporarily out of service, or otherwise dispose of a flammable or combustible liquid tank.

- Code Interpretation, Flammable and Combustible Liquid Tank Storage. **Permits are required for:**
 1. Aboveground stationary tanks.
 2.
 - a. Aboveground portable tanks with a capacity exceeding 660 gallons.
 - b. Multiple tanks may be at a site provided they meet distance separation requirements as specified in the *International Fire Code*.
 3. *Revised Ordinances of the City of Sioux Falls*, Section 92.012:
REQUIREMENTS FOR NEW INSTALLATIONS AND REPLACEMENT OF UNDERGROUND AND ABOVEGROUND STORAGE TANK SYSTEMS.
Any person, owning or possessing storage tanks containing materials classified as being capable of contaminating any public water supply or capable of endangering human health or the environment within the city **and within one mile of the boundaries of the city** shall provide protection against leakage or rupture of those tanks or connections thereto. These materials shall include, but not be limited to, **hazardous materials as set forth in 49 C.F.R. part 172.101**, as amended, the *National Registry of Hazardous Materials, United Nations Classification System* (cf Guidebook for Hazardous Materials, Department of Transportation, p. 5800.4) and hazardous wastes as set forth in 40 C.F.R. part 261, a copy of which is available at the public library.
 4. Code Interpretation, Tank Recertification, and Reinstallation.
 - a. With the approval of the Sioux Falls Fire Rescue—Fire Prevention Division, aboveground tanks may be recertified and placed back into service by meeting the same design standards as a new tank.
 - b. A current engineer statement or tank stamp is acceptable.

- **Approval of Aboveground Storage Tanks (AST) includes the following:** a plan review, site inspection to evaluate for fire and life-safety hazards, and an operational permit shall be issued prior to the event. Final approval is granted only after a site inspection by a Fire Inspector or Fire Marshal. The following documentation must be submitted along with the completed application to Fire Prevention for review and approval at least ten (10) business days prior to the event: (Note: Fee is one and a half times if application submittal is less than the required number of business days. Working without a permit is a double fee and possible a citation.)

Submit permit application via the Customer Self Service (CSS) portal at <https://siouxfalls.org/css>. Contact our administrative staff at 605-367-8093 for assistance with registration or questions.

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Plan submittals shall provide the following in a legible format:

1. Dimensioned site plan showing tank location. To include distance from buildings, property lines, the public way, and any other tanks or hazardous material storage. List on each page of the site plan the business name, property address, and general contractors' phone number. You can use this website to find property lines.
<https://cityofsfgis.maps.arcgis.com/apps/webappviewer/index.html?id=f6cf6b9dd71246f5aaa0b5e9fc94e82b>
2. Size, manufacturer, and testing performed of tanks.
3. Size, manufacturer, and testing performed of tanks to include a copy of pressure testing pipe layout shall include pipe vents (pressure of emergency vents), supply line type and fill ports.
4. Cathodic protection type (where applicable).
5. A cross section drawing of the tank indicating fill depth around the tank and depth of cover. (Example: piping buried below ground.)
6. Vent/emergency vent locations.
7. Overfill and spill protection devices.
8. Leak detection systems.
9. Dispensing system components.
10. Inventory control devices.
11. Emergency shut-off locations.
12. Additional protection systems. Physical barriers and secondary containment.
13. Bulk plants shall also indicate fencing.
14. Private fueling stations shall include keycard systems components.
15. Inside storage shall include ventilation, containment, and explosion venting systems if required by other building or fire code provisions.
16. Submit all equipment information on one attachment to include—spec. sheets are required for all components installed on each tank. Examples, emergency vents, containment sumps, underground piping, sensors, leak indication device, audio/visual alarm, dispensers, etc. These spec sheets should be uploaded as one document—not individual documents.

- Submittal package must identify and include all the above requirements to be accepted for review.
- Installation or construction on-site shall be prohibited until a permit has been issued.* Any work performed prior to the issuance of this permit may result in a citation and a stop work order issued per the adopted *International Fire Code* in use.
- The Fire Department will conduct a final inspection of the tank upon completion of installation and prior to filling the tank. Please schedule this inspection at least two working days in advance. Any approval issued by the Fire Marshal's Office does not release the contractor or property owner from the responsibility of full compliance with all applicable codes and ordinances.
- All Fire Department permits shall be kept on the job site until final inspection.
- All installations shall comply with the approved plans. Any deviation from the approved plans requires a resubmittal to the Fire Marshal's Office.
- All AST requirements for the purposes of this guideline and any other guidelines or requirements of Sioux Falls Fire Rescue shall conform to the **adopted International Fire Code (IFC)**, as adopted and amended by the City of Sioux Falls, along with NFPA 30, 30A, 31, 37, and 70.

This guide does not replace, nor supersede any codes and/or ordinances adopted by the City of Sioux Falls, or determinations and positions of the Fire Chief or Fire Marshal.

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SECTION 2—DEFINITIONS

Combustible and Flammable liquid information can be found on the product safety data sheet.

ABOVEGROUND STORAGE TANK. A horizontal or vertical tank that is listed and intended for fixed installation, without backfill, above or below grade and is used within the scope of its approval or listing.

BASEMENT. For the purposes of this code, a story of a building or structure having one-half or more of its height below ground level and to which access for firefighting purposes is restricted.

COMBUSTIBLE LIQUID. A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:

Class II. Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).

Class IIIA. Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. Liquids having closed cup *flash points* at or above 200°F (93°C).

FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA. Liquids having a flash point below 73°F (23°C) and having a *boiling point* below 100°F (38°C).

Class IB. Liquids having a *flash point* below 73°F (23°C) and having a *boiling point* at or above 100°F (38°C).

Class IC. Liquids having a *flash point* at or above 73°F (23°C) and below 100°F (38°C).

CONTROL AREA. Spaces within a building where quantities of hazardous materials not exceeding the maximum allowable quantities per control area are stored, dispensed, used, or handled. See also the definition of “Outdoor control area.”

CONTAINER. A vessel of 60 gallons or less in capacity used for transporting or storing hazardous materials. Pipes, piping systems, engines, and engine fuel tanks are not considered to be containers.

FLASH POINT. The minimum temperature in degrees Fahrenheit at which a liquid will give off sufficient vapors to form an ignitable mixture with air near the surface or in the container, but will not sustain combustion. The flash point of a liquid shall be determined by appropriate testing procedures (if the flash point is in question, review the Material Safety Data Sheets or MSDS for the product).

HYDROSTATIC TEST. Is performed by using water as the **test** medium.

MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA. The maximum amount of a hazardous material allowed to be stored or used within a *control area* inside a building or an outdoor control area. The maximum allowable quantity per control area is based on the material state (solid, liquid or gas) and the material storage or use conditions.

PNEUMATIC TEST uses air, (inert gas- nitrogen, helium) or any nonflammable and nontoxic gas.

TANK- ATMOSPHERIC. A storage tank designed to operate at pressures from atmospheric through 1.0 pound per square inch gauge (760 mm Hg through 812 mm Hg) measured at the top of the tank.

TANK—LOW-PRESSURE. For the purposes of this code, a storage tank designed to withstand an internal pressure above a gauge pressure of 1.0 psi (6.9 kPa) but not more than a gauge pressure of 15 psi (103 kPa) measured at the top of the tank.

TANK—PORTABLE. A packaging of more than 60-gallon capacity and designed primarily to be loaded into or on or temporarily attached to a transport vehicle and equipped with skids, mountings or accessories to facilitate handling of the tank by mechanical means. It does not include any cylinder having less than a 1,000-pound water capacity, cargo tank, tank car tank or trailers carrying cylinders of more than 1,000-pound water capacity.

TANK—PRIMARY. A *listed* atmospheric tank used to store liquid. See “Primary containment.”

TANK—SECONDARY CONTAINMENT. A tank that has an inner and outer wall with an interstitial space (annulus) between the walls and that has a means for monitoring the interstitial space for a leak.

TANK—STORAGE. Any vessel having a liquid capacity that exceeds 60 gal. is intended for fixed installation.

TANK—STATIONARY. Packaging designed primarily for stationary installations not intended for loading, unloading or attachment to a transport vehicle as part of its normal operation in the process of use. It does not include cylinders having less than a 1,000-pound (454 kg) water capacity.

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INDOOR OR OUTDOOR CONTROL AREA. An indoor or outdoor area that contains hazardous materials in amounts not exceeding the maximum allowable quantities per Chapter 50 of the *International Fire Code*.

API: American Petroleum Institute

UL: Underwriters Laboratories

ANSI: American National Standards Institute

SECTION 3—TANK CONSTRUCTION

Aboveground storage tanks must be constructed in accordance with Underwriter's Laboratories, Inc. (U/L) in accordance with the *International Fire Code* and NFPA 30. All new and existing tanks must meet one of these standards in order to remain in service. If it does not, it must be replaced with a tank that does meet this requirement. **Tanks must display the UL listing placard or certification marking.**

Exception:

The Fire Marshal does allow bulk storage tanks to be reused (relocated from a different site) with the understanding that upon relocation, the tanks will be tested by a qualified third-party engineer to determine the tanks are structurally sound and in good working order. As specified above, all new tanks that are installed in the City of Sioux Falls, must comply with the UL requirements. Examples of U/L listed tanks approved for aboveground storage include, but are not limited to the following:

U/L Standard 142 Tank (Double-Walled Steel Tank-Nonprotected or single wall the secondary containment). A metal plate should be posted on the tank indicating it meets U/L standard 142. There will also be a row of openings on the top for emergency venting, normal venting, filling, and product removal.

U/L Standard 2080 Tanks (Fire Resistant Tanks for Flammable and Combustible Liquids).

Aboveground tanks and dispensing operations meeting the criteria of NFPA 30A and the UL 2080 is an atmospheric aboveground storage tank with thermal insulation that has been evaluated for resistance to physical damage and for limiting the heat transferred to the primary tank when exposed to a hydrocarbon fuel fire. Used for the storage of liquids that have a specific gravity not greater than 1.0 and that are compatible with the material and construction of the tank.

U/L Standard 2085 (Two-Hour Protected Aboveground Tank)

A U/L Standard 2085 (protected) tank is constructed and tested in accordance with U/L 2085 and consists of a primary tank provided with protection from physical damage and fire resistive protection from a high-intensity liquid pool fire exposure. The tank may provide protection elements as a unit or may be an assembly of components, or a combination thereof. A metal plate should indicate that the tank meets the requirements of Underwriter's Laboratories Standard 2085. This is also a double-walled tank. Similar to the STI F-921 tank, the double-wall exempts it from meeting the secondary containment requirements. For more information on testing requirements, refer to Southwest Research Institute (SwRI) Procedure 93-01 as referenced in NFPA 30A Section A.3.3.15.4. **Tank opens shall be through the top only.**

UL Standard 80, Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids or UL 142 is allowed.

UL 2152 Nonmetallic cooking oil storage tanks shall not exceed 200 gal. Metallic cooking oil storage tanks is a UL 142.

UL 2245 Standard for Below-Grade Vaults for Flammable Liquid Storage Tanks.

UL 142A, Special Purpose Aboveground Tanks for Specific Flammable or Combustible Liquids.

U/L 2258 Tanks are allowed for Class IIIB liquids and must meet the following:

Tanks constructed of combustible materials shall be limited to any of the following:

1. Shall not be located in areas subject to exposure from spilled or leaked Class I or Class II liquids.
2. Storage of Class IIIB liquids FP \geq 200°F, inside a building shall be protected by an approved automatic fire sprinkler system.
3. Exposed combustible components of nonmetallic tanks shall be spaced at least 3 ft away from any surface heated to a temperature above 140°F and at least 6 ft away from any open flame.
 - For additional requirements on U/L 2258 AST please contact fire prevention tank inspector.

Existing noncompliant installations. Existing above-ground tanks shall be maintained in accordance with the code requirements that were applicable at the time of installation. Aboveground tanks that were installed in violation of code requirements applicable at the time of installation shall be made code compliant or shall be

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removed in accordance with International Fire Code, Chapter on Flammable and Combustible Liquid, regardless of whether such tank has been previously inspected.

- Maintenance.** Equipment, machinery and required detection and alarm systems associated with hazardous materials shall be maintained in an operable condition. Defective tanks shall be removed from service, repaired or disposed of in an *approved* manner. Defective equipment or machinery shall be removed from service and repaired or replaced. Required detection and alarm systems shall be replaced or repaired where defective.
- Tanks that are altered from their original U/L listing are not allowed in the city limits and one mile past city limits. Example: An anhydrous ammonia tank converted into a diesel tank.

SECTION 4—INSTALLATION GUIDELINES

1. Hydro Testing of Underground Piping from Tank to Dispenser

- Pressure testing** of piping will be performed in the presence of the Fire Inspector.
 - Underground piping** shall be installed on at least 6 inches of well-compacted bedding material. A shallower depth may be used if approved by the manufacturer.
 - In areas subject to vehicle traffic**, the pipe trench shall be deep enough to permit a cover of at least 18" of well-compacted backfill material and pavement.
 - Paved** with asphalt a minimum 2 inches of asphalt, backfill between the pipe and the asphalt shall be a minimum of 8" minimum.
 - Paved** with concrete a minimum 4 inches of reinforced concrete, backfill between the pipe and the concrete shall be permitted to be reduced to 4 inches minimum.
 - In areas not subject to vehicle traffic**, the pipe trench shall be deep enough to permit a cover of at least 6 inches of well-compacted backfill material.
 - A greater burial depth** shall be provided when required by the manufacturer's instructions or where frost conditions are present.
 - Piping within the same trench** shall be separated horizontally by at least two pipe diameters. Separation need not exceed 9".
 - Petroleum Equipment Institute (PEI)** testing of single and double walled piping where the primary pipe can be soaped at 50 psi or at the manufacturers recommend test pressure for a period of 1 hour. Piping shall be isolated from the tank and dispensers before air testing. **Do not test lines with air** that have contained hazardous, flammable or combustible liquids or vapor unless the lines are purged and made safe beforehand. If purging is not feasible, an inert gas such as nitrogen or helium maybe used to pressurize the piping.
- Testing secondary containment piping.** Air test new secondary piping for a period of 1 hour:
- For fiberglass secondary containment piping** that operates at atmospheric pressure and uses clamshell termination fittings, test at 10 psig. If flexible termination fittings are used, test at 5 psig. Expect that a slight expansion of piping may occur while the piping is under pressure. Pressure maybe maintained in the secondary piping as it can provide early warning of piping damage.
- Post-Construction Testing.** Immediately before underground product piping is placed into service, conduct a hydrostatic test at 150 percent of the operating pressure, but not less than 50 psig.
- Piping Backfill.** Use clean sand or pea gravel (3/4 inch maximum size or crushed rock 1/2 inch maximum size) for piping backfill material. Before backfilling remove any foreign material from the piping trench.
 - Monitoring During Construction.** After the initial test, 5 psig of air pressure may be maintained in the secondary piping. Monitoring the air pressure during subsequent construction can provide early warning of piping damage. If damage is suspected, retesting the piping is required.
 - All metallic underground piping** shall be schedule 40 factory-wrapped/coated black steel pipe properly designed, installed and maintained, and protected from corrosion by either a cathodic protection system or by being constructed of corrosion-resistant material. Avoid installing unions underground.
 - Protection from corrosion and galvanic action.** Where subject to external corrosion, piping, related fluid-handling components and supports for both underground and aboveground applications shall be fabricated from noncorrosive materials, and coated or provided with corrosion protection. Dissimilar metallic parts that promote galvanic action shall not be joined. Cathodic protection systems shall meet the requirements of applicable South Dakota Administrative Rules.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

Note: For transfer lines of Fresh Cooking Oil see NFPA 30 Specific Operations Design and Construction for testing requirements.

2. Dispensing Devices and Locations

2303.1 Location of dispensing devices. Dispensing devices shall be located as follows:

1. Ten feet from *lot lines*.
2. Ten feet from buildings *not part of a 1-hour fire-resistance rated assemble or having combustible overhangs*.
Exception: Canopies constructed in accordance with the *International Building Code* providing weather protection for the fuel islands.
3. All portions of the vehicle being fueled will be on the premises of the motor fuel-dispensing facility.
4. The nozzle, where the hose is fully extended, will not reach within 5 feet (1524 mm) of building openings.
5. Twenty feet (6096 mm) or more from fixed sources of ignition.

5705.3.8.2 Location on property. Dispensing activities that exceed the quantities set forth in Table 5705.3.8.2 (see table below) shall not be conducted within 15 feet of buildings or combustible materials or within 25 feet (7620 mm) of building openings, *lot lines*, public streets, public alleys, or *public ways*. Dispensing activities that exceed the quantities set forth in Table 5705.3.8.2 shall not be conducted within 15 feet of storage of Class I, II or III liquids unless such liquids are stored in tanks that are *listed* and *labeled* as 2-hour protected tank assemblies in accordance with UL 2085. **Exceptions:** 1. The requirements shall not apply to areas where only the following are dispensed: Class III liquids; liquids that are heavier than water; water-miscible liquids; and liquids with viscosities greater than 10,000 centipoise.

MAXIMUM ALLOWABLE QUANTITIES FOR DISPENSING FLAMMABLE AND COMBUSTIBLE LIQUIDS IN OUTDOOR CONTROL AREAS a, b

CLASS OF LIQUID	QUANTITY (gallons)
Flammable	
Class IA	10
Class IB	15
Class IC	20
Combination Class IA, IB and IC	30 ^c
Combustible	
Class II	30
Class IIIA	80
Class IIIB	3,300

a. For definition of "Outdoor Control Area," see Section 202.

b. The fire code official is authorized to impose special conditions regarding locations, types of containers, dispensing units, fire control measures and other factors involving fire safety.

c. Containing not more than the maximum allowable quantity per control area of each individual class.

Emergency disconnect switches. An *approved* emergency disconnect switch shall be located within 100 feet of, but not less than 20 from the fuel dispensers, which stop the transfer of fuel to the fuel dispensers in the event of a fuel spill or other emergency. Such devices shall be distinctly *labeled* as: "Emergency fuel shut off"; made of plastic, light gauge aluminum with white reflective letters on red reflective background lettering 1.5 inches. **Height.** The height of the emergency disconnect switch shall be located between 42 inches and 48 inches from the floor level to the activating button.

Fixed pumps required. Class I and II liquids shall be transferred from tanks by means of fixed pumps designed and equipped to allow control of the flow and prevent leakage or accidental discharge.

Mounting of dispensers. Dispensing devices, except those installed on top of a protected aboveground tank that qualifies as vehicle-impact resistant, shall be protected against physical damage by mounting on a concrete island 6 inches or more in height, or shall be protected vehicle impact protection. Dispensing devices shall be installed and securely fastened to their mounting surface in accordance with the dispenser manufacturer's instructions. Dispensing devices installed indoors shall be located in an *approved* position where they cannot be struck by an out-of-control vehicle descending a ramp or other slope.

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- **Where tanks are at an elevation** that produces a gravity head on the dispensing device, the tank outlet shall be equipped with a device, such as a normally closed solenoid valve, positioned adjacent to and downstream from an internal or an external valve located as close as practical to the shell of the tank. This valve shall be adjusted so that liquid cannot flow by gravity from the tank if the piping or hose fails when the dispenser is not in use.
- **Dispenser emergency shutoff valve.** An *approved* automatic emergency shutoff valve (also known as impact or fire valve) designed to close in the event of a fire or impact shall be properly installed in the liquid supply line at the base of each dispenser supplied by a remote pump. The valve shall be installed so that the shear groove is flush with or within 1/2 inch of the top of the concrete dispenser island and there is clearance provided for maintenance purposes around the valve body and operating parts. The valve shall be installed at the liquid supply line inlet of each overhead type dispenser. Where installed, a vapor return line located inside the dispenser housing shall have a shear section or *approved* flexible connector for the liquid supply line emergency shutoff valve to function. Emergency shutoff valves shall be installed and maintained in accordance with the manufacturer's instructions, tested at the time of initial installation and not less than yearly thereafter.
- **Dispenser hose.** Dispenser hoses shall be not more than 18 feet in length unless otherwise *approved*. Dispenser hoses shall be *listed* and *approved*. When not in use, hoses shall be reeled, racked or otherwise protected from damage.
- **Emergency breakaway devices.** Dispenser hoses for Class I and II liquids shall be equipped with a *listed* emergency breakaway device designed to retain liquid on both sides of a breakaway point. Such devices shall be installed and maintained in accordance with the manufacturer's instructions. Where hoses are attached to hose-retrieving mechanisms, the emergency breakaway device shall be located between the hose nozzle and the point of attachment of the hose-retrieval mechanism to the hose.
- **Fuel delivery nozzles.** A *listed* automatic-closing- type hose nozzle valve with or without a latch-open device shall be provided on island-type dispensers used for dispensing Class I, II or III liquids. Overhead-type dispensing units shall be provided with a *listed* automatic-closing-type hose nozzle valve without a latch-open device.
Exception: A *listed* automatic-closing-type hose nozzle valve with latch-open device is allowed to be used on overhead-type dispensing units where the design of the system is such that the hose nozzle valve will close automatically in the event the valve is released from a fill opening or upon impact with a driveway.
- **Special requirements for nozzles.** Where dispensing of Class I, II or III liquids is performed, a *listed* automatic-closing-type hose nozzle valve shall be used incorporating all of the following features:
 1. The hose nozzle valve shall be equipped with an integral latch-open device.
 2. Where the flow of product is normally controlled by devices or equipment other than the hose nozzle valve, the hose nozzle valve shall not be capable of being opened unless the delivery hose is pressurized. If pressure to the hose is lost, the nozzle shall close automatically.
Exception: Vapor recovery nozzles incorporating insertion interlock devices designed to achieve shutoff on disconnect from the vehicle fill pipe.
 3. The hose nozzle shall be designed such that the nozzle is retained in the fill pipe during the filling operation.
 4. The system shall include *listed* equipment with a feature that causes or requires the closing of the hose nozzle valve before the product flow can be resumed or before the hose nozzle valve can be replaced in its normal position in the dispenser.
- **Remote pumping systems Leak detection.** Where remote pumps are used to supply fuel dispensers, each pump shall have installed on the discharge side a *listed* leak detection device that will detect a leak in the piping and dispensers and provide an indication. A leak detection device is not required if the piping from the pump discharge to under the dispenser is aboveground and visible.
Location. Remote pumps installed above grade, outside of buildings, shall be located not less than 10 feet from lot lines of adjoining property that can be built on, at least 20 feet from all fixed sources of ignition and not less than 5 feet from any building opening. Where an outside pump location is impractical, pumps are permitted to be installed inside buildings as provided for dispensers under the adopted International Fire Code for motor fuel dispensing facilities and repair garages along with flammable and combustible liquids chapter. Pumps shall be substantially anchored and protected against physical damage.

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- **Gravity and pressure dispensing.** Flammable liquids shall not be dispensed by gravity from tanks, drums, barrels or similar containers, unless located on a temporary construction site. Flammable or *combustible liquids* shall not be dispensed by a device operating through pressure within a storage tank, drum or container.
- **Aboveground tanks located outdoors, above grade.** Aboveground tanks shall not be used for the storage of Class I, II, or III liquid motor fuels, except as provided by section 2306.2.3.
 1. Above-ground tanks used for outdoor, above-grade storage of Class I, Class II or IIIA liquids shall be *listed and labeled* as protected above-ground tanks in accordance with **UL 2085**. Such tanks shall be located in accordance the tables listed in section 7 for illustration (page 19-20 of this guide).
 2. Tanks containing fuels shall not exceed 12,000 gallons in individual capacity or 48,000 gallons in aggregate capacity. Installations with the maximum allowable aggregate capacity shall be separated from other such installations by not less than 100 feet.
 3. Aboveground tanks used for outdoor, above-grade storage of Class IIIB liquid motor fuel shall be *listed and labeled* in accordance with UL 142 or as protected aboveground tanks in accordance with UL 2085.

3. General Requirements

- **Fire Extinguishers** at fill sites for above tanks containing pressurized flammable liquids shall have the following fire extinguishers on site. At a minimum a 40-B within 30 feet at the fill site or larger, having a discharge rate of 1 LB./Sec or more shall be used to protect these hazards. For combustible liquids tanks a 2-A:20-B:C shall be provided and located such that an extinguisher is not more than 75 feet from pumps, dispensers or storage tank fill-pipe openings.
- **Electrical wiring and equipment** shall be installed and maintained in accordance with Section 604 and NFPA 70.

Wiring Class 1 Division 1 within 3 feet of open end of vent in all directions.

Class 1 Division 2:

Area between 3 feet and 5 feet of open end of vent in all directions.

Area up to 18 inches above floor or grade for entire storage or repair garage.

Electrical equipment: (I.E. light switch, outlets, fuse box) Spacing shall be provided (18 inches) to allow access for maintenance between a tank and electrical equipment.

Electrical panels shall have the following clearance: 30 inches wide or (15 inches on each side for multiple panels), 36 inches in depth and 78 inches in height shall be provided in front of electrical service equipment.

Indoor pump/bleeders: Within 5 feet of such devices, extending in all directions, and up to 3 feet above floor or grade level within 25 feet horizontally from any edge of such devices.

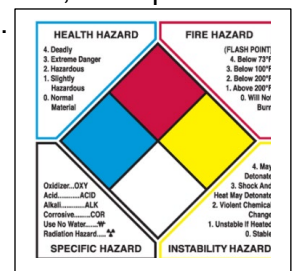
Outdoor pump/bleeders: Within 3 feet of any edge of such devices, extending in all directions, and up to 18 inches above floor or grade level within 10 feet horizontally from an edge of such devices.

- **Listed equipment.** Electrical equipment, dispensers, hose, nozzles and submersible or subsurface pumps used in fuel-dispensing systems shall be *listed*.

- **Hazard identification label and placard.** Tanks more than 100 gallons in capacity, which are permanently installed and used for the storage of Class I, II or III liquids, shall bear a label and NFPA 704 placard identifying the material therein.

Warning signs for flammable liquids shall have white lettering on a red background and shall read: DANGER— FLAMMABLE LIQUIDS. Constructed of durable materials, permanently installed and readily visible.

Piping containing flammable and combustible liquids shall be identified in accordance with ASME A13.1.



Fluid Service	Background Color	Letter Color	Color and Letter Sample
Flammable fluids	Safety yellow	Black	Letters
Combustible fluids	Safety brown	White	Letters

“No Smoking Signs.” Shall be conspicuously posted where a hazard from flammable vapors is normally present. For outdoor storage, dispensing or open use area the sign shall state “No Smoking Within 25 feet.”

Exterior signs heavy gauge alum with white lettering on a red background, lettering min. 4"H.

Interior signs made of plastic, light gauge aluminum with white reflective letters on red reflective background lettering 1.5 inches.

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- **Tank Supports.** Where tanks storing Class I, Class II, or Class IIIA liquids are supported above their foundations, tank supports shall be of concrete, masonry, or protected steel.
 - **Liquid-level limit control.** Atmospheric tanks having a capacity greater than 500 gallons and that contain hazardous material liquids shall be equipped with a liquid-level limit control or other *approved* means to prevent overfilling of the tank.
 - **Manual tank level gauging substitutes** include, but are not limited to, heavy-duty flat gauge glasses; magnetic, hydraulic, or hydrostatic remote reading devices; and sealed float gauges.
 - **Secondary Containment Tank.** A tank that has an inner and outer wall with an interstitial space between the walls shall have a means for monitoring the interstitial space for a leak.
 - **Monitoring.** An *approved* monitoring method shall be provided to detect hazardous materials in the secondary containment system. The monitoring method is allowed to be visual inspection of the primary or secondary containment, or other *approved* means. Where secondary containment is subject to the intrusion of water, a monitoring method for detecting water shall be provided. Where monitoring devices are provided, they shall be connected to *approved* visual or audible alarms.
 - **Spill control and secondary containment.** Where required, rooms, buildings, or areas used for storage, dispensing, use, mixing, or handling of flammable and Class II combustible liquids shall be provided with spill control and secondary containment for individual tank or systems greater than 55 gallons.
 - **Secondary containment.** Protected aboveground tanks shall be provided with secondary containment, drainage control or diking in accordance with Section 5704.2 and applicable South Dakota Administrative Rules (SDAR). A means shall be provided to establish the integrity of the secondary containment in accordance with NFPA 30. Secondary containment other than double walls or bottoms must be capable of containing 110 percent of the volume of the largest tank in the facility. Secondary containment must be compatible with the regulated substance stored. Secondary containment must be designed and installed to control storm water (SDAR).
 - **Design, fabrication and construction requirements for tanks.** Tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design.
 - **Tank openings.** Tank openings in **protected** aboveground tanks shall be through the top only.
 - **Tank openings other than Vents-** Each connection below the liquid level through which liquid does not normally flow shall be provided with a liquid tight closure such as a valve, plug, or blind, or a combination of these to include impact protection of valves at floor level.
- Filling and emptying connections for Class I, Class II, and Class IIIA liquids that are connected and disconnected shall be located outside of buildings at a location free from any source of ignition. Such connections shall be located not less than 5 feet (1.5 m) away from any building opening. Such connections for any liquid shall be closed and liquid tight when not in use and shall be properly identified.
- **Siphon prevention.** An *approved* anti-siphon method shall be provided in the pipe extending below the level of the top of the tank system to prevent flow of liquid by siphon action.
 - **Tank Fill Pipes.** Fill pipes that enter the top of a tank shall terminate within 6 in. of the bottom of the tank. This minimize the generation of static electricity. Fill pipes shall be installed or arranged so that vibration is minimized. For exceptions see NFPA 30.
 - **Fill pipe connections.** The fill pipe shall be provided with a means for making a direct connection to the tank vehicle's fuel delivery hose so that the delivery of fuel is not exposed to the open air during the filling operation. Where any portion of the fill pipe exterior to the tank extends below the level of the top of the tank, a check valve shall be installed in the fill pipe not more than 12 inches from the fill hose connection.
 - **Filling, emptying and vapor recovery connections.** Filling, emptying and vapor recovery connections to tanks containing Class I, II, or IIIA liquids shall be located outside of buildings. Filling, withdrawal and vapor recovery connections that are made and broken shall be located outside of buildings, not more than 5 feet above the finished ground level, in an *approved* location in close proximity to the parked delivery vehicle. Such location shall be away from sources of ignition and not less than 5 feet away from building openings or *lot lines* of property that can be built upon. Such connections shall be closed and liquid tight. Such openings shall be properly identified and provided with a liquid-tight cap that shall be closed when not in use.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

Filling and emptying connections to indoor tanks containing Class IIIB liquids and connected to fuel burning equipment shall be located at a finished ground level location outside of buildings. Such openings shall be provided with a liquid-tight cap that shall be closed when not in use. A sign that displays the following warning shall be permanently attached at the filling location:

TRANSFERRING FUEL OTHER THAN
CLASS IIIB COMBUSTIBLE LIQUID TO
THIS TANK CONNECTION IS A VIOLATION
OF THE FIRE CODE AND IS STRICTLY
PROHIBITED

☐ **Vent-line flame arresters and pressure vacuum vents.** *Listed* or *approved* flame arresters or pressure-vacuum (PV) vents that remain closed unless venting under pressure or vacuum conditions shall be installed in normal vents of tanks containing flammable liquids. **Exception:** Where determined by the *fire code official* that the use of these devices can result in damage to the tank.

☐ **Vent pipe outlets.** Normal vent pipe for Class I, II or IIIA liquids shall be located such that the vapors are released at a safe point outside of buildings, not less than 12 feet above the finished ground level and at least 3ft above the roof. Vent outlets shall be located such that flammable vapors will not be trapped by eaves or other obstructions and shall be not less than 5 feet from building openings or *lot lines* of properties that can be built upon and at least 15 feet from powered ventilation air intake devices. Vent outlets on atmospheric tanks storing Class IIIB liquids are allowed to discharge inside a building where the vent is a normally closed vent.

Exception: Vent pipe outlets on tanks storing Class IIIB liquid inside buildings and connected to fuel-burning equipment shall be located such that the vapors are released to a safe location outside of buildings.

☐ **Tank Openings for Fill, all Venting and Interstitial Spaces Opening for Oil-Burning Equipment:**

Table 7.2.5.1 Minimum Diameter of Tank Vent Opening

Capacity of Tank (U.S. gal)	Diameter of Vent, Nominal Opening Size (in.)
660 or less	1¼
661 to 3,000	1½
3,001 to 10,000	2
10,001 to 20,000	2½
20,001 to 35,000	3

For SI units, 1 gal = 3.785 L, 1 in. = 25 mm.

☐ **Vent pipes** shall be installed such that they will drain toward the tank without sags or traps in which liquid can collect. The normal vent shall be at least as large as the largest filling or withdrawal connection. Low melting point materials shall not be used as part of a tank's normal or emergency vent piping.

☐ **Connections.** Aboveground tanks with connections located below normal liquid level shall be provided with internal or external isolation valves located as close as practical to the shell of the tank. Connections for tank openings below the liquid level shall be liquid tight.

☐ **Tank fill connections.** Delivery of flammable liquids to tanks more than 1,000 gallons in capacity shall be made by means of *approved* liquid- and vapor-tight connections between the delivery hose and tank fill pipe. Where tanks are equipped with any type of vapor recovery system, all connections required to be made for the safe and proper functioning of the particular vapor recovery process shall be made. Such connections shall be made liquid and vapor tight and remain connected throughout the unloading process. Vapors shall not be discharged at grade level during delivery.

☐ **Piping systems** are supported and protected against physical damage and excessive stress.

☐ **Pipe joints.** Joints shall be liquid tight and shall be welded, flanged, threaded or mechanically attached, except that *listed* flexible connectors are allowed. Joints for Class I liquids in concealed spaces within building shall be welded. Nonmetallic joints shall be *approved* and shall be installed in accordance with the manufacturer's instructions. Piping shall be secured to prevent disengagement at the fitting.

☐ **Manifolding.** Tank vent piping shall not be manifolded unless required for special purposes.

☐ **Emergency relief venting.** Aboveground storage tanks, tank compartments and enclosed secondary containment spaces shall be provided with emergency relief venting.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

Emergency venting. Stationary, aboveground tanks shall be equipped with Emergency vents for Class I, II, and IIIA liquids and shall not discharge inside buildings. Class IIIB liquids are allowed to discharge inside the building.

Exceptions:

1. Tanks larger than 12,000 gallons in capacity storing Class IIIB liquids that are not within the diked area or the drainage path of Class I or II liquids do not require emergency relief venting.
2. Emergency vents on protected aboveground tanks complying with UL 2085 containing Class II or IIIA liquids are allowed to discharge inside the building. Filling and emptying connections to indoor tanks containing Class IIIB liquids and connected to fuel burning equipment shall be located at a finished ground level location outside of buildings. Such openings shall be provided with a liquid-tight cap that shall be closed when not in use. A sign that displays the following warning shall be permanently attached at the filling location:

TRANSFERRING FUEL OTHER THAN
CLASS IIIB COMBUSTIBLE LIQUID TO
THIS TANK CONNECTION IS A VIOLATION
OF THE FIRE CODE AND IS STRICTLY
PROHIBITED

Overfill control. An overfill prevention system shall be provided for each tank. During tank-filling operations, the system shall comply with one of the following:

1. The overfill prevention system shall include the following:
 - 1.1. An independent means of notifying the person filling the tank that the fluid level has reached 90 percent of tank capacity by providing an audible or visual alarm signal, providing a tank level gauge marked at 90 percent of tank capacity, or other *approved* means.
 - 1.2. Automatic shut off of the flow of fuel to the tank when the quantity of liquid in the tank reaches 95 percent of tank capacity. For rigid hose fuel-delivery systems, an *approved* means shall be provided to empty the fill hose into the tank after the automatic shutoff device is activated.
2. The system shall reduce the flow rate to not more than 15 gallons per minute (0.95 L/s) so that at the reduced flow rate, the tank will not overfill for 30 minutes, and automatically shut off flow into the tank so that none of the fittings on the top of the tank are exposed to product because of overfilling.

Information signs. A permanent sign shall be provided at the fill point for the tank, documenting the filling procedure and the tank calibration chart. The filling procedure shall require the person filling the tank to determine the gallonage required to fill it to 90 percent capacity before commencing the fill operation.

Spill containers. A spill container having a capacity of not less than 5 gallons shall be provided for each fill connection. For tanks with a top fill connection, spill containers shall be noncombustible and shall be fixed to the tank and equipped with a manual drain valve that drains into the primary tank.

Stairways, platforms and walkways. *Stairways*, platforms and walkways shall be of noncombustible construction and shall be designed and constructed in accordance with NFPA 30 and the *International Building Code*.

Damage to Tank or Piping. Any damage must be repaired according to the manufacturer's instructions.

AST system installation (South Dakota Administrative Rules-SDAR). All metallic AST and piping must meet the following cathodic protection requirements:

(a) Piping and bottoms of tanks which come in contact with the ground or an electrolyte must be cathodically protected with sacrificial anodes or an impressed current system which is designed, fabricated, and installed in accordance with codes of practice developed by nationally recognized associations or independent testing laboratories, such as NACE Standard RP-02-85, API Standard 1632 (1983), or similar methods approved by the department SDAR;

(b) **The cathodic protection system** must be designed to provide a minimum of 20 years of protection;

(c) A qualified engineer or corrosion expert must supervise the design or installation, or both, of the cathodic protection system;

(d) Each cathodic protection system must have a monitor or test station which enables the owners or operators to check on the adequacy of cathodic protection; and

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

- Before the tank is initially placed in service, all leaks or deformations shall be corrected in an approved manner. Mechanical caulking shall not be permitted for correcting leaks in welded tanks except for pinhole leaks in the roof.
- **Separation between tanks** should be at least 3 feet. For all tanks not over 150 feet in diameter, containing class IA-IC, II & IIIA the distance between the tanks must be at least 1/6 the sum of the diameters (see Section 7, separation requirements). Tanks over 150 feet in diameter see NFPA 30.
- **Tightness Testing. All tanks and connections shall be tested for tightness after installation and before being placed in service in accordance with the requirements below.**

Testing required shall not be required for a primary tank or an interstitial space that continues to maintain a factory-applied vacuum in accordance with the manufacturer's instructions. Such components shall be considered to be tight until such time that the vacuum is broken. Final tightness testing of an interstitial space shall not be required if the factory-applied vacuum is maintained until the tank is set on the site at the location where it is intended to be installed.
- **Air pressure shall not** be used to test tanks that contain flammable or combustible liquids or vapors.
- **Horizontal shop-fabricated aboveground tanks** shall be tested for tightness either hydrostatically or with air pressure at not less than a gauge pressure of 3 psi and not more than a gauge pressure of 5 psi.
- **Vertical shop-fabricated aboveground tanks** shall be tested for tightness either hydrostatically or with air pressure at not less than a gauge pressure of 1.5 psi and not more than a gauge pressure of 2.5 psi. Vertical aboveground secondary containment-type tanks shall have their primary (inner) tank tested for tightness either hydrostatically or with air pressure at not less than a gauge pressure of 1.5 psi and not more than a gauge pressure of 2.5 psi. The interstitial space of such tanks shall be tested either hydrostatically or with air pressure at a gauge pressure of 1.5 to 2.5 psi (10 to 17 kPa), by vacuum at 5.3 in. Hg (18 kPa), or in accordance with the tank's listing or manufacturer's instructions. These limits shall not be exceeded. The pressure or vacuum shall be held for not less than 1 hour or for the duration specified in the listing procedures for the tank.
- **All tanks** shall have an approved API, UL, and ANSI mark to indicate they were built to code. A permanent record of the test results shall be maintained by the owner.
- **Bonding of vessels.** Where differences of potential could be created, vessels containing Class I liquids or liquids handled at or above their *flash points* shall be electrically connected by bond wires, ground cables, piping or similar means to a static grounding system to maintain equipment at the same electrical potential to prevent sparking.
- **Tanks in Vaults, Commercial cooking oil storage tank, Tank Heating, Waste oil, and Unstable liquids.** Additional requirements can be found in the *International Fire Code*, NFPA 30, 31A and/or 31 as applicable.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

4. Final Inspection on AST Inside Buildings

- ☐ **Aboveground tanks located inside buildings.** Aboveground tanks for the storage of Class I, II, and IIIA liquid fuels shall be *listed and labeled* as protected aboveground tanks in accordance with UL 2085.
- ☐ **Aboveground tanks inside of buildings.** Tanks storing Class I, II, and IIIA liquids inside buildings shall be equipped with a device or other means to prevent overflow into the building including, but not limited to: a float valve; a preset meter on the fill line; a valve actuated by the weight of the tank's contents; a low head pump which is incapable of producing overflow; or a liquid-tight overflow pipe at least one pipe size larger than the fill pipe and discharging by gravity back to the outside source of liquid or to an approved location. Aboveground tanks exceeding the exempt amounts shall be located in a special enclosure as defined in International Fire Code, Chapter on flammable and combustible liquids in section 4 or in an H-2 room as defined in the *International Building Code*.
- ☐ **Sufficient clearance (18 inches) between the tanks** shall be provided to allow for visual inspection and maintenance of the tank and its appurtenances.
- ☐ Poly-tanks:
 - SFFR will accept poly tanks as acceptable storage for new lubricating oils (motor oil-Class IIIB liquids).
 - Cannot have more than 660 gallons aggregate per control area in poly tanks.
 - If storage is over 660 gallons aggregate, then steel tanks must be used and meet UL142 standard.
 - Poly tanks need two shutoff valves: one at the tank and the other at the nozzle.
 - Poly containers and tanks cannot be used for storage of waste oil. Only steel tanks meeting UL142 or UL80 or an approved U/L tank listed in NFPA 30 or 30A will be approved.
 - SFFR is allowing an exception for three 55-gallon steel barrels to be used for waste oil from filter changes.
 - Approved secondary containment is required for all tanks.
 - All piping must meet NFPA 30 standard. This standard does not allow for the use of plastic hoses or PVC piping and fittings.

MAQ of Flammable and Combustible Liquids Per Control Area for Incidental Operations

Liquid Class(es)	Open Use		Use — Closed Containers	
	gal	L	gal	L
IA	10	38	30	115
IB and IC	30	115	120	460
II	30	115	120	460
IIIA	80	300	330	1,265
IIIB	3,300	12,650	13,200	50,600

Note: This is for indoor storage:

- ☐ **Maximum allowable quantities (MAQ)** shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system.
- ☐ **Quantities exceeding MAQ limits per control areas** is possible but will change the occupancy to a high hazard and additional requirements apply.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

□ The quantities listed in 1-3 below shall not apply to the maximum allowable quantity when apply to fuel oil storage tanks containing Class II or III combustible liquid shall be permitted in a building and used only to supply fuel oil to fuel-burning equipment, generators or fire pumps. Connections between tanks and equipment supplied by such tanks shall be made using closed piping systems. The aggregate capacity of all tanks shall not exceed the following:

1. 660 gallons in unsprinklered buildings, where stored in a UL 80, UL 142 or UL 2085 tank.
2. 1,320 gallons in buildings equipped with an automatic sprinkler, where stored in a UL 142 tank.
3. 3,000 gallons where stored in a protected aboveground UL 2085 tank and the room is protected by an automatic sprinkler system.

Separation. Rooms containing fuel oil tanks for internal combustion engines shall be separated from the remainder of the building by *fire barriers, horizontal assemblies*, or both, with a minimum 1-hour fire-resistance rating with 1-hour fire-protection-rated *opening protectives* constructed in accordance with the *International Building Code*.

Exception: Rooms containing protected aboveground tanks complying with normal and emergency venting, secondary containment, vehicle impact protection, overfill prevention, signage, fill pipe connections, spill containers, tank openings and anti-siphon devices shall not be required to be separated from surrounding areas.

DESIGN AND NUMBER OF CONTROL AREAS

STORY		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA ^a	NUMBER OF CONTROL AREAS PER STORY	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS ^b
Above grade plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 5003.1.1(1) and 5003.1.1(2), with all increases allowed in the footnotes to those tables.

b. Separation shall include fire barriers and horizontal assemblies as necessary to provide separation from other portions of the building.

MAXIMUM STORAGE HEIGHT IN CONTROL AREA

TYPE OF LIQUID	NONSPRINKLERED AREA (feet)	SPRINKLERED AREA ^a (feet)	SPRINKLERED WITH IN-RACK PROTECTION ^{a, b} (feet)
Flammable liquids:			
Class IA	4	4	4
Class IB	4	8	12
Class IC	4	8	12
Combustible liquids:			
Class II	6	8	12
Class IIIA	8	12	16
Class IIIB	8	12	20

For SI: 1 foot = 304.8 mm.

a. In buildings protected by an automatic sprinkler system, the storage height for containers and portable tanks shall not exceed the maximum storage height permitted for the fire protection scheme set forth in NFPA 30 or the maximum storage height demonstrated in a full-scale fire test, whichever is greater. NFPA 30 criteria and fire test results for metallic containers and portable tanks shall not be applied to nonmetallic containers and portable tanks.

b. In-rack protection shall be in accordance with Table 5704.3.6.3(5), 5704.3.6.3(6) or 5704.3.6.3(7).

Basement storage. Class I, II, and IIIA liquids shall be allowed to be stored in *basements* in amounts not exceeding the *maximum allowable quantity per control area (see above chart)*, provided that automatic suppression and other fire protection are provided in accordance with Fire Protection and Life-Safety Systems listed in the *International Fire Code*.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

5. Final Inspection on AST Outdoors

Note: Tanks (empty or full) installed in an area subject to flooding, shall be secured to the ground to prevent them from floating during a rise in water. The flooding may be from natural causes or from fire suppression operations. Tank vents or other openings that are not liquid tight shall extend above the maximum flood stage water level.

Physical Protection for All Outside Aboveground Tanks. Tanks shall be enclosed with a chain link fence at least 6 feet high. The fence shall be separated from the tanks by at least 10 feet and shall have a gate that is secured against unauthorized entry.

Exception: Tanks are not required to be enclosed with a fence if the property on which the tanks are located has a perimeter security fence.

Vehicle Impact Protection—Protection shall be provided when tanks are subject to vehicle impact. When guard posts are installed, the posts shall be:

1. Constructed of steel, not less than 4 inches in diameter, and concrete filled.
2. Spaced not more than 4 feet between posts on center.
3. Set not less than 4 feet deep in a concrete footing of not less than a 15-inch diameter.
4. Set with the top of the post not less than 3 feet aboveground, and
4. Located not less than 3 feet from the protected object.

Outside aboveground tanks and their appurtenances (accessories) and supports shall be protected from external corrosion by a coating suitable for exterior use.

6. Tanks out of Service

Aboveground tanks. Temporarily out of service. Aboveground tanks temporarily out of service shall have all connecting lines isolated from the tank and be secured against tampering.

Exception: In-place fire protection (foam) system lines.

Tanks out of service for 90 days. Stationary tanks not used for a period of 90 days shall be properly safeguarded or removed in an *approved* manner. Such tanks shall have the fill line, gauge opening and pump connection secured against tampering. Vent lines shall be properly maintained.

Exceptions:

1. Tanks connected to oil burners that are not in use during the warm season of the year or are used as a backup heating system to gas.
2. In-place, active fire protection (foam) system lines.

Return to service. Tanks that are to be placed back in service shall be tested in an *approved* manner.

Out of service for one year. Aboveground tanks that have been out of service or abandoned for a period of one year shall be removed.

Exception: Tanks within operating facilities.

Removal. Removal of aboveground tanks shall be in accordance with all of the following:

1. Flammable and *combustible liquids and sludge* shall be removed from the tank and connected piping.
2. Piping at tank openings shall be disconnected and removed.
3. Piping shall be removed from the ground.

Exception: Piping is allowed to be abandoned in place where the *fire code official* determines that removal is not practical. Abandoned piping shall be capped and safeguarded as required by the *fire code official*.

4. Tank openings shall be capped or plugged, leaving a 1/8-inch to 1/4-inch-diameter opening for pressure equalization.

5. Tanks shall be purged of vapor and made inert prior to removal.

6. All exterior above grade fill and vent piping shall be permanently removed.

Exception: Piping associated with bulk plants, terminal facilities, and refineries.

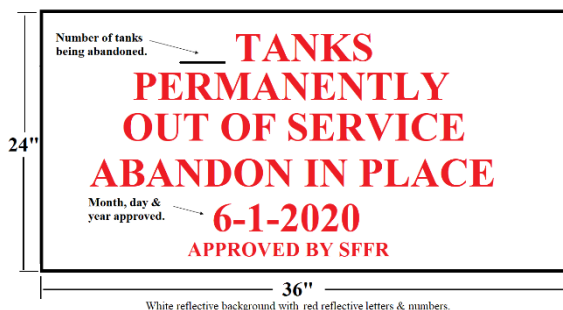
Disposal. Tanks shall be removed from property and disposed of in accordance with federal, state, and local regulations.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

□ **Tanks abandoned in place.** Under certain situations, the owner may request in writing to abandon his tanks in place. Tanks abandoned in place shall be as follows:

1. Flammable and *combustible liquids and sludge* shall be removed from the tank and connected piping.
2. All the piping except, the vents shall be disconnected and removed from the room and shall be capped or plugged at the wall, ceiling or floor.
3. A record of tank size, location, and date of abandonment shall be retained.
4. All exterior above-grade fill piping shall be permanently removed when tanks are abandoned or removed.
5. The tank shall be filled completely with an *approved* inert solid material. Exception: If due to the location these tanks are not able to be filled with an approved inert solid material. This may be waived by the Fire Marshal, with a permanent sign posted stating they are permanently out of service. Post sign at entrance into space, example below.

□ **Empty tanks.** Empty tanks previously used for the storage of hazardous materials shall be free from residual material and vapor as defined by DOTn, the Resource Conservation and Recovery Act (RCRA) or other regulating authority or maintained as specified for the storage of hazardous material.



7. AST Separation Requirements

□ **Location of tanks with storing Class I, Class II, or Class IIIA** stable liquids whose emergency vent pressures is 2.5 psig or less. For Protected Aboveground Tanks with an emergency vent pressure of 2.5psi or less, use the table below for separation distance.

For Aboveground Tanks with an emergency vent pressure greater than 2.5psi, the distance for stable liquids shall be 1½ x value of the table below, but not less than 50 ft. for column A and not less than 25 ft. for column B.

□ **Separation between adjacent tanks containing flammable or combustible liquids and LP-gas.** The minimum horizontal separation between LP-gas tank and a Class I, II, or IIIA liquid storage tank shall be 20 feet, except in the case of Class I, II, or IIIA liquid tanks operating at pressures exceeding 2.5 psig or equipped with emergency venting allowing pressures to exceed 2.5 psig, the distance shall be 1 1/2 x value of the table below, but not less than 50 feet for column A and not less than 25 feet for column B.

Exceptions: 1. Liquefied petroleum gas containers of 125 gallons (473 L) or less in capacity installed adjacent to fuel-oil supply tanks of 660 gallons (2498 L) or less in capacity.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

Minimum Distance (ft)	Column	A	B
		From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way	From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property
Tank Capacity (gal)			
275 or less		5	5
276 to 750		10	5
751 to 12,000		15	5
12,001 to 30,000		20	5
30,001 to 50,000		30	10
50,001 to 100,000		50	15
100,001 to 500,000		80	25
500,001 to 1,000,000		100	35
1,000,001 to 2,000,000		135	45
2,000,001 to 3,000,000		165	55
3,000,001 or more		175	60

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L.

□ **Location of tanks storing Class IIIB liquids.** Aboveground tanks for the storage of Class IIIB liquids, excluding unstable liquids, shall be located in accordance per the table below. Except where a Class IIIB liquid storage tank is within the diked area or drainage path for a Class I or II liquid, see NFPA 30 for distances.

Location of Aboveground Storage Tanks Storing Class IIIB Liquids

Tank Capacity (gal)	Minimum Distance (ft)	
	From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way	From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property
12,000 or less	5	5
12,001 to 30,000	10	5
30,001 to 50,000	10	10
50,001 to 100,000	15	10
100,001 or more	15	15

□ **Delivery vehicle location.** Where liquid delivery to aboveground storage tanks is accomplished by positive-pressure operation, tank vehicles shall be positioned not less than 25 feet from tanks receiving Class I liquids and 15 feet from tanks receiving Class II and IIIA liquids, measured from the tank to the nearest unloading valve on the tank vehicle.

□ **Clearance from combustibles.** The area surrounding an outdoor storage area or tank shall be kept clear of combustible materials and vegetation for a minimum distance of 25 feet and 30 feet for outdoor dispensing.

Note: A separate table for location of process vessels, unstable liquids and liquids with boil-over characteristics can be found in NFPA 30.

□ This table provides the minimum physical separation requirements for aboveground motor fuel storage tanks of all types.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

MINIMUM SEPARATION REQUIREMENTS FOR ABOVE-GROUND TANKS

TANK TYPE	INDIVIDUAL TANK CAPACITY (gallons)	MINIMUM DISTANCE FROM NEAREST IMPORTANT BUILDING ON SAME PROPERTY (feet)	MINIMUM DISTANCE FROM NEAREST FUEL DISPENSER (feet)	MINIMUM DISTANCE FROM LOT LINE THAT IS OR CAN BE BUILT ON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY (feet)	MINIMUM DISTANCE FROM NEAREST SIDE OF ANY PUBLIC WAY (feet)	MINIMUM DISTANCE BETWEEN TANKS (feet)
Protected above-ground tanks	Less than or equal to 6,000	5	25 ^{a,c}	15	5	3
	Greater than 6,000	15	25 ^{a,c}	25	15	3
Tanks in vaults	0–20,000	0 ^b	0	0 ^b	0	Separate compartment required for each tank
Other tanks	All	50	50	100	50	3

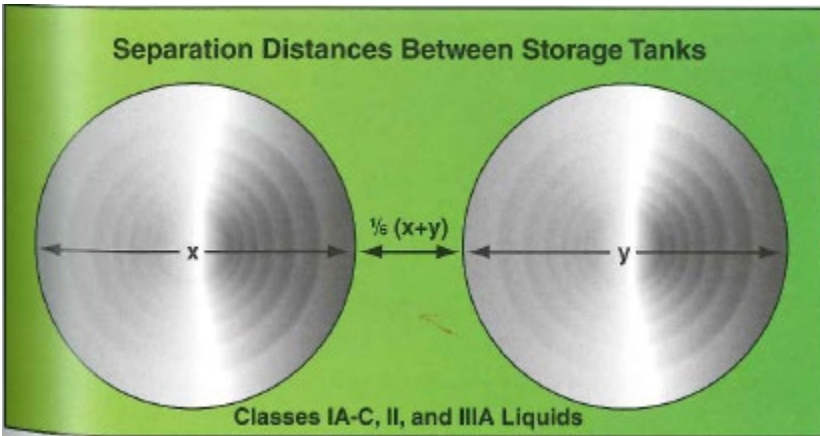
For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

a. At fleet vehicle motor fuel-dispensing facilities, a minimum separation distance is not required.

b. Underground vaults shall be located such that they will not be subject to loading from nearby structures, or they shall be designed to accommodate applied loads from existing or future structures that can be built nearby.

c. For Class IIIB liquids in protected above-ground tanks, a minimum separation distance is not required.

☐ **Separation between tanks** should be at least 3 feet. For all tanks not over 150 ft. in diameter, containing class IA-IC, II, and IIIA the distance between the tanks must be at least 1/6 the sum of the diameters. Tanks over 150 ft. in diameter see NFPA 30.



Example: 2–10 ft. wide tanks

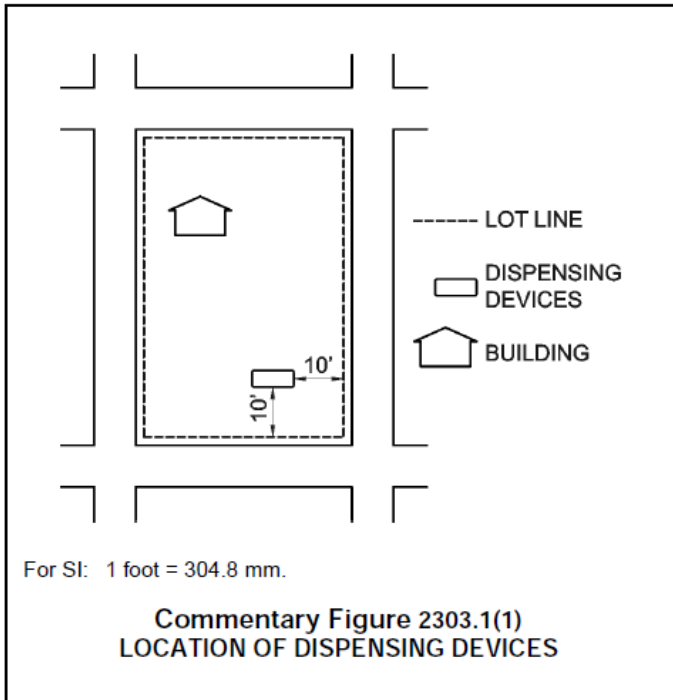
$$10+10= 20$$

$$20/6= 3.33 \text{ ft. separation}$$

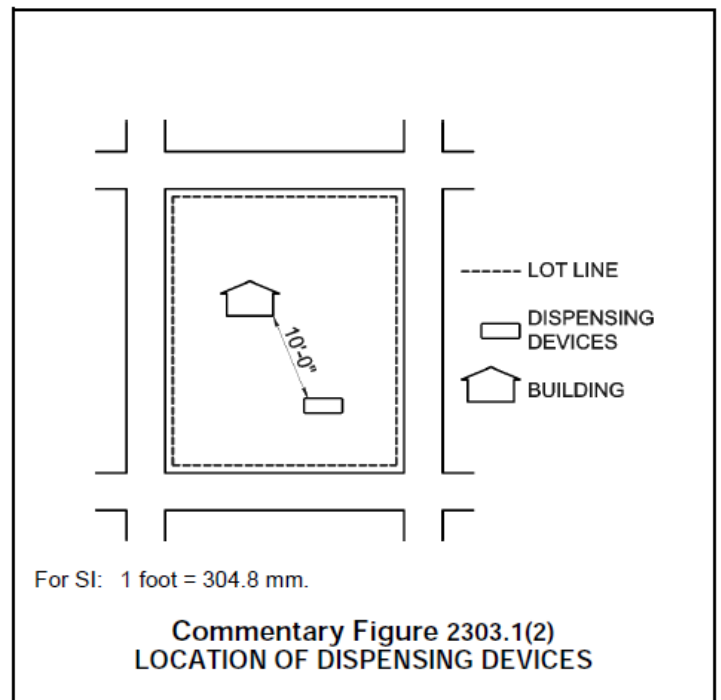
NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

SECTION 5—ILLUSTRATIONS

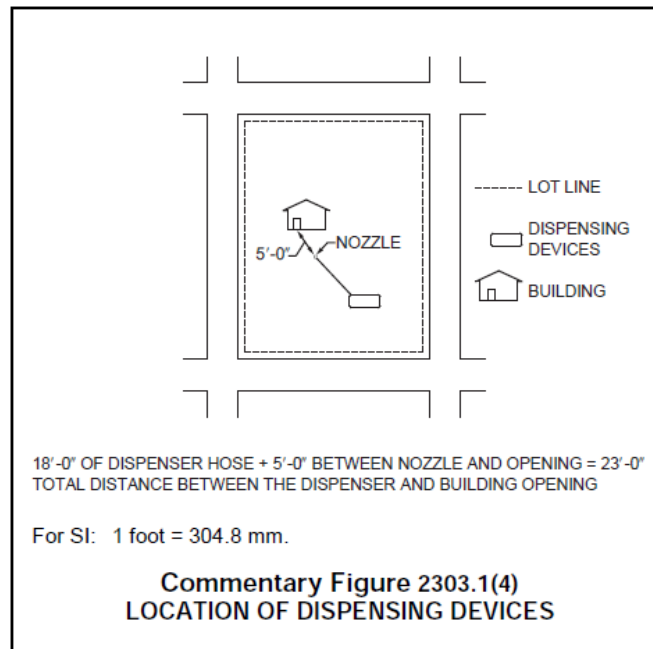
1. Location of Dispensing Devices



Shows the relationship of the dispenser to the lot line.

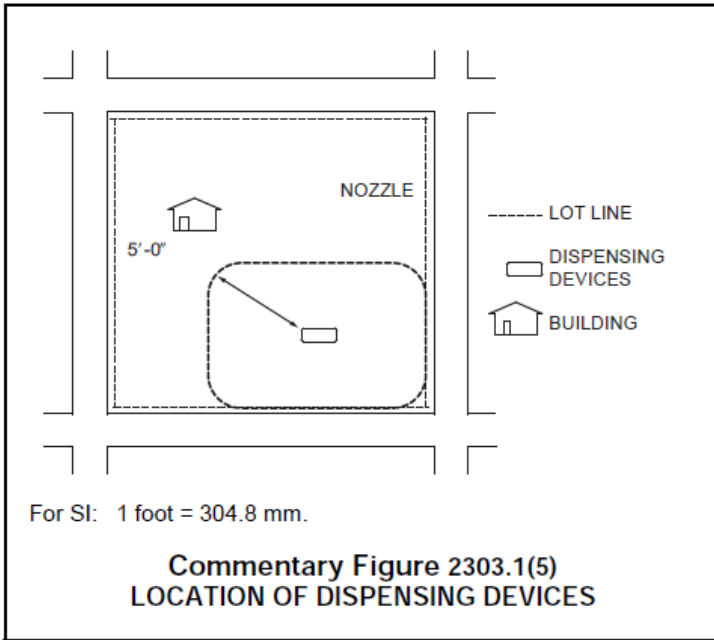


Shows the relationship of the dispenser to a building with a combustible exterior.

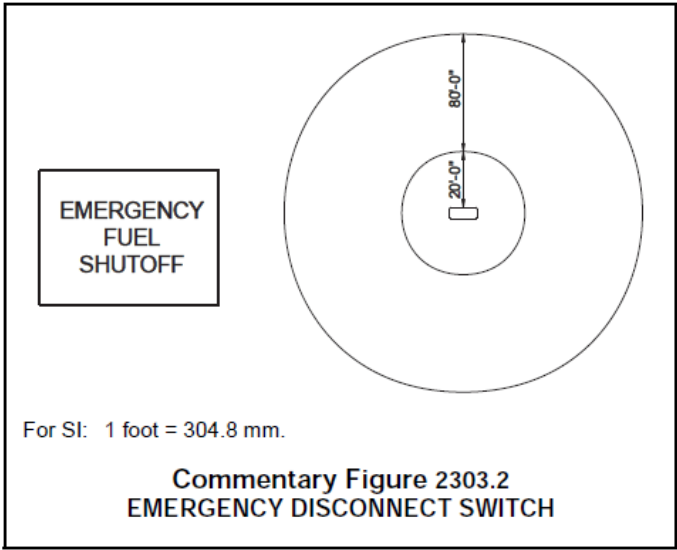


Shows the relationship of the dispenser nozzle to a building opening. This is intended to keep the motor fuel from possible contact with ignition sources inside the building.

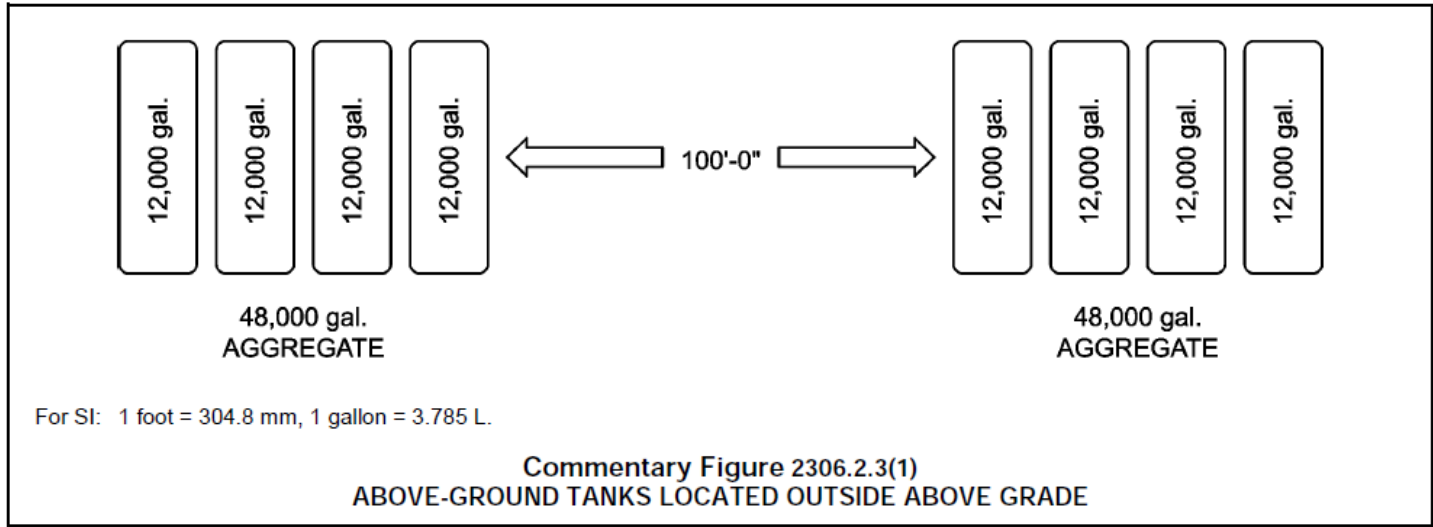
NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.



Illustrates the area around a dispenser where fixed sources of ignition are prohibited. In planning and reviewing dispenser locations, the 20-foot dimension should be correlated with Item 1 to prevent any fixed ignition sources beyond the property line from falling within the 20-foot area required by this item.

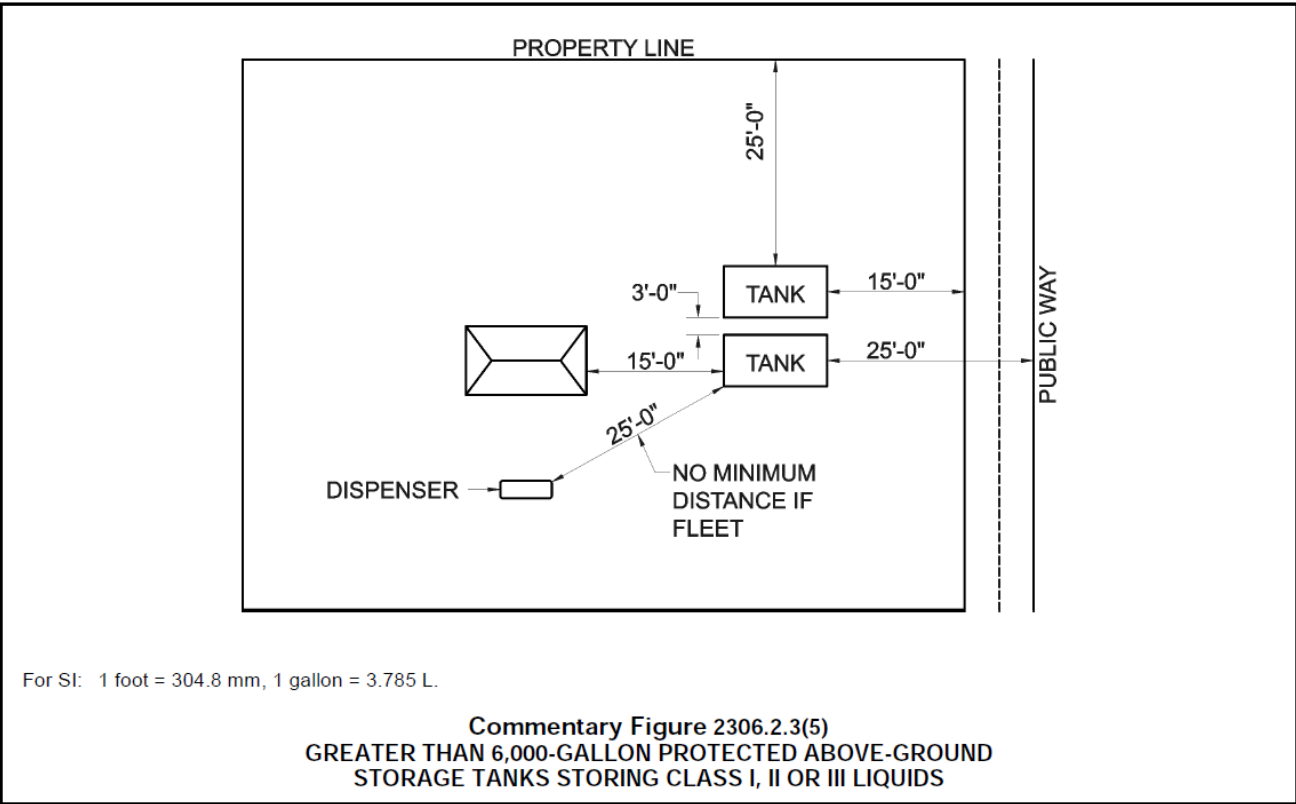
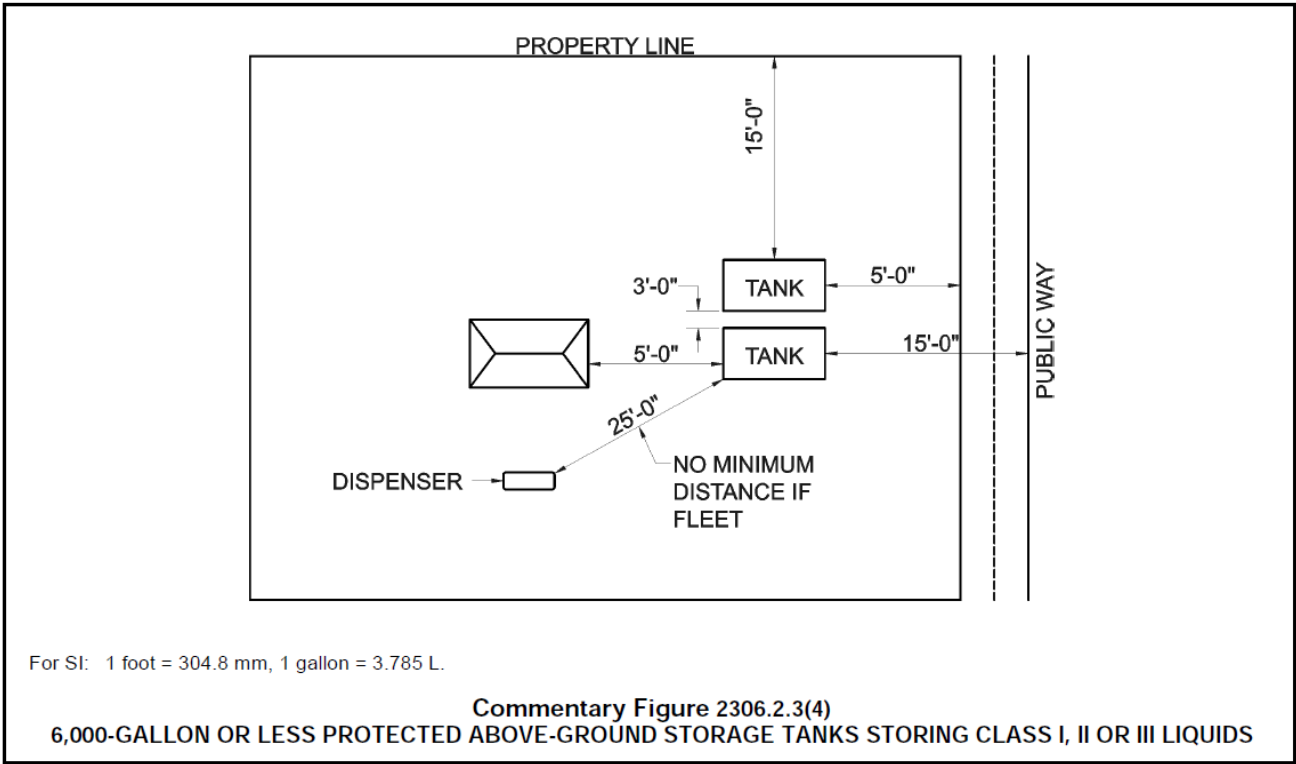


Emergency fuel shutoff switch shall fall in that 80-foot area.

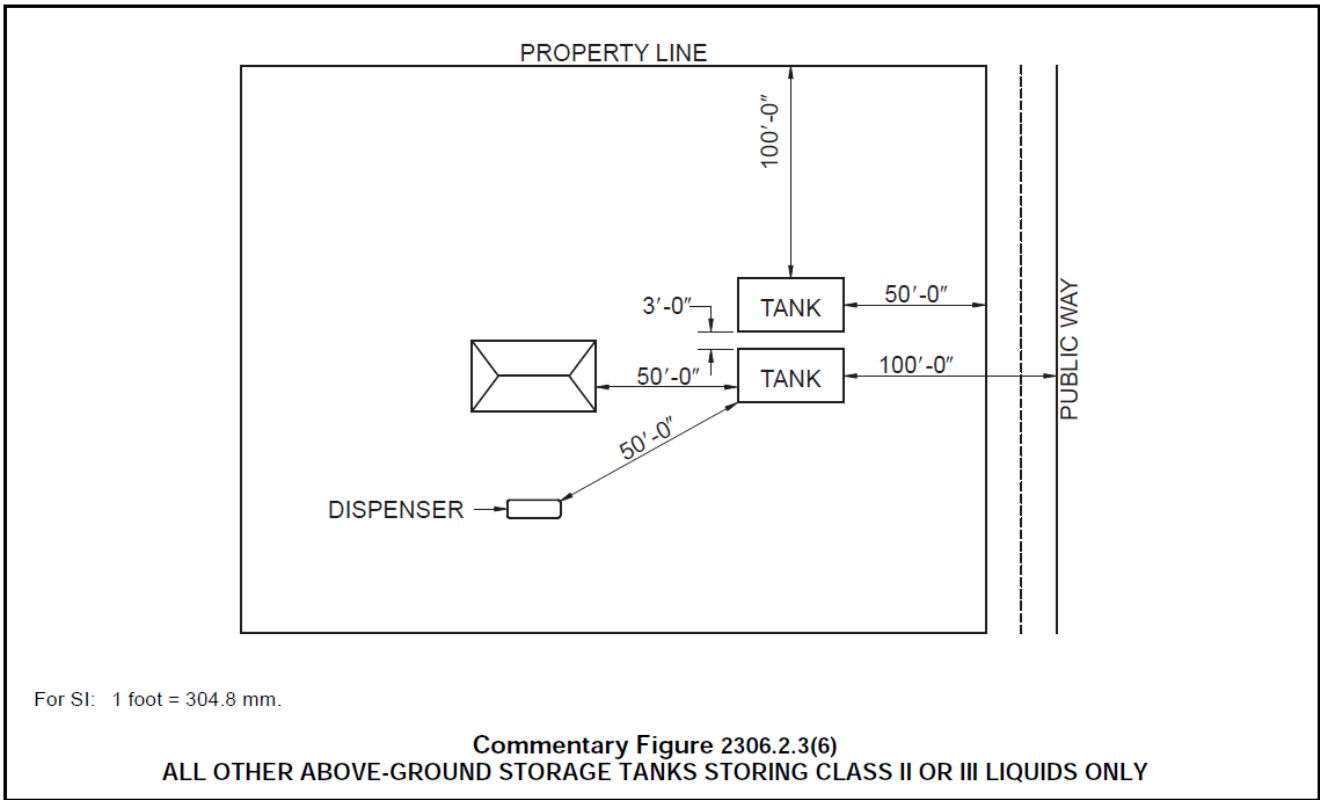


Aboveground tanks located outdoors, above grade. Class I, II, or III liquid motor fuels shall be *listed* and *labeled* as protected aboveground tanks in accordance with UL 2085.

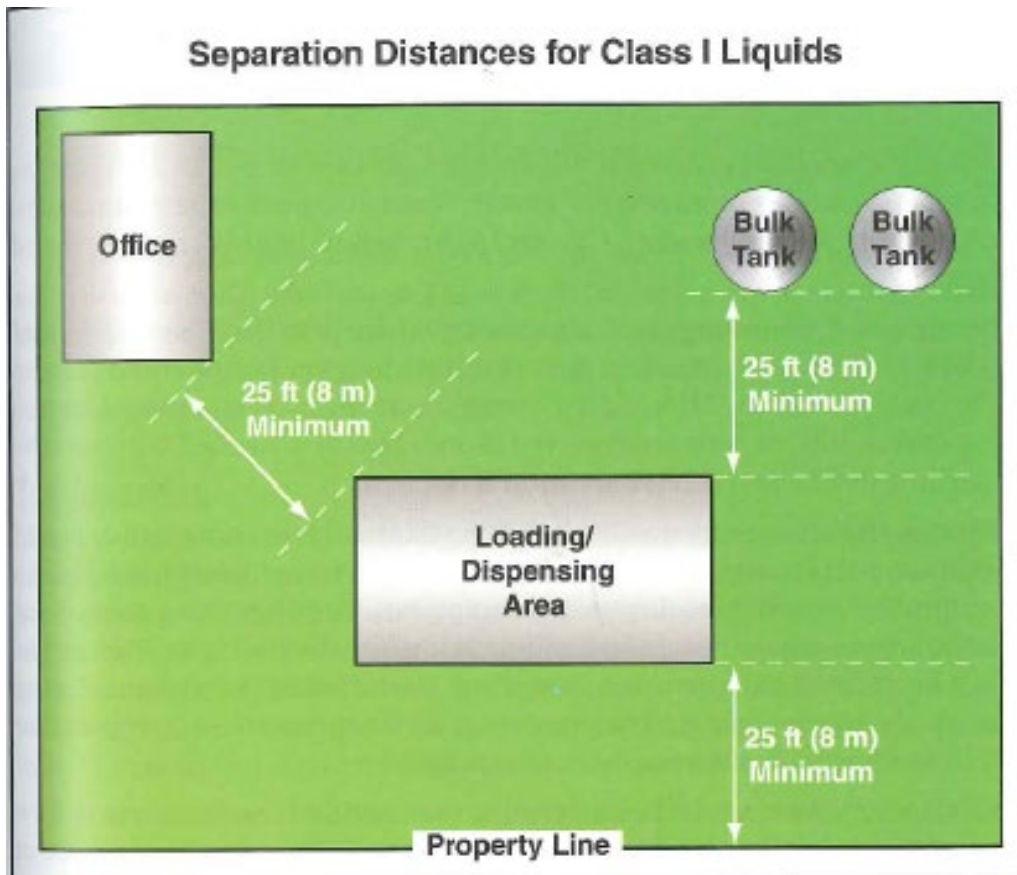
NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.



NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.



NONPROTECTED AST (UL-142).



NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

4" STEEL POST
FILLED WITH
CONCRETE

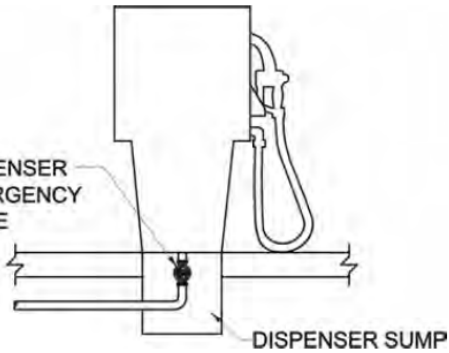


DISPENSER MUST BE MOUNTED ON
A CONCRETE ISLAND OR VEHICLE
IMPACT PROTECTION MUST BE PROVIDED
BY STEEL BOLLARDS FILLED WITH CONCRETE

For SI: 1 inch = 25.4 mm.

Commentary Figure 2306.7.3
MOUNTING OF DISPENSERS

DISPENSER
EMERGENCY
VALVE



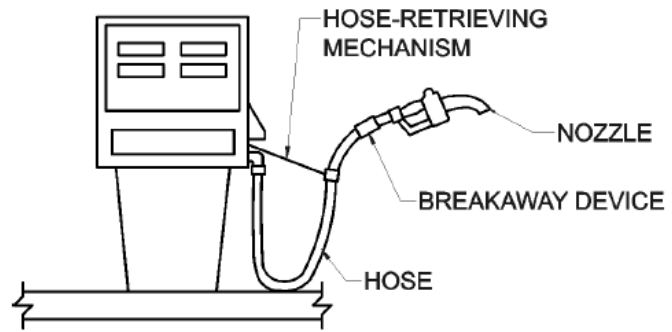
Commentary Figure 2306.7.4
DISPENSER EMERGENCY VALVES

HOSE-RETRIEVING
MECHANISM

NOZZLE

BREAKAWAY DEVICE

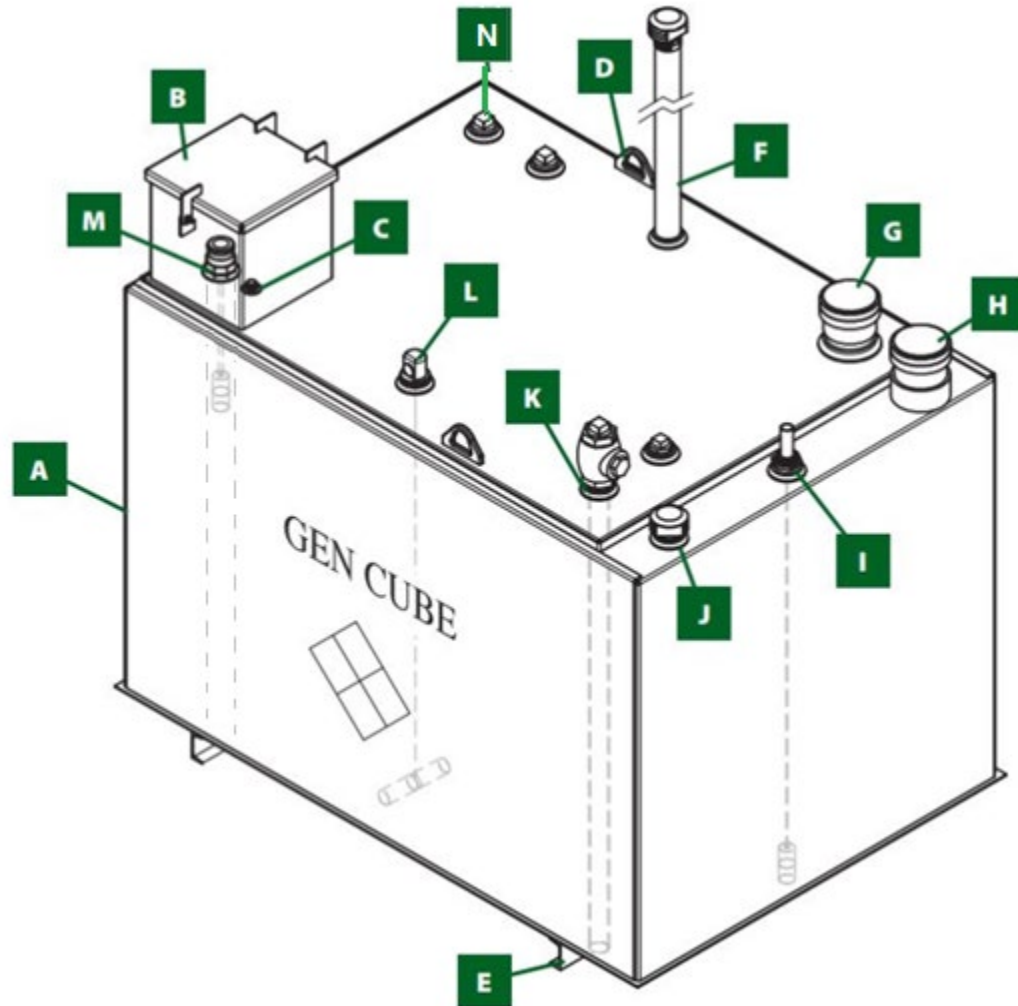
HOSE



Commentary Figure 2306.7.5.1
BREAKAWAY DEVICES

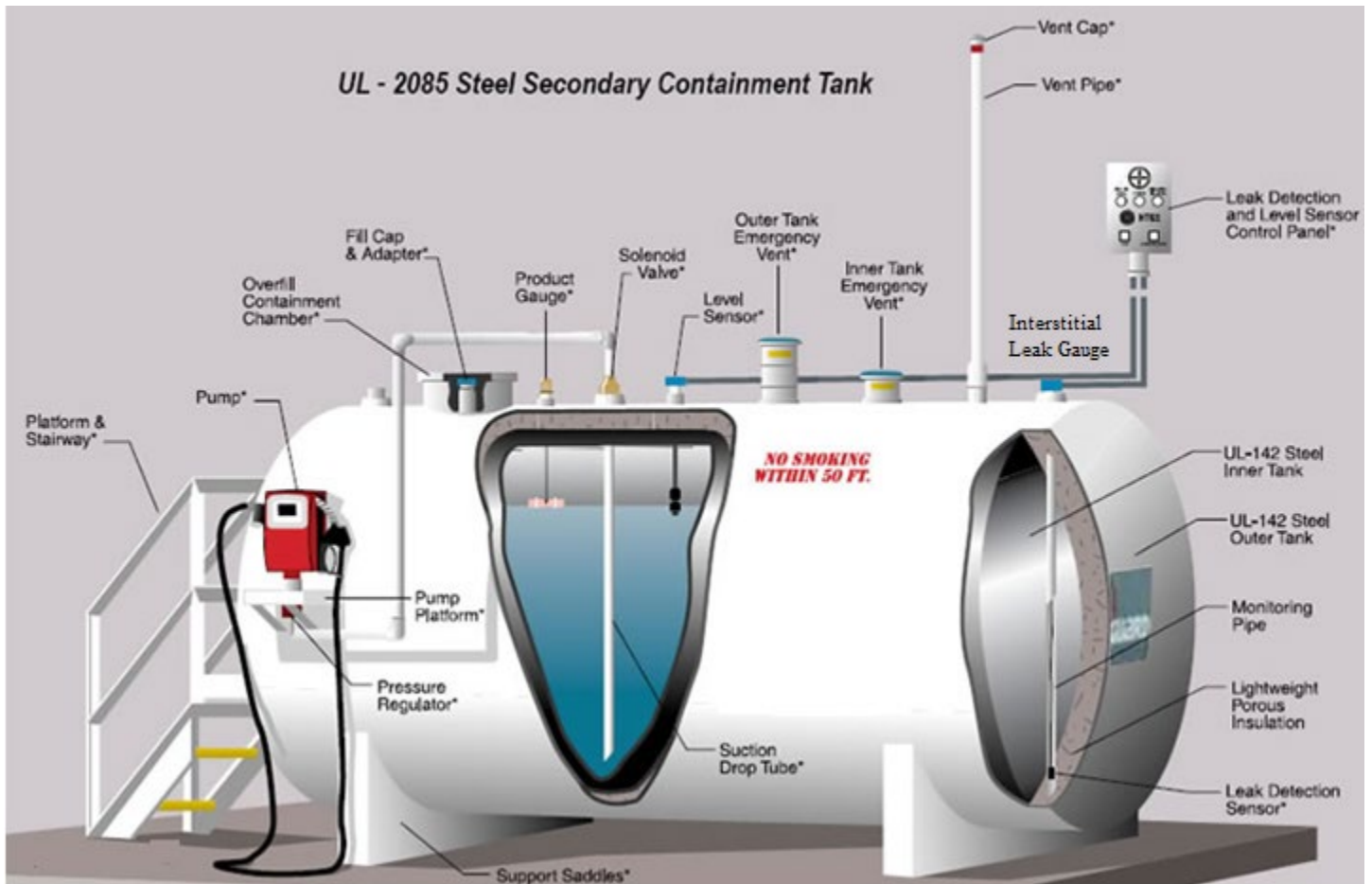
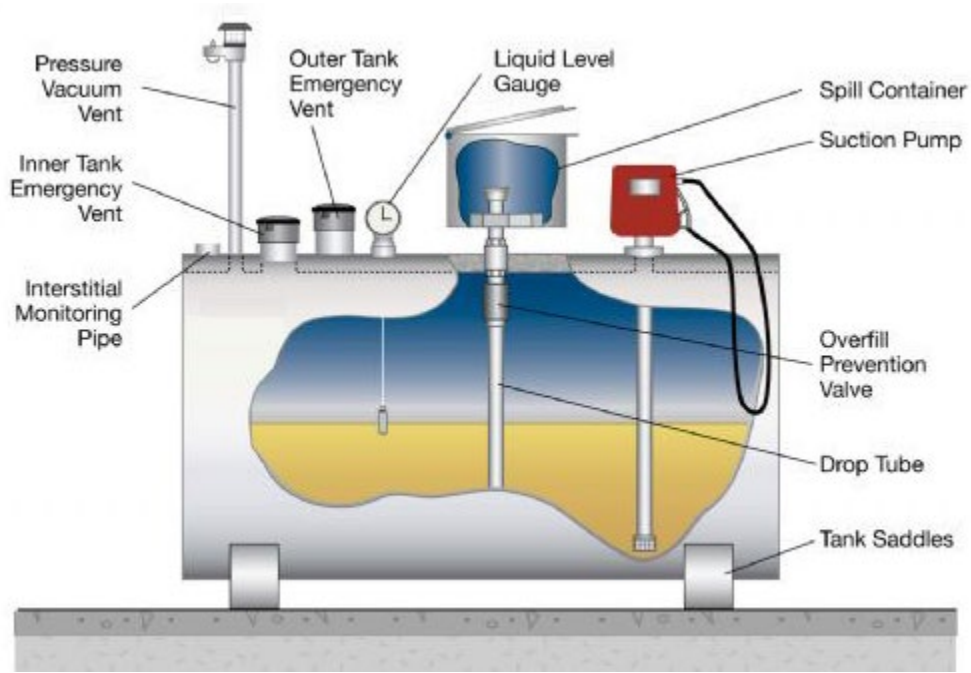
NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

2. Examples of AST with Equipment



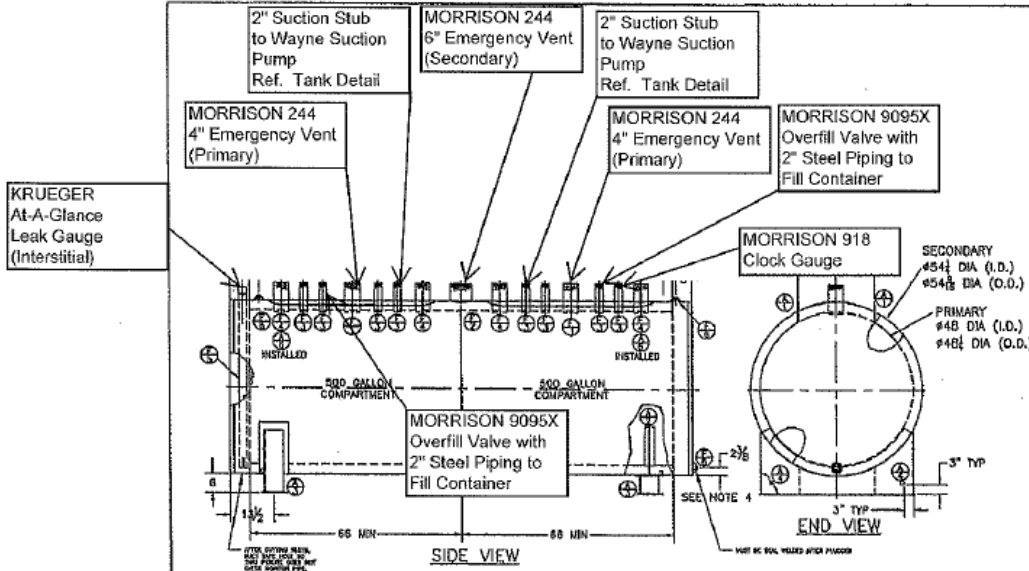
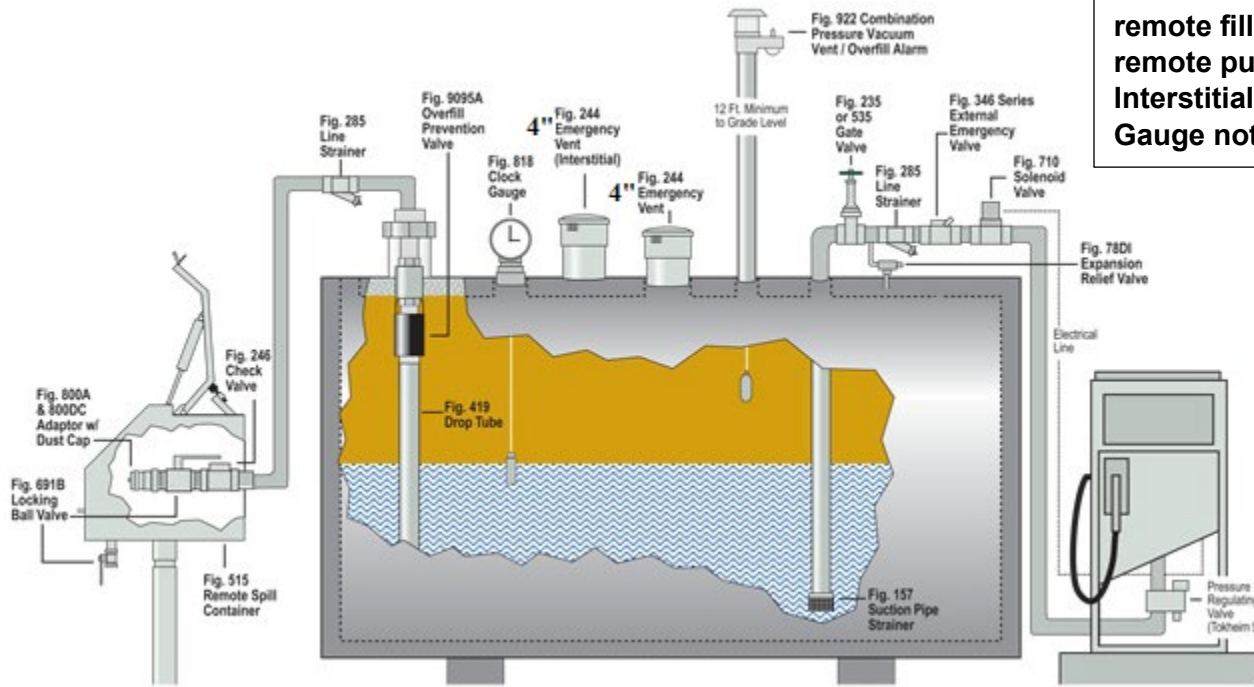
- A. U/L 142 Double Wall Tank
- B. Spill containment
- C. 1/2-inch NPT Drain
- D. Lifting Lugs
2—60-650 Gallon
4—1,000—20,000 Gallon
- E. Support Feet
- F. Primary Working Vent
- G. Primary Tank Emergency Vent
- H. Secondary Containment Emergency Vent
- I. Interstitial Monitoring Gauge
- J. 2-inch Spare
- K. 2-inch Discharge outlet connection
- L. Tank Level Gauge
- M. Quick Connect Fill—2 inches, 4 inches, or 6 inches
- N. Over fill audible/visual alarm

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.



NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

Double wall tank with remote fill and remote pump. Note: Interstitial Monitoring Gauge not shown.



BILL OF MATERIALS	
PRIMARY HEADS & SHELLS	
MARK QTY	DESCRIPTION
2	10 GA. 61" x 60" PLATE (HEAD)
1	10 GA. 60" WIDE x 152" LONG SHEET (SHELL)
1	10 GA. 72" WIDE x 152" LONG SHEET (SHELL)
1	10 GA. 51" x 60" PLATE (HEAD/HEAD)
SECONDARY HEADS & SHELLS	
MARK QTY	DESCRIPTION
2	10 GA. 60" x 60" PLATE (HEADS)
2	10 GA. 72" WIDE x 171" LONG SHEETS (SHELL)
FITTINGS	
MARK QTY	DESCRIPTION
2	4"x8" T.O.E. NIPPLE w/ 4" E. VENT END CARB 0366-03-404F (PRI)
1	8"x8" T.O.E. NIPPLE w/ 8" E. VENT END CARB 0366-03-804F (SEC)
8	2"x2" T.O.E. NIPPLES
4	4"x8" T.O.E. NIPPLES
1	2" SCH 40 PIPE 66" LG w/ 2" FULL COUP (MONITOR WELL)
3	2" PIPE TANK FLANGES w/ PLUGS (PERLITE VENTS)
ATTACHMENTS	
MARK QTY	DESCRIPTION
2	FIREGUARD LIFT LUG 10" x 10" x 1/2"
2	3"x 2" SPACERS
2	FD-54-1 UL SADDLES
4	RPA 4-C GROUND LUG
2	WEARPAD 10GA x 6" WIDE x 84 1/2" LONG
34	ESTIMATED TONS OF PERLITE

1,000 Gallon 48" x 144" Double Wall Horizontal Fireguard Storage Tank Compartmented (500 Gals - 500 Gals) (Diesel - Gasoline)

- NOTES:**
- TANK IS TO BE FABRICATED IN ACCORDANCE WITH UL 2085 (FIREGUARD) SPECIFICATIONS, ATTACH LABELS.
 - AFTER COMPLETING PRIMARY TANK, TEST IT WITH 3 TO 5 PSIG AIR PRESSURE AND APPLY A LEAK DETECTION SOLUTION TO ALL OUTSIDE WELDS. REPAIR ANY LEAKS, AND RE-TEST.
 - AFTER TESTING PRIMARY TANK, COMPLETE SECONDARY TANK AND APPLY 3 TO 5 PSIG MAXIMUM AIR PRESSURE TO PRIMARY TANK. RELEASE 3 TO 5 PSIG AIR PRESSURE INTO INTERSPACE FROM PRIMARY TANK. MAINTAIN PRESSURE AND APPLY A LEAK DETECTION SOLUTION TO ALL WELDS. REPAIR ANY LEAKS, AND RE-TEST.
 - AFTER PERLITE IS PUMPED INTO INTERSPACE, PLUG MUST BE SEAL WELDED.
 - TANK EXTERIOR IS TO BE SANDBLASTED & PAINTED w/ 1 COAT OF WHITE POLYURETHANE (5-B TOTAL MILS).

EST WT = 7,500 LB

TANK

ENGINEERED

DATE: 8/21/18

BY: [Signature]

FOR: 1,000 GALLON HORIZ. DW FIREGUARD TANK #48" X 144" LG (PRI)

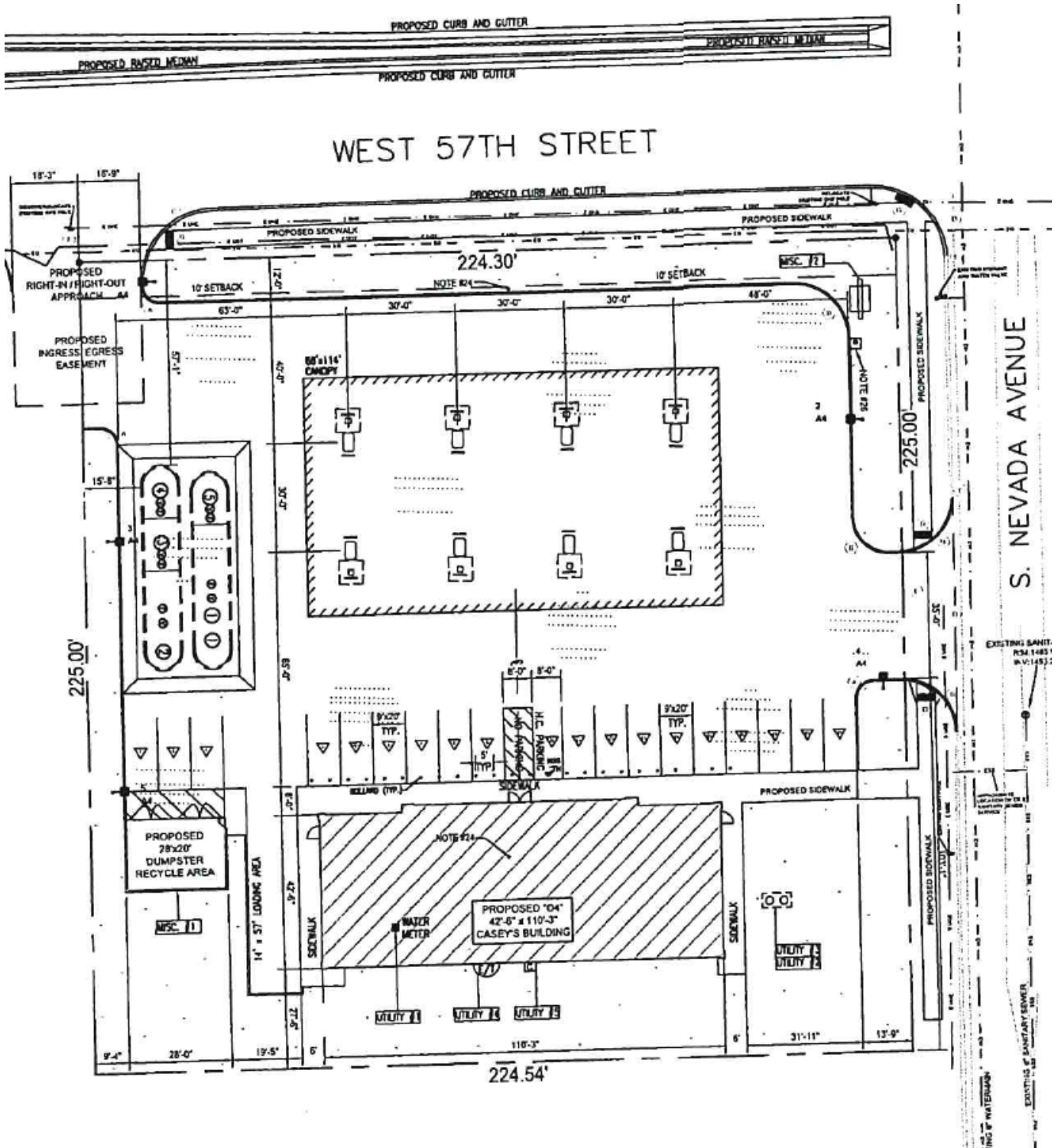
BY: [Signature]

DATE: [Blank]

STATUS: QUOTE

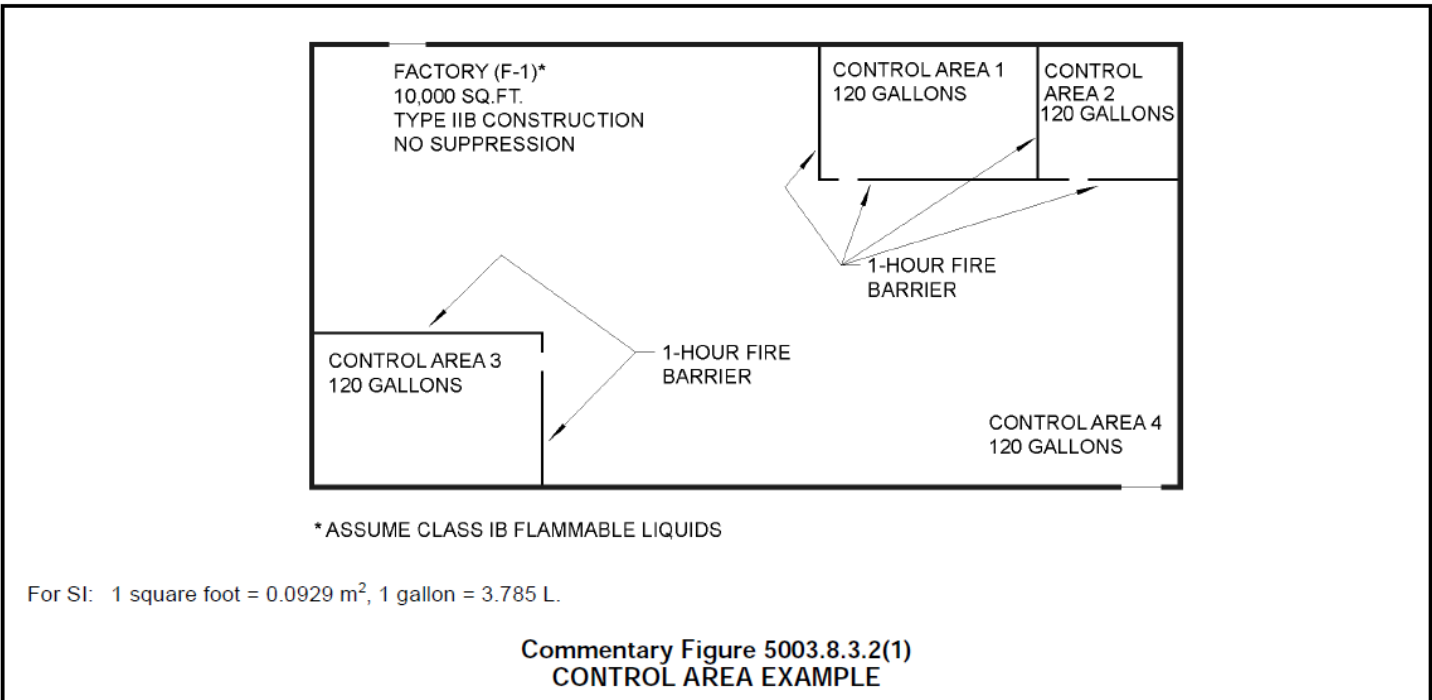
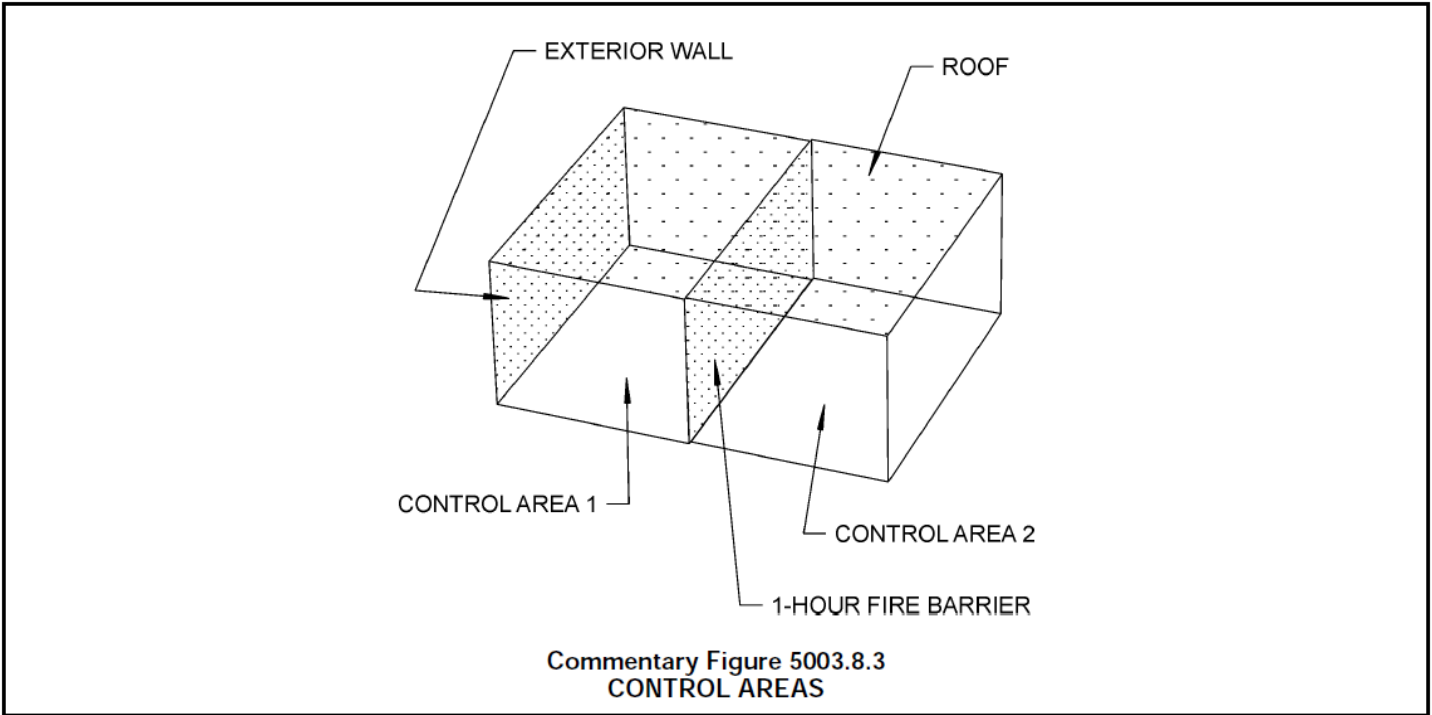
NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

3. Example of a Site Plan to Scale



NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

4. Example of Control Area to Increase Maximum Allowable Quantity of Flammable and Combustibles Inside a Building



NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

5. Example of Class I Division I or Class I Division 2 Wiring

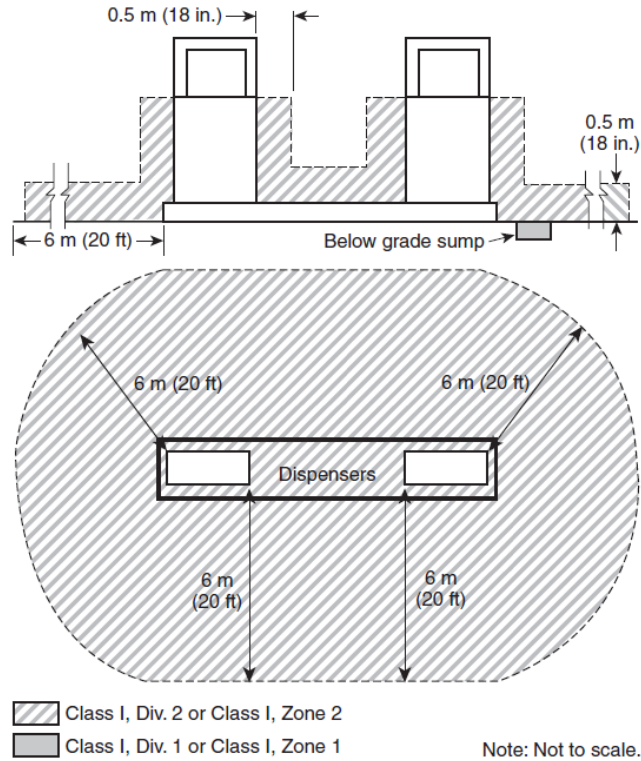


FIGURE 8.3.2(a) Classified Areas Adjacent to Dispensers.

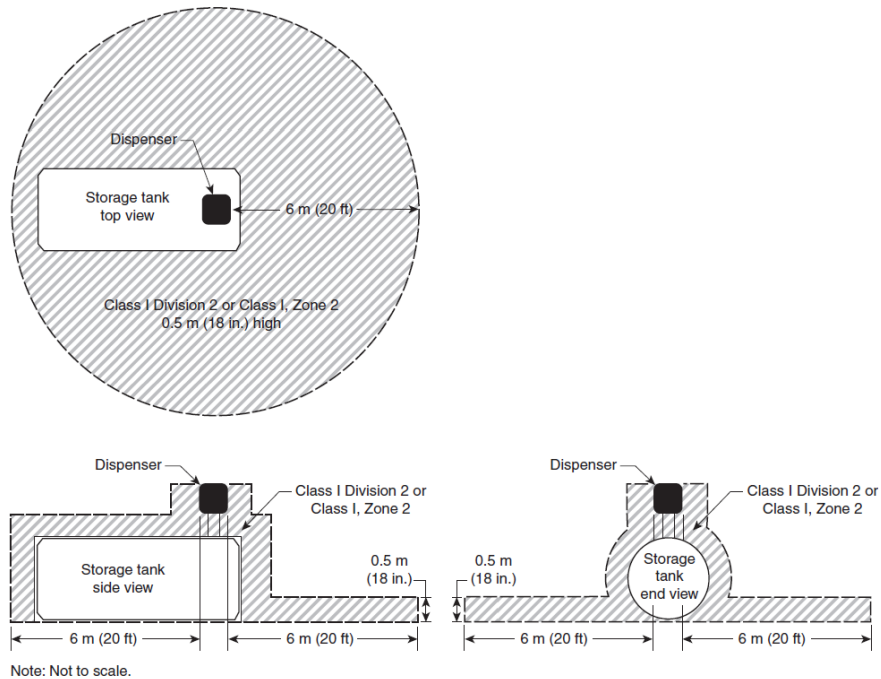
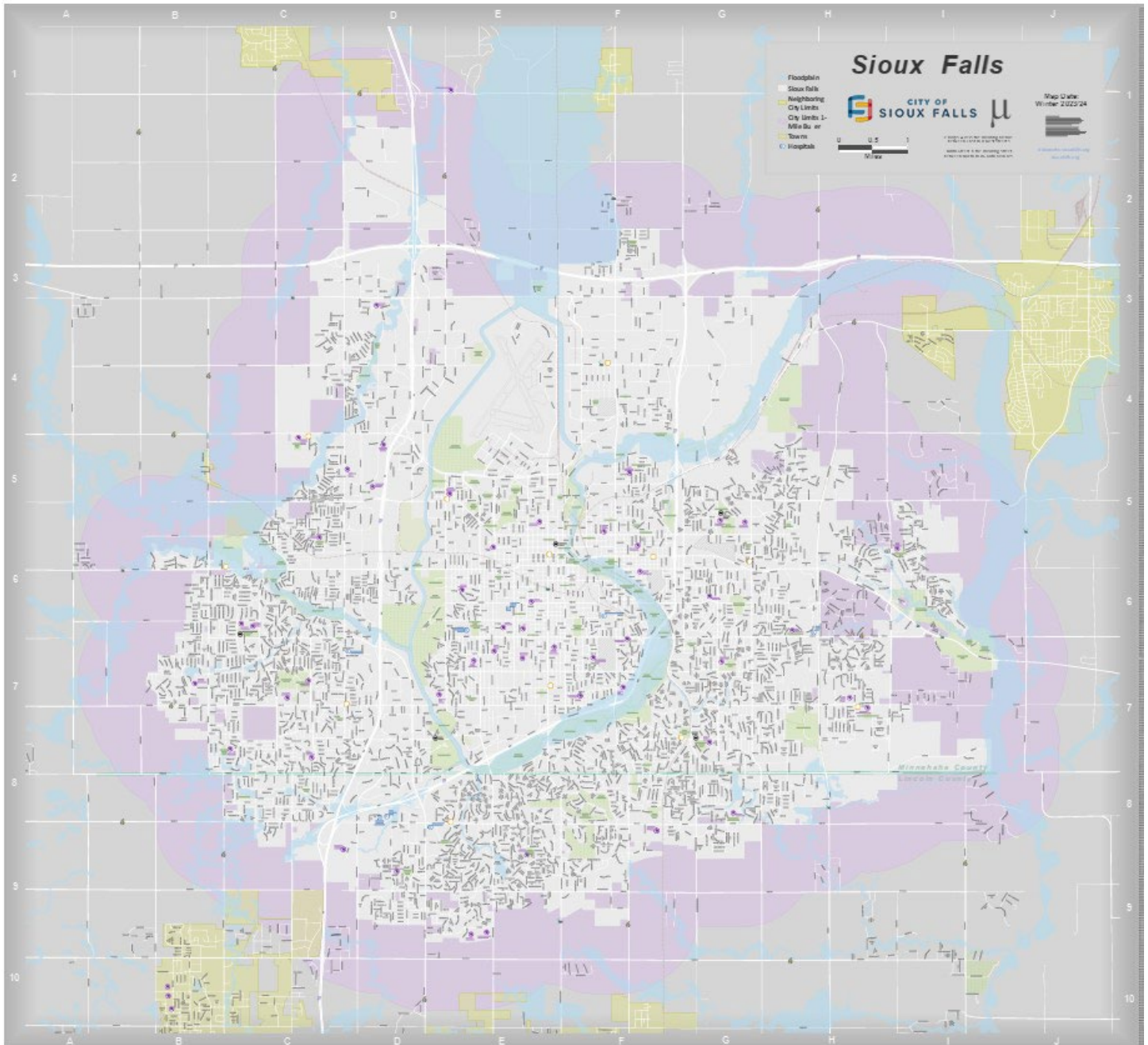


FIGURE 8.3.2(b) Classified Areas Adjacent to Dispenser Mounted on Aboveground Storage Tank.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.

6. City Boundaries Map Requiring a Permit for Tank Installation



2023 Sioux Falls City limits map (white) which includes the 1-mile buffer (Purple). Reminder any tank being installed in the blue flood plan areas will need to be properly anchored. If a tank is installed and falls within the 1-mile buffer but is within a green area (neighboring city limits) the tank installation will be within the neighboring city's jurisdiction (code) or the state fire marshal. For a PDF version of this map, go to, https://css.siouxfalls.gov/documents/City_of_Sioux_Falls_Floodplain_Boundary_with_1_mile_buffer.pdf.

NOTE: This is a general checklist for AST for flammable and combustible liquids and is not all inclusive.