

NFPA 30

Aboveground Tank Installation

Chapter 4 Tank Storage

4.1 General.

4.1.1 Scope. This chapter shall apply to the following:

- (1) The storage of flammable and combustible liquids, as defined in 1.7.3, in fixed aboveground tanks
- (2) The storage of flammable and combustible liquids in portable tanks and bulk containers whose capacity exceeds 250 gal (1136 Liters)
- (3) The design, installation, operation and maintenance of such tanks, portable tanks, and bulk containers.

4.2 Design and Construction of Tanks.

4.2.1 General Requirements. Tanks shall be permitted to be of any shape, size, or type consistent with sound engineering. Metal tanks shall be welded according to ASME standards

4.2.2 Materials of Construction. Tanks shall be designed and built in accordance with recognized good engineering standards for the material of construction being used. Tanks shall be of steel or other approved noncombustible material, with the following limitations and exceptions:

- (a) The materials of construction for tanks and their appurtenances shall be compatible with the liquid to be stored. In case of doubt about the properties of the liquid to be stored, the supplier, producer of the liquid, or other competent authority shall be consulted.
- (b) Tanks shall be permitted to be constructed of combustible materials only when approved by the authority having jurisdiction.

4.2.3 Design Standards

4.2.3.1 Design Standards for Atmospheric Tanks

2.2.3.1.1 Atmospheric tanks, including those incorporating secondary containment, shall be designed and constructed in accordance with recognized standards or approved equivalents. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 4.2.3.1

- (1) UL 142, *Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids*; UL 2080 *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*; or UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*
- (2) API Standard 650. *Welded Steel Tanks for Oil Storage*

4.2.4 Design of Tank Supports

- 4.2.4.1** Supports for tanks shall be designed and constructed in accordance with recognized standards or approved equivalents
- 4.2.4.2** Tanks shall be supported in a manner that prevents excessive concentration of loads on the supported portion of the shell
- 4.2.4.3** In areas subject to earthquakes, tank supports and connections shall be designed to resist damage as a result of such shocks

4.2.5 Design of Tank Vents

4.2.5.1 Normal Venting for Tanks

4.2.5.1.2 Normal vents shall be sized in accordance with API Standard 2000, *Venting Atmospheric and Low-Pressure Storage Tanks*, or another accepted standard. Alternatively the normal vent shall be at least as large as the largest filling or withdrawal connection but in no case shall it be less than 1.25 in. (32 mm) nominal inside diameter.

4.2.7 Vaults for Aboveground Tanks

4.2.7.2 General. Aboveground tanks shall be permitted to be installed in vaults that meet the requirements of 4.2.7. Except as modified by the provisions of 4.2.7, vaults shall meet all other applicable provisions of this code. Vaults shall be constructed and listed in accordance with UL 2245, *Standard for Below-Grade Vaults for Flammable Liquid Storage Tanks*. Vaults shall be permitted to be either above or below grade.

4.2.7.3 Vault Design and Construction. Vaults shall be designed and constructed to meet the following requirements:

- (a) The walls and floor of the vault shall be constructed of reinforced concrete at least 6 in. (150 mm) thick.
- (b) The top of an above grade vault that contains a tank storing Class I flammable liquid or Class II liquid when stored at temperatures above its flash point shall be constructed of noncombustible material and shall be designed to be weaker than the walls of the vault to ensure that the thrust of any explosion occurring inside the vault is directed upward before destructive internal pressure develops within the vault. The top of an at grade or below grade vault that contains a tank storing Class I flammable liquid or Class II liquid when stored at temperatures above their flash point shall be designed to relieve or contain the force of any explosion occurring inside the vault.

- (c) The vault shall be liquid tight
- (d) The vault shall be provided with an approved means to admit a fire suppression agent.
- (e) The vault shall be provided with a means for personnel entry

4.2.7.4 Tank Selection and Arrangement. Tanks shall be listed for aboveground use. Each tank shall be in its own vault and shall be completely enclosed by the vault. Sufficient clearance between the tank and the vault shall be provided to allow for visual inspection and maintenance of the tank and its appurtenances. Backfill shall not be permitted around the tank.

4.2.7.5. Tank Appurtenances

4.2.7.5.1 Vent pipes that are provided for normal tank venting shall terminate outside and at least 12 ft above ground level.

4.3.1.4 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 maximum flood stage

4.3.2 Installation of Aboveground Tanks

4.3.2.1 Location with Respect to Property Lines, Public Ways, and Important Buildings on the Same Property

4.3.2.1.1 Tanks storing Class 1, Class II, or Class IIIA stable liquids and operating at pressures not in excess of 2.5 psig shall be located in accordance with the following table:

Tank Capacity (gal)	Minimum Distance from Property Line that is or Can Be built upon, including the Opposite Side of a Public Way (ft)	Minimum Distance from Nearest side of Any Public Way or from Nearest Important Building on the Same Property (ft)
275 or less	5	5
276 to 750	10	5
751 to 12,000	15	5
12,001 to 30,000	20	5

4.3.2.1.5 Tanks storing IIIB stable liquids shall be located in accordance with table 2.3.2.1.5.

Table 4.3.2.1.5 Class IIIB Liquids

Tank Capacity (gal)	Minimum Distance from Property Line that is or Can Be built upon, including the Opposite Side of a Public Way (ft)	Minimum Distance from Nearest side of Any Public Way or from Nearest Important Building on the Same Property (ft)
12,000 or less	5	5

4.3.2.3 Control of Spills from Aboveground Tanks. Every tank that contains a Class I, Class II, or Class IIIA liquid shall be provided with means to prevent an accidental release of liquid from endangering important facilities and adjoining property from reaching waterways. Such means shall meet the requirements of 4.3.2.3.3.

4.3.2.3.3 Secondary Containment Tanks. Where a secondary containment tank is used to provide spill control, the tank shall meet all of the following requirements:

- (a) The capacity of the tank shall not exceed 12,000 gal.
- (b) All piping connections to the tank shall be made above the normal maximum liquid level.
- (c) Means shall be provided to prevent the release of liquid from the tank by siphon flow.
- (d) Means shall be provided for determining the level of liquid in the tank. This means shall be accessible to the delivery operator
- (e) Means shall be provided to prevent overfilling by sounding an alarm when the liquid level in the tank reaches 90 percent of capacity and by automatically stopping delivery of liquid to the tank when the liquid level in the tank reaches 95 percent of capacity. In no case shall these provisions restrict or interfere with the proper functioning of the normal vent or the emergency vent
- (f) Spacing between adjacent tanks shall not be less than 3 ft.
- (g) The tank shall be capable of resisting the damage from the impact of a motor vehicle or suitable collision barriers shall be provided.
- (h) Where the means of secondary containment is enclosed it shall be provided with emergency venting in accordance with 4.2.5.2
- (i) Means shall be provided to establish the integrity of the secondary containment, in accordance with 4.4.2.3 and 4.4.2.4. The secondary containment shall be designed to withstand the hydrostatic head resulting from a leak from the

primary tank of the maximum amount of liquid that can be stored in the primary tank

4.3.2.4 Vent Piping for Aboveground Tanks. Piping for normal and emergency relief valve venting shall be constructed in accordance with chapter 5 of NFPA 30.

4.3.2.5 Tank Openings Other than Vents for Aboveground Tanks

4.3.2.5.1 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 each tank.

4.3.2.5.2 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.

4.3.2.5.3 Openings for gauging on tanks storing Class I liquids shall be provided with a vapor tight cap or cover.

4.3.2.5.4 Fill pipes that enter the top of a tank shall terminate within 6 in. of the bottom of the tank. Fill pipes shall be installed or arranged so that vibration is minimized.

4.3.2.5.5 Filling and emptying connections for Class I, Class II, and Class III liquids that are connected and disconnected shall be outside of buildings at a location free from any source of ignition. They shall be located not less than 5 ft 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.

4.3.2.6 Requirements for Aboveground Tanks Located in Areas Subject to Flooding.

4.3.2.6.1 Vertical tanks shall be located so that the tops of the tanks extend above the maximum flood stage by at least 30 percent of their allowable storage capacity.

4.3.2.6.2 Horizontal tanks that are located where more than 70 percent of the tank's storage capacity will be submerged at the established flood stage shall be secured by one of the following methods:

1. Anchor to resist movement
2. Attach to a foundation of steel and concrete or of concrete having sufficient weight to provide adequate load for the tank when filled with liquid and submerged by floodwater to the established flood stage.
3. Adequately secured from floating by other means

4.3.2.6.3 Tank vents or other openings that are not liquid tight shall extend above the maximum flood stage water level.

4.3.2.6.4 A dependable water supply shall be available for filling an empty or partially filled tank.

Exception: Where filling the tank with water is impractical or hazardous because of the contents of the tank, the tank shall be protected by other means against movement or collapse.

4.3.2.6.5 Spherical or spheroid tanks shall be protected by any of the methods specified in this subsection.

4.3.2.7 Collision Protection. Where a tank might be exposed to vehicular damage, protection shall be provided to prevent damage to the tank.

4.3.2.8 Installation Instructions. Factory-built aboveground tanks shall be provided with instructions for testing and for installation of the normal and emergency vents.

4.4 Testing Requirements for Tanks.

4.4.1 Initial Testing. All tanks, whether shop-built or field erected, shall be tested before they are placed in service in accordance with the applicable requirements of the code under which they were built.

4.4.1.1 An approved listing mark on a tank shall be considered to be evidence of compliance with this requirement. Tanks not marked in accordance with this subsection shall be tested before they are placed in service in accordance with good engineering principles or in accordance with the requirements for testing in the codes listed in 4.2.3.1.1, 4.2.3.2.1, or 4.2.3.3.1.

4.4.1.2 Where the vertical length of the fill and vent pipes is such that, when filled with liquid, the static head imposed on the bottom of the tank exceeds 10 psig (69 kPa), the tank and its related piping shall be tested hydrostatically to a pressure equal to the static head thus imposed. In special cases where the height of the vent above the top of the tank is excessive, the hydrostatic test pressure shall be determined by using recognized engineering practice.

4.4.1.3 Before the tank is initially placed in service, all leaks or deformations shall be corrected in an acceptable manner. Mechanical caulking shall not be permitted for correcting leaks in welded tanks except for pinhole leaks in the roof.

4.4.1.4 Tanks to be operated at pressures below their design pressure shall be tested by the applicable provisions of 4.4.1.1 or 4.4.1.2 based upon the pressure developed under full emergency venting of the tank.

4.4.2* Tightness Testing. In addition to the tests called for in 4.4.1, all tanks and connections shall be tested for tightness after installation and before being placed in service in accordance with 4.4.2.1 through 4.4.2.4, as applicable. Except for underground

tanks, this test shall be made at operating pressure with air, inert gas, or water. Air pressure shall not be used to test tanks that contain flammable or combustible liquids or vapors. *(See Section 6.6 for testing pressure piping.)*

Exception: FM field-erected tanks, the tests required by 4.4.1.1 or 4.4.1.2 shall be permitted to be considered the test for tank tightness.

4.4.2.1 Horizontal shop-fabricated aboveground tanks shall be tested for tightness either hydrostatically or with air pressure at not less than 3 psig (gauge pressure of 20.6 kPa) and not more than 5 psig (gauge pressure of 34.5 kPa). Vertical shop-fabricated aboveground tanks shall be tested for tightness either hydrostatically or with air pressure at not less than 1.5 psig (gauge pressure of 10.3 kPa) and not more than 2.5 psig (gauge pressure of 17.3 kPa).

4.4.2.2 Single-wall underground tanks and piping, before being covered, enclosed, or placed in use, shall be tested for tightness either hydrostatically or with air pressure at not less than 3 psig (gauge pressure of 20.6 kPa) and not more than 5 psig (gauge pressure of 34.5 kPa).

4.4.2.3 Underground secondary containment tanks and horizontal aboveground secondary containment tanks shall have the primary (inner) tank tested for tightness either hydrostatically or with air pressure at not less than 3 psig (gauge pressure of 20.6 kPa) and not more than 5 psig (gauge pressure of 34.5 kPa). The interstitial space (annulus) of such tanks shall be tested either hydrostatically or with air pressure at 3 to 5 psig (gauge pressure of 20.6 to 34.5 kPa), by vacuum at 5.3 in. Hg (17.9 kPa), or in accordance with the tank's listing or manufacturer's instructions. 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. Care shall be taken to ensure that the interstitial space is not over pressured or subjected to excessive vacuum.

4.4.2.4 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 10 kPa (1.5 psig) and not more than a gauge pressure of 17 kPa (2.5 psig). The interstitial space (annulus) of such tanks shall be tested either hydrostatically at a gauge pressure of 10 to 17 kPa (1.5 to 2.5 psig), by vacuum at 18 kPa (5.3 in Hg), or in accordance with the tank's listing or manufacturer's instructions. The pressure or vacuum shall be held for 1 hour without evidence of leaks. Care shall be taken to ensure that the interstitial space is not over pressured or subjected to excessive vacuum.

4.4.3* Additional Testing. Tanks that have been relocated, structurally damaged, repaired, or are suspected of leaking shall be tested in a manner acceptable to the authority having jurisdiction.

4.5.3.4* Static Electricity. All equipment such as tanks, machinery, and piping shall be designed and operated to prevent electrostatic ignitions. All metallic equipment where an ignitable mixture could be present shall be bonded or grounded. The bond or ground or both shall be physically applied or shall be inherently present by the nature of the

installation. Any electrically isolated section of metallic piping or equipment shall be bonded or grounded to prevent hazardous accumulation of static electricity. All nonmetallic equipment and piping where an ignitable mixture could be present shall be given special consideration.

4.5.3.5 Electrical Installations. Design, selection, and installation of electrical wiring and electrical utilization equipment shall meet the requirements of Chapter 6 of the 2003 Edition of NFPA 30.

4.5.7 Inspection and Maintenance.

4.5.7.1 All fire protection equipment shall be properly maintained and periodic inspections and tests shall be done in accordance with both standard practice and equipment manufacturer's recommendations.

4.5.7.2 Maintenance and operating practices at tank storage facilities shall control leakage and prevent spillage of liquids.

4.5.7.3 Ground areas around tank storage facilities shall be kept free of weeds, trash, or other unnecessary combustible materials.

4.5.7.4 Access ways established for movement of personnel shall be maintained clear of obstructions to permit orderly evacuation and ready access for manual fire fighting.

4.5.7.5 Combustible waste material and residues in operating areas shall be kept to a minimum, stored in covered metal containers, and disposed of daily.

4.6.4 Temporary or Permanent Removal from Service of Aboveground Tanks.

4.6.4.1 * Closure of Storage Tanks. Aboveground tanks taken out of service or abandoned shall be emptied of liquid, rendered vapor-free, and safeguarded against trespassing.

4.6.4.2 Reuse of Aboveground Storage Tanks. Only those used tanks that comply with the applicable sections of this code and are approved by the authority having jurisdiction shall be installed for flammable or combustible liquids service.

4.6.7 Tank Maintenance.

4.6.7.1* Each tank shall be inspected and maintained to ensure compliance with the requirements of this code. Testing requirements for tanks shall be in accordance with Section 4.4

4.6.7.2 Each tank shall be maintained liquid tight. Each tank that is leaking shall be emptied of liquid or repaired in a manner acceptable to the authority having jurisdiction.

4.6.7.3 Tanks that have been structurally damaged, have been repaired or reconstructed, or are suspected of leaking shall be tested in accordance with **4.4.1** or in a manner acceptable to the authority having jurisdiction.

4.6.7.4* Tanks and all tank appurtenances, including normal vents and emergency vents and related devices, shall be properly maintained to ensure that they function as intended.

4.6.7.5 Openings for gauging on tanks storing Class I liquids shall be provided with a vapor tight cap or cover. Such covers shall be closed when not gauging.

Chapter 5 Piping Systems

5.1 Scope.

5.1.1 This chapter shall apply to piping systems consisting of pipe, tubing, flanges, bolting, gaskets, valves, fittings, flexible connectors, the pressure-containing parts of other components such as expansion joints and strainers, and devices that serve such purposes as mixing, separating, snubbing, distributing, metering, controlling flow, or secondary containment of liquids and associated vapors.

5.1.2 This chapter shall not apply to any of the following:

- (1) Tubing or casing on any oil or gas wells and any piping
Connected directly thereto
- (2) Motor vehicles, aircraft, boats, or piping that are integral
To a stationary engine assembly
- (3) Piping within the scope of any applicable boiler and pres-
Sure vessel code

5.2 General Requirements.

5.2.1 Performance Standards. The design, fabrication, assembly, test, and inspection of piping systems shall be suitable for the expected working pressures and structural stresses. Compliance with applicable sections of ASME B31, *Code for Pressure Piping*, and the provisions of this chapter shall be considered prima facie evidence of compliance with the foregoing provisions.

5.2.2 Tightness of Piping. Piping systems shall be maintained liquid tight. A piping system that has leaks that constitute a hazard shall be emptied of liquid or repaired in a manner acceptable to the authority having jurisdiction.

5.3 Materials for Piping Systems.

5.3.1 Material Specifications. Pipe, valves, faucets, couplings, flexible connectors, fittings, and other pressure-containing parts shall meet the material specifications and pressure and temperature limitations of ASME B31, *Code for Pressure Piping*, except as provided for in 5.3.2, 5.3.3, and 5.3.4.

5.3.2 Ductile Iron. Ductile (nodular) iron shall meet the specifications of ASTM A 395, *Ferritic Ductile Iron Pressure Retaining Castings for Use at Elevated Temperatures*.

5.3.3 Materials of Construction of Valves. Valves at storage tanks, as required by 4.3.2.5.1 and 4.3.4.7.3, and their connections to the tank shall be of steel or ductile iron, except as provided for in 5.3.3.1, 5.3.3.2, or 5.3.4.

5.3.3.1 Valves at storage tanks shall be permitted to be other than steel or ductile iron where the chemical characteristics of the liquid stored are not compatible with steel or where the valves are installed internally to the tank. Valves installed externally to the tank shall be permitted to be other than steel or ductile iron if the material of construction has a ductility and melting point comparable to steel or ductile iron and is capable of withstanding the stresses and temperatures involved in fire exposure or the valves are otherwise protected from fire exposures, such as by materials having a fire resistance rating of not less than 2 hours.

5.3.2 Cast iron, brass, copper, aluminum, malleable iron, and similar materials shall be permitted to be used on tanks described in 4.3.2.2.1 or on tanks storing Class IIIB liquids where the tanks are located outdoors and not within a diked area or drainage path of a tank storing a Class I, Class II, or Class IIIA liquid.

5.3.4 Low Melting Point Materials. Low melting point materials such as aluminum, copper, and brass; materials that soften on fire exposure such as plastics; or nonductile material such as cast iron shall be permitted to be used underground within the pressure and temperature limitations of ASME B31, *Code for Pressure Piping*.

5.3.4.1 Such materials shall be permitted to be used outdoors above ground or inside buildings provided they meet one of the following conditions.

- (1) They are resistant to damage by fire
- (2) They are located so that any leakage resulting from failure will not unduly expose persons, important buildings, or structures
- (3) They are located where leakage can readily be controlled by operation of one or more accessible remotely located valves

5.3.4.2 The piping materials chosen shall be compatible with the liquids being handled. Piping systems of these materials shall be designed and built in accordance with recognized standards of design for the particular materials chosen or with acceptable equivalent standards or shall be listed.

5.3.5 Lining Materials. Piping, valves, and fittings shall be permitted to have combustible or noncombustible linings.

5.3.6 Nonmetallic Piping. Piping systems of nonmetallic materials, including piping systems incorporating secondary containment, shall be designed and built in accordance with recognized standards of design or approved equivalents and shall be installed in accordance with 5.3.4. Nonmetallic piping shall be built and used within the scope of their approvals or within the scope of UL 971, *Standard for Nonmetallic Underground Piping for Flammable Liquids*. Nonmetallic piping systems and components shall be installed in accordance with manufacturers' instructions.

5.4 Pipe Joints.

5.4.1 Tightness of Pipe Joints. Joints shall be made liquid tight and shall be welded,

flanged, threaded, or mechanically attached. They shall be designed and installed so that the mechanical strength of the joint will not be impaired if exposed to a fire. Threaded joints shall be made with a suitable thread sealant or lubricant. Joints in piping systems handling Class I liquids shall be welded when located in concealed spaces within buildings.

5.4.2 Flexible Connectors. Listed flexible connectors shall be permitted to be used where installed in accordance with 5.4.3.

3.4.3 Friction Joints. Pipe joints dependent upon the friction characteristics or resiliency of combustible materials for mechanical continuity or liquid tightness of piping shall only be used outside of buildings above ground or below ground. Where used above ground, either the piping shall be secured to prevent disengagement at the fitting, or the piping system shall be so designed that any spill resulting from disengagement could not unduly expose persons, important buildings, or structures and could be readily controlled by remote valves.

Exception: Pipe joints that depend on friction characteristics of their components shall be permitted to be used inside buildings provided both of the following are met:

(a) They are located where leakage can be readily controlled by operation of an accessible remotely located valve that is outside the fire risk area.

(b) The mechanical strength and liquid tightness of the joint is not dependent on the resiliency of a combustible material or component.

5.5 Installation of Piping Systems.

5.5.1 General. Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion, or contraction. The installation of nonmetallic piping shall be in accordance with the manufacturer's instructions.

5.5.2* Load-Bearing Supports. Load-bearing piping supports that are located in areas with a high fire exposure risk shall be protected by one or more of the following:

- (1) Drainage to a safe location to prevent liquid from accumulating under pipe ways
- (2) Fire-resistive construction
- (3) Fire-resistant protective coatings or systems
- (4) Water spray systems designed and installed in accordance with NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*
- (5) Other alternate means acceptable to the authority having jurisdiction

5.5.3 Pipe Penetrations. Piping that passes through or pierces a dike wall or the wall of a structure shall be designed to prevent excessive stresses and leakage due to settlement or fire exposure.

5.5.4* Protection Against Corrosion. Aboveground piping systems that are subject to external corrosion shall be suitably protected. Underground piping systems shall be protected against corrosion in accordance with 4.2.6.

5.5.5 Underground Piping.

5.5.5.1 Underground piping shall be installed on a bedding of at least 6 in. (150 mm) of well-compacted backfill material.

5.5.5.2 In areas subject to vehicle traffic, the pipe trench shall be of sufficient depth to permit a cover of at least 18 in. (450 mm) of well-compacted backfill material and pavement. In paved areas where a minimum 2 in. (50 mm) of asphalt is used, backfill between the pipe and the asphalt can be reduced to 8 in. (200 mm) minimum. In paved areas where a minimum 4 in. (100 mm) of reinforced concrete is used, backfill between the pipe and the concrete can be reduced to 4 in. (100 mm) minimum.

5.5.5.3 In areas not subject to vehicle traffic, the pipe trench shall be of sufficient depth to permit a cover of at least 6 in. (150 mm) 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.

5.5.5.4 Piping within the same trench shall be separated by two pipe diameters. Piping shall not need to be separated horizontally by more than 9 in. (230 mm).

5.5.5.5 Two or more levels of pipes within the same trench shall be separated vertically by a minimum 6 in. (150 mm) of well-compacted backfill.

5.5.6 Valves. Piping systems shall contain a sufficient number of valves to operate the system properly and to protect the equipment. Piping systems in connection with pumps shall contain a sufficient number of valves to properly control the flow of liquid both in normal operation and in the event of physical damage. Each connection to a piping system by which equipment such as tank cars, tank vehicles, or marine vessels discharges 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. (*See also 2.3.2.5.1.*)

5.5.7 Common Loading and Unloading Piping. If loading and unloading is done through a common pipe system, a check valve shall not be required. However, an isolation valve shall be provided. This valve shall be located so that it is readily accessible or shall be remotely operable.

5.6 Testing.

5.6.1 Initial Testing. Unless tested in accordance with the applicable sections of ASME B31, *Code for Pressure Piping*, all piping shall be tested before being covered, enclosed, or placed in use. Testing shall be done hydrostatically to 150 percent of the maximum anticipated pressure of the system or pneumatically to 110 percent of the maximum anticipated pressure of the system, and the test pressure shall be maintained for a sufficient time to conduct a complete visual inspection of all joints and connections. In no case shall the test pressure be less than 5 psig (gauge pressure of 34.5 kPa) measured at the highest point of the system, and in no case shall the test pressure be maintained for less than 10 minutes.

5.6.2 Initial Testing of Secondary Containment Piping. The interstitial (annular) space

of secondary containment-type piping shall be tested hydrostatically or with air pressure at 5 psig (gauge pressure of 34.5 kPa) or shall be tested in accordance with its listing or with the manufacturer's instructions. The pressure source shall be disconnected from the interstitial space to ensure that the test is being conducted on a closed system. The pressure shall be maintained for a minimum of 1 hour.

5.6.3 Testing During Maintenance. Existing piping shall be tested in accordance with this subsection if there is indication that the piping is leaking. Piping that could contain a Class I, Class II, or Class IIIA liquid or vapor shall not be tested using air.

5.7 Vent Piping. Vent piping shall be designed, constructed, and installed in accordance with this section.

5.7.1 Vent Piping for Aboveground Tanks.

5.7.1.1 Where the outlets of vent pipes for tanks storing Class I liquids are adjacent to buildings or public ways, they shall be located so that vapors are released at a safe point outside of buildings and not less than 12 ft (3.6 m) above the adjacent ground level. Vapors shall be discharged upward or horizontally away from adjacent walls. Vent outlets shall be located so that vapors will not be trapped by eaves or other obstructions and shall be at least 5 ft (1.5 m) from building openings.

5.7.1.2 Manifolding of vent piping shall be avoided except where required for special purposes such as vapor recovery, vapor conservation, or air pollution control. Where vent piping is manifolded, pipe sizes shall be capable of discharging, within the pressure limitations of the system, the vapors they are required to handle when all manifolded tanks are subject to the same fire exposure.

5.7.1.3 Vent piping for tanks storing Class I liquids shall not be manifolded with vent piping for tanks storing Class II or Class III liquids unless positive means are provided to prevent the following:

- (1) Vapors of Class I liquids from entering tanks storing Class II or Class III liquids
- (2) Contamination (*see A.1.2*)
- (3) Possible change in classification of the less volatile liquid

5.7.1.4* Extension of Emergency Vent Piping. Piping to or from approved emergency vent devices for atmospheric and low-pressure tanks shall be sized to provide emergency vent flows that limit the back pressure to less than the maximum pressure permitted by the design of the tank. Piping to or from approved emergency vent devices for pressure vessels shall be sized in accordance with the ASME *Boiler and Pressure Vessel Code*.