6 NYCRR PART 599
STANDARDS FOR NEW HAZARDOUS SUBSTANCE TANK SYSTEMS

(Statutory authority: Environmental Conservation Law sections 1-0101, 3-0301, 3-0303, 17-0301, 17-0303, 17-0501, 17-1743, 37-0101 through 37-0107, and 40-0101 through 40-0121)

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599.1 General.

(a) *Purpose*. This Part sets forth standards for all new tank systems.

(b) *Applicability*.

(1) This Part applies to facilities described under section 596.1(b) of this Title.

(2) Beginning on February 11, 1995, all new tank systems must be constructed, designed and installed pursuant to the provisions of this Part.

(c) *Definitions*. The definitions found in section 596.1(c) of this Title shall apply to this Part.

(d) *Severability*. If any provision of this Part or its application to any person or circumstance is held to be invalid, the remainder of this Part and the application of that provision to other persons or circumstances shall not be affected.

(e) *Variances*.

(1) The department may, upon written request from any person subject to this Part, grant a variance from one or more specific provisions of this Part. An application for a variance must:

(i) identify the specific provisions of this Part from which a variance is sought;

(ii) demonstrate that compliance with the identified provisions would, on the basis of conditions unique to the person's particular situation, tend to impose a substantial economic, technological or safety burden on the person; and

(iii) demonstrate that the proposed activity will have no significant adverse impact on the public health, safety, welfare or the environment and will be consistent with the provisions of the ECL and the performance expected from application of this Part.

(2) The department may not grant any variance which would result in regulatory controls less stringent than those in 40 CFR parts 280 and 281 (see section 598.1(j) of this Title).

(3) In granting any variance, the department may impose specific conditions necessary to assure that the subject activity will have no significant adverse impact on the public health, safety, welfare or the environment.

(f) *Confidentiality*. Any person submitting information to the department pursuant to this Part may, at the time of submission, request that the department exempt such information from disclosure under paragraph (d) of subdivision (2) of section 87 of the Public Officers Law.

All requests under this section must be made in accordance with the provisions of section 616.7 of this Title and all determinations will be made pursuant to that section.

(g) *Enforcement*. Any person who violates any of the provisions of this Part, or any order issued by the department, shall be liable for the civil, administrative and criminal penalties set forth in article 71 of the Environmental Conservation Law.

(h) *References*. Citations used in this Part refer to the publications listed in section 598.1(j) of this Title. These publications are available for inspection at the Department of Environmental Conservation, 625 Broadway, Albany, NY 12233-7020.

(i) *Access to records and tank systems.* Any designated officer or employee of the department shall have the right of access as provided in section 596.1(e) of this Title.

(j) *Use of equivalent technology*. Where specified in this Part, the department may approve the use of an equivalent technology method or practice by any person subject to this Part. A request to use equivalent technology must:

(1) identify the applicable provision of this Part;

(2) include evidence, including but not limited to data, plans, specifications and test results that demonstrate that the technology, method or practice desired to be used will protect the public health, safety and welfare and the environment in a manner which equals or exceeds the requirements of the applicable provision of this Part.

599.2 General requirements for underground tank systems.

(a) *New underground tank systems - summary of requirements*. Beginning on February 11, 1995, owners and operators of new underground tanks must meet the following requirements:

(1) tanks must be designed in accordance with section 599.3 of this Part;

(2) secondary containment must be designed, constructed and installed as specified in section 599.4 of this Part;

(3) a leak monitoring system must be installed as specified in sections 599.5 and 599.15 of this Part;

(4) tank systems must be installed as specified in section 599.6 of this Part;

(5) New piping being connected to the tank must be designed, constructed and installed as specified in sections 599.12 through 599.16 of this Part;

(6) spill/overfill prevention equipment must be installed as specified in section 599.17 of this Part; and

(7) vents, gauges and alarms must be installed as specified in section 599.18 of this Part.

(b) *Compliance with Part 598*. New tank systems must meet all of the requirements of this Part and of Part 598 of this Title before being placed in service.

599.3 New underground tanks.

(a) *Label requirements*.

(1) All new underground tanks must bear a permanent stencil, label or plate with the following information:

(i) a manufacturer's or qualified engineer's statement that, "This tank conforms with 6 NYCRR Part 599";

(ii) the standard of design by which the tank was manufactured;

(iii) the hazardous substances which may be stored permanently and compatibly within the tank, or reference to a list available from the manufacturer which identifies substances compatible with all tank materials;

(iv) the year in which the tank was manufactured;

(v) the dimensions, design and working capacity, and model number of the tank; and

(vi) the name of the manufacturer.

(2) A label which shows the information required in subdivision (a) of this section, and in section 596.2(h) of this Title, and the date of installation must be conspicuously displayed and permanently affixed at the fill port. It must be readily visible to the carrier and may be imbedded in concrete, welded to the fill port, or otherwise permanently affixed.

(b) *Tanks subject to scouring*. All new underground tanks subject to scouring by the inflow of hazardous materials or subject to wear from manual gauging must be equipped with wear plates, diffusers or alternate means to prevent localized wear or corrosion. If wear plates are used, they must cover an area of at least 144 square inches and be installed in a manner which avoids crevice corrosion.

(c) *Tank designs*.

(1) Underground tanks must be of sufficient structural strength to withstand normal handling and use. They must be compatible with the hazardous substance to be stored and be protected or resistant to all forms of internal and external wear, vibration, shock and corrosion. They must have a stable foundation under all operating conditions and be protected from fire, heat, vacuum and pressure which might cause tank failure. If fiberglass-reinforced-plastic material is used, the material must be of sufficient density and strength to form a hard, impermeable shell which will not crack, wick, wear, soften or separate under normal service conditions. Tanks must be designed with a minimum 30 years of useful life unless a shorter life expectancy is defined in the spill prevention report.

(2) All new underground tanks, their welds, seams and connecting fittings must be factory tested for tightness using generally accepted engineering practices. All tanks sold in New York State must be guaranteed by the manufacturer to be tight.

(3) All new underground tanks must meet the criteria of this subdivision and must be designed, constructed and installed or certified by a qualified engineer or technician in accordance with one of the following:

(i) ULC Standard S603;

(ii) ASTM D4021-92 (see section 598.1(j) of this Title); or

(iii) any other consensus code, practice or standard developed by a nationally recognized association or independent testing laboratory which meet the specifications of this subdivision.

(d) *Corrosion protection*.

(1) All new underground tanks which are in contact with soil and subject to corrosion must be protected from external corrosion by one of the following:

(i) corrosion resistant materials; or

(ii) a cathodic protection system.

(2) Cathodic protection must consist of one or a combination of the following:

(i) sacrificial anodes and coating;

(ii) impressed current; or

(iii) other method that is designed and installed in accordance with a consensus code, standard or practice developed by a nationally recognized association or

independent testing laboratory such as the following: API Publication No. 1632; ULC-S603.1, or NACE Standard RP-02-85 (see section 598.1(j) of this Title).

(3) The corrosion protection system must be designed and constructed by a qualified engineer or corrosion specialist and must provide a minimum of 30 years of protection against external corrosion. The engineer or specialist must supervise the installation of all field fabricated corrosion protection systems and pre-fabricated systems where necessary to assure that the system has been installed as designed.

(4) Tanks which are protected with sacrificial anodes must be electrically insulated from the piping if the piping is constructed of a conductive material unless the cathodic protection system has been designed to protect the tank and piping. Electrical insulation must be provided by dielectric fittings, bushings, washers, sleeves or gaskets which are chemically stable when exposed to the stored substances and soil.

(5) The cathodic protection system must be installed with a monitor that allows for annual review of the adequacy of protection.

(6) The tank must be isolated from or protected against stray electric currents which include underground cables, electric machinery, railroad systems and electrical grounding rods.

(7) Tank and piping connections of two dissimilar metals which create a corrosion inducing galvanic cell are prohibited.

(8) External coatings must be fiberglass-reinforced-plastic, epoxy, or other suitable dielectric material with a minimum thickness of 10 mils after curing. The coating must be factory applied or equivalent, have a coefficient of thermal expansion compatible with that of steel and be firmly bonded to the steel. It must be of sufficient strength and density to form a hard, impermeable shell that will not crack, wick, wear, soften, flake or separate and must be non-corrodible under adverse underground electrolytic conditions. The application of the coating must be in strict accordance with the instructions of the supplier of the coating material.

(9) Coatings must be inspected for air pockets, cracks, blisters, and pinholes, and must be electrically tested for coating faults. Any defects must be repaired in accordance with the manufacturer's instructions prior to installation.

599.4 Secondary containment for underground tanks.

(a) *General requirements*.

(1) All new underground tanks must have a secondary containment system. This must consist of one of the following:

(i) a double-walled tank;

(ii) a vault;

(iii) a synthetic liner; or

(iv) any other comparable system designed and installed in accordance with a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory that meets the criteria of this section.

(2) The secondary containment system must:

(i) be designed and constructed with a permeability rate to the substance stored of 1 x 10-6 cm/sec or less;

(ii) be designed, installed and operated to prevent any migration of hazardous substances out of the system to the environment;

(iii) allow for detection and collection of releases, spills and accumulated liquids until the collected material is removed;

(iv) be constructed of, or lined with materials that are compatible with the hazardous substances to be placed in the tank system. It must have sufficient strength and thickness to prevent failure owing to pressure gradients, physical contact with the materials to which it is exposed, climatic conditions, and the normal stress of operation;

(v) be placed on a foundation or base capable of providing support to the secondary containment system, and preventing failure due to settlement, compression or uplift; and

(vi) be provided with a leak detection system that is designed and operated in accordance with section 599.5 of this Part.

(b) *Standards for double-walled tanks*. Double-walled tanks must be designed, constructed and installed in accordance with the following:

(1) the outer wall must contain a release from any portion of the inner wall and must enclose the entire primary tank;

(2) the tank must be designed so that monitoring of the interstitial space for tightness can be readily performed;

(3) there must be no penetrations of any kind through the outer wall into the tank, except top entry manholes and fittings required for filling and emptying the tank, venting the tank, or monitoring the tank;

(4) the outer wall must be resistant to punctures and protected from corrosion in a manner consistent with section 599.3(d) of this Part; and

(5) the outer wall must be designed to contain an inert gas or liquid at a pressure greater than the maximum internal pressure of the inner wall.

(c) *Standards for vaults*. Vaults must be water tight, impervious to leakage of hazardous substances, compatible with the substance in storage, and able to withstand chemical deterioration and structural stresses from internal and external causes. The vault must be a continuous structure with a chemical resistant water stop used at all joints. There must be no drain connections or other entries through the vault except that there may be top entry manholes and other top openings for filling and emptying the tank, venting and for monitoring and pumping of hazardous substances which may leak into the vault. The tank or tanks within the vault must be supported, backfilled or bedded in a manner consistent with generally acceptable engineering practices.

(d) *Standards for synthetic liners*. Synthetic liners must be compatible with the substance in storage, be at least 60 mils in thickness and not deteriorate in an underground environment. The life expectancy of the liner must be specified in the spill prevention report. All punctures, tears or inadequate seams in the liner must be repaired prior to backfilling. The liner must be installed with a slope to the sump of at least one-quarter of an inch per foot. Since some chemicals will readily diffuse through a synthetic liner, the liner used must have been tested and found resistant to diffusion of the substance stored.

599.5 Monitoring at new underground tanks.

All new underground tanks must be equipped with leak detection equipment capable of detecting leakage between the tank and secondary containment and monitored as specified in section 598.6(b)(2) of this Title.

599.6 Installation of underground tank systems.

(a) *Backfill*. Backfill material must be a non-corrosive, porous, homogeneous substance placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.

(b) *Burial depth*. Underground tanks must be installed at a depth consistent with NFPA 30, section 2-4.2.

(c) *Avoiding floatation*. When subject to the buoyancy effect of water, underground tanks must be anchored to prevent floatation.

(d) *Connections*.

(1) All connections to new underground tanks must be located within a containment chamber constructed of a compatible material and capable of containing hazardous substance leaks from the connections. Such chambers must be fitted with a manhole or other means of access so that connections can be inspected.

(2) Valves and other ancillary equipment must be protected against physical damage by freezing or vehicular traffic.

(e) *Inspection of tank systems.*

(1) Prior to covering, enclosing, or placing a tank system in use, the tank system must be inspected by a qualified inspector for the following:

(i) weld breaks;

(ii) punctures;

(iii) scrapes of protective coatings;

(iv) cracks;

(v) corrosion;

(vi) other structural damage; and

(vii) improper installation.

(2) Before being placed in service., the tank system must be tested for tightness in accordance with generally accepted practices.

(3) If a tank system is found to be leaking or the tank system or installation is deficient such that a leak is possible, the owner or operator must repair the system prior to the system being placed in use.

(4) Upon completion of the test and inspection, the inspector must sign and date a statement certifying that the system meets the standards of this Part.

(5) The inspector's statement and records of the test and repairs must be kept for five years following the date of installation and made part of the spill prevention report.

(f) *Qualifications of tank system installers*. Installation of an underground tank system must be performed by a qualified installer or technician who is trained in the engineering methods for installing underground tank systems.

(g) *Installation instructions*. In addition to the above requirements, all tanks must be installed in strict accordance with the manufacturer's instructions or a consensus code, standard or practice of a nationally recognized association or independent testing laboratory such as API 1615 (see section 598.1(j) of this Title). This includes repair of any damage to tank coatings prior to backfilling.

599.7 General requirements for aboveground tank systems.

(a) *New aboveground tank systems - summary of requirements*. Beginning on February 11, 1995, owners and operators of new aboveground tank systems must meet the following requirements:

(1) tanks must be designed as specified in section 599.8 of this Part;

(2) secondary containment must be designed, constructed and installed as specified in section 599.9 of this Part;

(3) a leak monitoring system must be installed as specified in section 599.10 of this Part;

(4) tank systems must be installed in accordance with section 599.11 of this Part;

(5) new piping being connected to the tank must be designed, constructed and installed as specified in section 599.12 of this Part;

(6) spill/overfill prevention equipment must be installed as specified in section 599.17 of this Part; and

(7) vents and pressure, vacuum and thermal monitoring systems must be installed as specified in section 599.18 of this Part.

(b) *Compliance with Part 598*. New aboveground tank systems must meet the requirements of this Part and Part 598 of this Title before being placed in service.

599.8 New aboveground tanks.

(a) *Tanks subject to scouring*. All new aboveground tanks subject to scouring by the inflow of hazardous materials or subject to wear from manual gauging must be equipped with wear plates, diffusers or alternate means to prevent localized wear or corrosion. If wear plates are used, they must cover an area of at least 144 square inches and be installed in a manner which avoids crevice corrosion.

(b) *Tank designs*.

(1) Aboveground tanks must be of sufficient structural strength to withstand normal handling and use. They must be compatible with the hazardous substance being stored and with adjacent soil. They must be protected from, or resistant to, all forms of internal and external wear, vibration, shock and corrosion. They must have a stable foundation under all operating conditions and be protected from fire, heat, vacuum and pressure which might cause tank failure. Tanks must be protected from physical damage by moving machinery such as forklifts and trucks. If fiberglass-reinforced-plastic material is used, the material must be of sufficient density and strength to form a hard, impermeable shell which will not crack, wick, wear, soften or separate under normal service conditions. All tanks must be designed with a minimum of 30 years of useful life unless a shorter life expectancy is defined in the spill prevention report.

(2) All new aboveground tanks must be designed, constructed and installed or certified by a qualified engineer or technician in accordance with one of the following:

(i) API 650;

(ii) API 620;

(iii) CAN4-S601-M84;

(iv) CAN4-S630-M84;

(v) ASTM D4097-88;

(vi) ASTM D3299-88, (see section 598.1(j) of this Title); or

(vii) a comparable consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory which meet the standards of this section.

(c) *Tanks subject to melting*. All aboveground tanks constructed of plastic, cross-linked polyolefin, high density polyethylene, fiberglass-reinforced-plastic or any other material subject to melting when exposed to fire must be suitably protected against fire and located so that any spill or release resulting from the failure of these materials could not expose persons, or have a significant impact on buildings, structures or the environment.

(d) *Corrosion protection for bottoms of on-ground tanks.*

(1) The bottom of a new on-ground tank must be protected from external corrosion by one of the following:

(i) corrosion resistant materials; or

(ii) a cathodic protection system.

(2) Cathodic protection must consist of one or a combination of the following:

(i) sacrificial anodes and coating;

(ii) impressed current; or

(iii) another method specified in a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory such as API 651 (see section 598.1(j) of this Title).

(3) The cathodic protection system must be designed and constructed by a qualified engineer or corrosion specialist and must provide a minimum of 30 years of protection against external corrosion. The engineer or specialist must supervise the installation of all field fabricated systems and pre-fabricated systems where necessary to assure that the system has been installed as designed.

(4) Tanks which are protected with sacrificial anodes must be electrically insulated from the piping if the piping is constructed of a conductive material, unless the cathodic protection system has been designed to protect the entire tank system. Electrical insulation must be provided by dielectric fittings, bushings, washers, sleeves or gaskets which are chemically stable when exposed to the stored substances and soil.

(5) The cathodic protection system must be installed with a monitor that allows for annual review of the adequacy of protection.

(6) The tank must be isolated from or protected against stray electric currents which include underground cables, electric machinery, railroad systems and electrical grounding rods.

(7) Tank and piping connections of two dissimilar metals which create a corrosion inducing galvanic cell are prohibited.

(8) External coatings must be fiberglass-reinforced-plastic, epoxy, or other suitable dielectric material with a minimum thickness of 10 mils after curing. The coating must have a coefficient of thermal expansion compatible with that of steel and be firmly bonded to the steel. It must be of sufficient strength and density to form a hard, impermeable shell that will not crack, wick, wear, soften, flake or separate and must be noncorrodible under adverse underground electrolytic conditions. The application of the coating must be in strict accordance with the instructions of the supplier of the coating material.

(9) Coatings must be inspected for air pockets, cracks, blisters, and pinholes, and must be electrically tested for coating short circuits or coating faults. Any defects must be repaired in accordance with the manufacturer's instructions prior to installation.

(e) *Manways*. All new aboveground tanks with a design capacity of 5,000 gallons or more must be provided with an access lid or manhole.

(f) *Painting of exterior tank surfaces*. Unless constructed of a corrosion-resistant material, the exterior surfaces of new aboveground tanks must be protected from corrosion. The surface should be prepared to a SSPC SP #6 blast (see section 598.1(j) of this Title), or equivalent method, and protected by an inhibitive primer coat, intermediate inhibitive and two or more final coats of paint, or have an equivalent or better surface coating or protective system designed to prevent corrosion and deterioration.

(g) *Impermeable barriers under on-ground tanks.* Any new on-ground tank must be constructed with a double bottom or underlain by an impervious barrier such as a concrete pad or a cutoff barrier. The permeability rate of the barrier relative to the substance stored must be equal to or less than 1 x 10-6 cm/sec. The barrier must not deteriorate in an underground environment or in the presence of the hazardous substance being stored.

(h) *Explosion protection*. Tanks must be protected from explosion in accordance with generally accepted engineering practices. Protection must be provided by fail-safe cooling systems, fire-proofing, depressurizing valves, foundation sloping to prevent burning liquids from accumulating under the tank, or other equally effective means determined by a qualified engineer and acceptable to the department.

599.9 Secondary containment for aboveground tanks.

(a) *General requirements*.

(1) All new aboveground tanks used to store a hazardous substance must have a secondary containment system which collects and contains a leak or spill. The secondary containment system must prevent spills from entering the land or waters of the State that might result from tank rupture, failure of pumps, valves and other ancillary equipment and overfilling. In addition, the system must isolate and protect the tank from vehicular traffic, fire, and spills of incompatible substances which might occur in adjacent storage or work areas. Except for on-ground piping under section 599.14 of this Part, secondary containment is not required for aboveground piping. If the stored substance is a liquid at storage conditions and a gas at ambient conditions, then secondary containment must be provided to contain the liquid component of any spill until the phase change from liquid to gas occurs or the spill is cleaned up, whichever comes first. Secondary containment systems must consist of one of the following:

(i) a surrounding dike and impoundment system;

(ii) a remote catch tank or impoundment area; or

(iii) another system or practice which meets the requirements of paragraph (1) of this subdivision and which is designed and installed in accordance with a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory.

(2) The secondary containment system must be:

(i) designed and constructed with a permeability rate to the hazardous substance stored of 1 x 10-6 cm/sec or less;

(ii) designed, installed, and operated to prevent any migration of hazardous substances out of the system to the environment before cleanup occurs;

(iii) designed so that overfills from connections, vents and pressure relief devices occur within the secondary containment system or are directed to another appropriate collection device;

(iv) constructed, coated or lined with materials that are compatible with the substance stored and the environment. All joints must be tight and leak-free using one or a combination of stops, grouts, coatings, gaskets or welds. The secondary containment system must have sufficient structural strength and thickness to withstand equipment and pedestrian traffic, hydrostatic forces, frost heaving and weathering;

(v) placed on a foundation which prevents settlement, compression or uplift;

(vi) equipped with a sump and manually controlled pump or siphon, manually controlled dike valve, or any other manually controlled drainage system to permit the drainage of liquids resulting from leaks, spills or precipitation. Control of the pump, siphon or valve must be possible from outside of the diked area. All valves for gravity drainage systems must be locked in a closed position except when the operator is draining accumulated liquids from the containment area. Spilled or leaked substances must be removed from the secondary containment system within 24 hours; and

(vii) capable of containing at least 110 percent of the capacity of the largest tank or manifolded tanks that are connected in such a way as to permit the combined contents to spill, whichever is greater.

(3) Stormwater discharges from a secondary containment system must be uncontaminated. Stormwater which is contaminated must be discharged and treated in accordance with department requirements imposed under Parts 701, 702, 703, and 750 to 758 of this Title, as applicable.

(4) If clay soil is used for the secondary containment system it must be installed in accordance with generally accepted engineering practices and must be of such character that any spill will be readily recoverable and will result in a minimal amount of soil contamination.

(5) If a pre-engineered manufactured clay liner is used, it must be installed in accordance with the manufacturer's instructions.

(6) If a synthetic liner is used, it must be compatible with the substance in storage, be at least 60 mils in thickness, not deteriorate in an underground environment and have a life expectancy defined in the spill prevention report based on manufacturer's specifications orwarranty and operator use. All punctures, tears or inadequate seams in the liner must be repaired prior to placing in use. Since some chemicals will readily diffuse through a synthetic liner, the synthetic liner used must have been tested and found resistant to diffusion of the substance stored.

(b) *Standards for dike and impoundment systems*.

(1) In addition to the requirements of subdivision (a) of this section, a dike system used for secondary containment must be constructed in accordance with NFPA No. 30, 2-3.4.3 (see section 598.1(j) of this Title), unless specified otherwise in these regulations.

(2) All dikes and impoundment floors subject to hydraulic pressure must be designed to prevent migration of moisture into the dike system.

(3) If constructed within a floodplain, the dike must be designed and installed to withstand structural damage and overtopping by a 100 year flood.

(4) A slope of not less than one percent away from the tank must be provided for at least 50 feet or to the dike base, whichever is less.

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

(6) The walls of the diked area must not exceed an average height of six feet above interior grade, unless provisions are made for safe access and egress to tanks, valves and other equipment.

(7) Each diked area with two or more tanks containing a flammable, combustible or unstable hazardous liquid must be subdivided pursuant to NFPA No. 30, section 2-3.4.3(g) (see section 598.1(j) of this Title). The subdivision may be by intermediate dikes, drainage channels or curbs, and must prevent spills from endangering adjacent tanks within the diked area.

(c) *Standards for remote impounding*. Remote catch tanks and surface impounding areas used for secondary containment must comply with the following:

(1) All of the general requirements of subdivision (a) of this section must be followed;

(2) A slope of not less than one percent away from the tank must be provided so that accumulated liquid drains away from the tank to the sump;

(3) The route of the drainage system must be located so that if liquids in the drainage system are ignited, the fire will not affect tank systems or adjoining property; and

(4) The confines of the surface impounding area must be located so that when filled to capacity, the liquid level will be no closer than 50 feet from any property line that is or can be built upon, or from any tank.

599.10 Monitoring systems for new aboveground tanks.

(a) All new aboveground tanks must have a system for monitoring leakage between the tank bottom and the secondary containment system. This may include perforated gravity collection piping or channels in a concrete foundation or other equivalent method acceptable to the department. Monitoring may be accomplished by visual, mechanical, electronic or other means acceptable to the department. Tanks which are entirely aboveground, such as tanks on racks, cradles or stilts, may be visually monitored for leakage to meet this requirement.

(b) Observation wells or other systems which monitor the soil or groundwater external to the secondary containment system do not satisfy the leak detection requirements of this section.

599.11 Installation of aboveground tank systems.

(a) *Foundation design*.

(1) New aboveground tanks must have a stable and well drained foundation, footing and structural support which are capable of supporting the total weight of the tank when full. Supports, foundations and anchorage of all tanks must be in accordance with NFPA No. 30, section 2-6.1, 2-6.2, 2-6.3, 2- 6.4 and 2-6.5 (see section 598(j) of this Title).

(2) Horizontal aboveground tanks must be supported in such a manner as to permit expansion and contraction and to prevent the concentration of excessive loads on the supporting portion of the shell. The bearing afforded by the saddles must extend over at least 1/3 of the circumference of the shell. If bearing of less than 1/3 is used, the design must be approved by a qualified engineer and be documented or referenced in the spill prevention report. Suitable means for preventing corrosion must be provided on that portion of the tank in contact with the foundations or saddles.

(3) Tank systems that are exposed to temperatures of less than 32 degrees Fahrenheit must be supported in such a way, or supplied with heat, to prevent the effects of freezing and frost heaving of the foundation.

(b) *Avoiding traffic hazards*. New aboveground tank systems must be protected from physical damage that may result from moving machinery or vehicles, such as forklifts, automobiles or trucks.

(c) *Separation of incompatible substances*. All new aboveground tanks must assure separation of incompatible substances. One means of accomplishing this separation is by installing separate independent secondary containment systems capable of preventing the mixing of the incompatible substances in the event of a leak, spill or overfill.

(d) *Emergency response equipment*. All new aboveground tank systems and dikes must be accessible by fire fighting and other emergency response equipment.

(e) *Inspection of tank systems.*

(1) Prior to placing a tank system in use, the tank system must be inspected by a qualified inspector for the presence of any of the following items:

(i) weld breaks;

(ii) punctures;

(iii) scrapes of protective coatings;

(iv) cracks;

(v) corrosion;

(vi) structural damage; and

(vii) improper installation.

(2) In addition to the above, tank systems must be tested for tightness and inspected in accordance with a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory which meets the standards of this section such as API 650 or API 620. (See section 598.1(j) of this Title). If a pneumatic test is used, all fittings, welds and joints must be coated with a soap solution and inspected for air leaks.

(3) If a tank system is found to be leaking or the tank or installation is deficient such that a leak is possible, the owner or operator must repair the system prior to the tank system being placed in use.

(4) Upon completion of the test and inspection, the inspector must sign and date a statement certifying that the system meets the standards of this Part.

(5) The inspector's statement and records of the test and repairs must be kept for five years following the date of installation and made part of the spill prevention report.

(f) *Qualifications of tank system installers*. Installation of an aboveground tank system must be performed by a qualified installer or technician who is trained in the methods of installing aboveground tank systems.

(g) *Manufacturer's instructions*. In addition to the above requirements, all tank systems must be installed in strict accordance with manufacturer's instructions.

599.12 General requirements for piping.

(a) *New piping - summary of requirements*. Beginning on February 11, 1995, all new piping must meet the following requirements:

(1) piping must be designed, labeled, protected and otherwise constructed in accordance with section 599.13 of this Part;

(2) on-ground and underground piping must be installed with secondary containment as specified in section 599.14 of this Part;

(3) on-ground and underground piping must be provided with leak monitoring as specified in section 599.15 of this Part;

(4) piping must be installed as specified in section 599.16 of this Part; and

(5) all new piping must pass an inspection as specified in subdivision 599.16(e) of this Part before being placed in service.

(b) *Compliance with Part 598*. New piping must meet the requirements of this Part and Part 598 of this Title before being placed in service.

599.13 New piping.

(a) *General requirements*.

(1) New piping must be compatible with the substance(s) stored and be protected or resistant to all forms of internal and external wear, vibration, shock and corrosion. They must be free of leakage, structurally sound, properly supported under all operating conditions and protected from fire, heat, vacuum and pressure which would cause the system to fail. Piping

must be designed to prevent damage from expansion, jarring, vibration, contraction and frost. The life expectancy of the piping must be specified in the spill prevention report.

(2) New piping must be designed and installed in accordance with one or more of the following:

(i) ULC-C107.7;

(ii) ASTM D2996-88; (see section 598.1(j) of this Title); or

(iii) a comparable consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory which meet the standards of this section.

(3) Adequate provisions must be made to protect all exposed piping from physical damage that might result from moving machinery such as forklifts, automobiles and trucks.

(4) Joint compounds and gaskets must be compatible with the substance(s) in storage.

(5) Piping must contain shut-off valves located adjacent to pump or compressor connections.

(6) Flexible connectors, elbows, loops, expansion chambers or other measures must be installed singularly, or in combination, to allow for movement and prevent damage from water hammer.

(7) Piping that carries liquid hazardous substances which expand upon freezing must be protected from freezing or must have provisions to prevent rupture due to freezing of the hazardous substance.

(8) Refrigerated piping must be constructed of materials suitable for extreme temperatures and pressures in the tank system.

(9) Piping which employs screw-type fittings must be provided with means to prevent leakage from these fittings.

(b) *Corrosion protection for piping*.

(1) Piping in contact with the soil and subject to corrosion must be protected from external corrosion by one of the following:

(i) corrosion resistant materials; or

(ii) a cathodic protection system.

(2) Cathodic protection must consist of one or a combination of the following:

(i) sacrificial anodes and coating;

(ii) impressed current; or

(iii) another method specified in a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory which meet the standards of this section, such as the following: API 1632; or NACE Standard RP-01-69 (see section 598.1(j) of this Title).

(3) The corrosion protection system must be designed and constructed by a qualified engineer or corrosion specialist and must be designed to provide a minimum of 30 years of protection against external corrosion. The engineer or specialist must supervise the installation of all field fabricated protection systems and pre-fabricated systems to assure that the system has been installed as designed.

(4) Piping which is protected by cathodic protection other than impressed current must be electrically insulated from the tank unless the cathodic protection has been designed to protect the tank and piping. This insulation must be provided by dielectric fittings, bushings, washers, sleeves or gaskets which are chemically stable when exposed to the stored substances or soil.

(5) Each cathodic protection system must have a monitor that allows the adequacy of the cathodic protection system to be checked on an annual basis.

(6) Piping must be isolated from, or protected against, sources of stray electric current which include underground cables, electric machinery, railroad systems and electrical grounding rods.

(7) Tank and piping connections of two dissimilar metals which create a corrosion-inducing galvanic cell are prohibited.

(8) External coatings must be fiberglass-reinforced plastic, epoxy, or any other suitable dielectric material with a minimum thickness of 10 mils after curing. The coating must be factory-applied, or equivalent, and have a coefficient of thermal expansion compatible with that of steel and be firmly bonded to the steel. It must be of sufficient strength and density to form a hard, impermeable shell that will not crack, wick, wear, soften, flake or separate and must be non-corrodible under adverse underground electrolytic conditions. The application of the coating must be in strict accordance with the instructions of the supplier of the coating material.

(9) Coatings must be inspected for air pockets, cracks, blisters, and pinholes, and must be electrically tested for coating short circuits or coating faults. Any defects must be repaired in accordance with the manufacturer's instructions prior to installation.

(c) *Aboveground piping.*

(1) Unless constructed of a corrosion resistant material, the exterior surfaces of aboveground piping must be protected from corrosion. The surface must be prepared to a SSPC SP #6 blast, (see section 598.1(j) of this Title), or equivalent, and be protected by an inhibitive primer coat, intermediate inhibitive and two or more final coats of paint, or have an equivalent or better surface coating or protective system designed to prevent corrosion and deterioration.

(2) All new permanent aboveground piping greater than two inches in diameter must have welded or flanged connections or be plastic-lined metal piping with flared end connections. Screwed connections are not acceptable where the threads are exposed to hazardous substances flowing within the piping. This does not apply to piping components such as gauges and instruments not normally available in flange connections.

(3) Piping passing through dike walls must be designed to prevent excessive stresses as a result of settlement or fire exposure.

(4) All new aboveground piping must bear a stencil, label or plate which contains the chemical name or common name if the chemical name is not appropriate, for the substance stored. The stencil, label or plate must be located at all valves, pumps, switches, and on each side of any wall where piping enters or exits. At least one conspicuously visible label must be provided at each end of the piping.

599.14 Secondary containment for on-ground and underground piping.

(a) *General requirements*.

(1) All new on-ground and underground piping must be installed with secondary containment or other acceptable means of detecting leakage and preventing it from entering the environment. This must consist of one of the following:

(i) double-walled piping;

(ii) a synthetic trench liner; or

(iii) another method that meets the requirements of this section and is designed and constructed in accordance with a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory which meets the standards of this section.

(2) The secondary containment system must:

(i) be designed and constructed with a permeability rate to the substance stored of 1 x 10-6 cm/sec or less;

(ii) be designed, installed, and operated to prevent any migration of hazardous substances out of the system to the environment at any time during the use of the piping;

(iii) allow for detection and collection of releases, spills and accumulated liquids until the collected material is removed;

(iv) be constructed of, or lined with materials that are compatible with the hazardous substances to be placed in the piping, and have sufficient strength and thickness to prevent failure due to physical contact with the materials to which it is exposed, climatic conditions, and the stress of daily operation;

(v) be placed on a suitable foundation which prevents failure due to settlement, compression or uplift;

(vi) be sloped or otherwise designed and operated to drain and remove liquids resulting from leaks, spills and precipitation. Spilled or leaked substances must be removed from the secondary containment system within 24 hours. If the owner or operator can demonstrate that removal of the spilled or leaked substance, or accumulated precipitation cannot be accomplished within 24 hours, then it must be removed in as timely a manner as possible to prevent harm to human health and the environment; and

(vii) be provided with a leak detection system that is designed and operated so that it will either detect the failure of the primary containment structure or the presence of any spill, leak, or release of hazardous substance or accumulated liquid in the secondary containment system within two hours. If the owner or operator can demonstrate that existing detection technologies or site conditions will not allow detection of a spill, leak or release within two hours, then the leak detection system must detect failure of the primary containment structure at the earliest feasible time.

(b) *Standards for secondary containment*.

(1) Double-walled piping. If the secondary containment system consists of double-walled piping, the piping must be constructed in accordance with the following:

(i) outer walls of double-walled piping must be protected from corrosion as prescribed in section 599.13(b) of this Part;

(ii) the outer jacket must enclose the primary piping;

(iii) the jacket must be designed to allow for monitoring of leaks as specified section 599.15(b) of this Part; and

(iv) the jacket must allow for safe venting of vapors.

(2) Synthetic trench liners. If a synthetic liner is used for secondary containment, it must be constructed and installed in accordance with section 599.4(d) of this Part. In addition, the liner must enclose and encapsulate the piping; all punctures, tears or inadequate seams in the liner must be repaired prior to backfilling; and the liner must be installed with a slope of at least ¼ of an inch per foot which channels any leaked substance to a sump or other suitable receiver.

599.15 Monitoring of new on-ground and underground piping.

(a) *Line leak detectors*. All on-ground or underground piping that conveys hazardous substances under pressure must be equipped with an automatic line leak detector which alerts the operator to the presence of a leak by restricting or shutting off the flow of hazardous substances through the piping or by triggering an audible or visual alarm. These devices must detect leaks equivalent to three gallons per hour at 10 PSIG line pressure within one hour with a probability of detection of 95 percent and a probability of false alarm of five percent or less.

(b) *Interstitial monitoring*. All new on-ground and underground piping must be equipped with leak detection equipment capable of detecting leakage between the piping and the secondary containment system.

599.16 Installation of piping.

(a) *General requirements*. All piping must be installed in accordance with generally accepted engineering practices. All joints must be liquid and air tight.

(b) *Backfill*. All new piping that is placed underground and is backfilled must be provided with a backfill material that is a non-corrosive, porous, homogeneous substance, which is installed so that the backfill is placed completely around the piping and compacted to ensure that the piping is uniformly supported. Backfill of at least six inches in depth must be placed underneath the piping.

(c) *Burial depth*. All new piping buried underground must be placed so that the top of the piping is at least 18 inches below the surface of the ground. Should conditions make compliance with this requirement impracticable, precautions must be taken to prevent physical damage to the piping. It is not necessary to cover the portion of the piping to which an access port is affixed.

(d) *Corrosion protection*. The installation of a corrosion protection system that is field fabricated must be supervised by a corrosion expert to ensure proper installation.

(e) *Inspection of new piping*.

(1) Prior to covering, enclosing, or placing new piping in use, the piping must be inspected by a qualified inspector in accordance with a consensus code, standard or practice

developed by a nationally recognized association or independent testing laboratory which meets the standards of this section. This must include an inspection for the presence of any of the following items:

(i) weld breaks;

(ii) punctures;

(iii) scrapes of protective coatings;

(iv) cracks;

(v) corrosion;

(vi) structural damage; and

(vii) improper installation.

(2) Piping must be tested for tightness. If a pneumatic test is used, all fittings, welds and joints must be coated with a soap solution and inspected for air leaks.

(3) If piping is found not to be tight or to be defective in any way, all repairs necessary to remedy the leaks or deficiencies in the piping must be performed prior to it being placed in use.

(4) Upon completion of the test and inspection, the inspector must sign and date a certification statement verifying that to the best of his or her knowledge, the installation was properly conducted on the date(s) shown.

(5) The inspector's statement and records of the test and repairs must be kept for five years following the date of installation and made part of the spill prevention report.

(f) *Installation instructions*. In addition to the above requirements, all piping must be installed in strict accordance with the manufacturer's instructions and a consensus code, standard or practice developed by a nationally recognized association or independent testing laboratory consistent with the standards of this section such as API 1615. (See section 598.1(j) of this Title). This includes repair of any damaged coatings prior to backfilling.

599.17 Spill and overfill prevention.

(a) *General requirement*. The owner or operator must use overfill and spill prevention equipment and practices on all new tank systems. Responsibility and operating requirements set forth in section 598.4(a) and (b), respectively, of this Title must also be followed for all transfers of hazardous substances.

(b) *Standards for spill and overfill prevention.*

(1) Overfill prevention equipment and practices must consist of the following:

(i) new aboveground and underground tanks must be equipped with one of the following: a device which will alert the operator or carrier by triggering either a high-level warning alarm when the]substance reaches ninety-five percent of the working capacity of the tank; a device such as a high-level trip (delivery cut-off system) which will automatically shut off or restrict flow when the substance level reaches the working capacity of the tank; or anautomatic by-pass to an overflow tank if the overflow tank is equipped with overflow protection or other equivalent systems for preventing overfills;

(ii) monitoring wells and fill ports must be labeled] in accordance with sections 598.4(b)(8) and 598.6(b)(4) of this Title; and

(iii) new aboveground tanks must be equipped with a gauge or other monitoring device which accurately determines the level or quantity of the substance in the tank. The gauge must be accessible to the operator or carrier and be installed so that it can be conveniently read. The design capacity, working capacity, and identification number of the tank must be clearly marked at the gauge. Where filling or emptying is remotely operated, all gauges, gauge labeling and alarms required above must be located at the remote operating station. In addition, remote flow controls must be provided.

(2) Valves and couplings must meet the following standards:

(i) any coupling or open-ended valve used for making a transfer must be located within the secondary containment system of the transfer station;

(ii) where a substance transfer pipe or fill pipe is not drained of liquid upon completion of a transfer operation, it must be equipped with a valve such as a dry disconnect shutoff valve which prevents discharges from the line;

(iii) where siphoning or back flow is possible, fill pipes must be equipped with a properly functioning check valve, siphon break or equivalent device or system which provides automatic protection against backflow; and

(iv) each tank connection through which a hazardous substance can normally flow must be equipped with an operating valve or other appropriate means to control such flow. Valves must have the proper capacity and control characteristics. The valve must have a proper mechanical balance for the application so that it is capable of shutting off flow against the operating pressure and must be capable of being manually controlled or have fail-safe features which operate in the event of a power loss.

(c) *Secondary containment for transfers*.

(1) Transfer of hazardous substances must take place within a transfer station which is equipped with a permanently installed secondary containment system.

(2) This containment system must:

(i) be capable of collecting leaks and spills which are likely to occur during the transfer including leaks or spills from connections, couplings, vents, pumps and valves, hose failure or overturning of a container. Open-ended fill pipes must be located with the secondary containment system;

(ii) be designed and constructed with a permeability rate to the substance(s) transferred of less than 1 x 10-6 cm/sec. Properly designed concrete which has water stops on all seams and is compatible with the substance(s) stored or other equivalent or superior material satisfies this requirement;

(iii) be designed, installed, and operated to prevent any migration of hazardous substances out of the system to the environment before cleanup occurs. The system is not required to be designed to contain the gaseous component of a spill;

(iv) be constructed, coated, or lined with materials that are compatible with the substances to be transferred and the environment. The system must have sufficient strength and thickness to withstand wear, hydrostatic forces, frost heaving and weathering. It must support without failure, any vehicle brought into the transfer station, and must have a foundation which prevents failure due to settlement, compression, or uplift;

(v) be equipped with a sump and either a manually controlled pump or siphon, manually controlled dike valve, or any other manually controlled drainage system to permit the drainage of liquids resulting from leaks, spills, and precipitation. Control of the pump, siphon or valve must be possible from outside of the diked area. All drainage systems must be locked in a closed position when a transfer of a hazardous substance is in progress. Spilled or leaked substances must be removed from the containment system within 24 hours; and

(vi) contain the volume of any leak or spill likely to occur at the transfer station.

(3) Stormwater must be pumped from slop tanks and catch tanks to allow for the containment of the volume required by subparagraph (2)(vi) of this section.

599.18 Venting, and pressure/vacuum/thermal monitoring.

(a) *General venting requirements*.

(1) All tanks must be protected from over-pressurization and excessive vacuums such as may be caused by operator error, filling, emptying, atmospheric temperature changes, pumping, refrigeration, heating and fire exposure. Protection must be provided by one or a combination of the following means: vents, rupture discs, pressure/vacuum relief devices, controllers, fail-safe vessel designs or other means determined by a qualified engineer.

(2) If a pilot-operated relief valve is used, it must be designed so that the main valve will open automatically and will protect the tank in the event of failure of the pilot valve or another essential functioning device.

(3) Open vents must be provided with a flame-arresting device, if used on a tank containing a flammable hazardous substance or if used on tanks containing a hazardous substance that is heated above its flash point.

(4) All vent discharge openings must be designed and constructed to prevent interference of operation due to precipitation.

(5) Discharge from vents must not terminate in or underneath any building if the discharge could pose a fire, health or safety problem.

(6) All vents must have provisions for draining any condensate which may accumulate.

(7) Vents must be so arranged that the possibility of tampering will be minimized.

(8) Vents must have direct contact with the vapor space of the tank.

(9) The capacity of the vent must not be restricted below design.

(10) Tanks fitted with relief valves must not be equipped with an isolation valve below it unless two or more relief valves are provided and isolation valves are interlocked.

(11) All cooled tanks with sealed double-wall construction must have a pressure relief valve on the outer wall in addition to a pressure relief valve or safety disk on the inner tank.

(b) *Normal vents*.

(1) All atmospheric tanks and all low-pressure tanks must be equipped with normal vents designed to accommodate:

(i) inbreathing resulting from maximum outflow of hazardous substances from the tank;

(ii) inbreathing resulting from contraction of vapors caused by maximum decrease in atmospheric temperature;

(iii) outbreathing resulting from maximum inflow of hazardous substances into the tank and maximum evaporation caused by such inflow; and

(iv) outbreathing resulting from expansion and evaporation that result from maximum increase in atmospheric temperature (thermal breathing).

(2) Normal vents may consist of a pilot-operated relief valve, a pressure relief valve, a pressure-vacuum valve, a conservation vent, an open vent or an equivalent device or combination of devices.

(c) *Emergency vents*. All atmospheric, low-pressure and high-pressure aboveground tanks must have emergency vents to insure that the safe pressure for the tank is not exceeded. Emergency vents must be designed by a qualified engineer in accordance with generally accepted engineering practices. Emergency vent designs may include: larger or additional open vents, pressure-vacuum valves, pressure relief valves, a gauge hatch that permits the cover to lift under abnormal internal pressure, a manhole cover that lifts when exposed to abnormal internal pressure; or other practice for pressure and vacuum relief.

(d) *Labeling of safety/pressure/vacuum relief valves*. Where safety, pressure relief or vacuum relief valves are used, each must be permanently labeled with the information listed below. The labeling may be provided on the valve itself, or on a plate or plates securely fastened to the valve. Labels may be stamped, etched, impressed or cast in the valve or nameplate. The label must include the following information:

(1) the name or identifying trademark of the manufacturer;

(2) the manufacturer's design or type number;

(3) the pipe size of the inlet;

(4) the set pressure or vacuum, in PSIG;

(5) the full open pressure or vacuum, in PSIG; and

(6) the capacity at the indicated pressure or full open vacuum in either cubic feet of gas per minute or cubic feet of gas per hour, and be so designated.

(e) *Pressure, vacuum and thermal monitoring*.

(1) All tanks subject to failure due to pressure or vacuum, must be provided with pressure/vacuum gauges and pressure/vacuum controllers.

(2) Thermal monitors, pressure/vacuum indicators, and their corresponding alarms must be provided for all tanks where a reaction may cause damage to the tank system or endanger human health, safety or the environment.

(3) All heated or cooled tanks must be equipped with a temperature and pressure gauge and appropriate thermal controls.

(4) Special precaution against overheating or overcooling must be provided for heated or cooled tanks in accordance with generally accepted engineering practices. Protection must be provided by one or a combination of the following means: temperature controllers, insulation, alarms, fail-safe cooling systems, material selection, or other means determined by a qualified engineer.