CHAPTER 3
GENERAL REGULATIONS

SECTION 301
GENERAL

301.1 Scope. The provisions of this chapter shall govern the general regulations regarding the installation of plumbing not specific to other chapters.

301.2 System installation. Plumbing shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls and other surfaces through fixture usage.

301.3 Connections to drainage system. Plumbing fixtures, drains, appurtenances and appliances used to receive or discharge liquid waste or sewage shall be directly connected to the sanitary drainage system of the building or premises, in accordance with the requirements of this code. This section shall not be construed to prevent indirect waste systems required by Chapter 8.

Exception: Bathtubs, showers, lavatories, clothes washers and laundry trays are not required to discharge to the sanitary drainage system where such fixtures discharge to a recycled water system approved by the Ohio Environmental Protection Agency in accordance with chapter 3745-42 of the Administrative Code or approved by the Ohio Department of Health in accordance with chapter 3701-28 of the Administrative Code.

301.4 Connections to water supply. Every plumbing fixture, device or appliance requiring or using water for its proper operation shall be directly or indirectly connected to the water supply system in accordance with the provisions of this code.

301.5 Pipe, tube and fitting sizes. Unless otherwise indicated, the pipe, tube and fitting sizes specified in this code are expressed in nominal or standard sizes as designated in the referenced material standards.

301.6 Prohibited locations. Plumbing systems shall not be located in an elevator shaft or in an elevator equipment room.

Exception: Floor drains, sumps and sump pumps shall be permitted at the base of the shaft, provided that they are indirectly connected to the plumbing system and comply with Section 1003.4.

301.7 Conflicts. In instances where conflicts occur between this code and the manufacturer's installation instructions, the more restrictive provisions shall apply.

SECTION 302
EXCLUSION OF MATERIALS DETRIMENTAL TO THE SEWER SYSTEM

302.1 Detrimental or dangerous materials. Ashes, cinders or rags; flammable, poisonous or explosive liquids or gases; oil, grease or any other insoluble material capable of obstructing, damaging or overloading the building drainage or *sewer* system, or capable of interfering with the normal operation of the sewage treatment processes, shall not be deposited, by any means, into such systems.

302.2 Industrial wastes. Waste products from manufacturing or industrial operations shall not be introduced into the public *sewer* until it has been determined by the *building official* or other authority having jurisdiction that the introduction thereof will not damage the public *sewer* system or interfere with the functioning of the sewage treatment plant.

SECTION 303
MATERIALS

303.1 Identification. Each length of pipe and each pipe fitting, trap, fixture, material and device utilized in a plumbing system shall bear the identification of the manufacturer and any markings required by the applicable referenced standards.

303.2 Installation of materials. Materials used shall be installed in strict accordance with the standards under which the materials are accepted and *approved*. In the absence of such installation procedures, the manufacturer's instructions shall be followed. Where the requirements of referenced standards or manufacturer's installation instructions do not conform to minimum provisions of this code, the provisions of this code shall apply.

303.3 Plastic pipe, fittings and components. Plastic pipe, fittings and components shall be listed as conforming to NSF 14.

303.4 Approved agency testing and certification. Plumbing products and materials required by the code to be in compliance with a referenced standard are to be *listed* by an *approved agency* as complying with the applicable referenced standards. Products and materials are to be identified in accordance with Section 303.1.

303.5 Cast-iron soil pipe, fittings and components. Cast-iron soil pipes and fittings, and the couplings used to join these products together, are to be *listed* and *labeled* by an *approved agency*.

SECTION 304
RODENTPROOFING

304.1 General. Plumbing systems shall be designed and installed in accordance with Sections 304.2 through 304.4 to prevent rodents from entering structures.

304.2 Strainer plates. Strainer plates on drain inlets shall be designed and installed so that all openings are not greater than $^1/_2$ inch (12.7 mm) in least dimension.

304.3 Meter boxes. Meter boxes shall be constructed in such a manner that rodents are prevented from entering a structure by way of the water service pipes connecting the meter box and the structure.

304.4 Openings for pipes. In or on structures where openings have been made in walls, floors or ceilings for the passage of pipes, the annular space between the pipe and the sides of the opening shall be sealed with caulking materials or closed with gasketing systems compatible with the piping materials and locations.

SECTION 305
PROTECTION OF PIPES AND PLUMBING SYSTEM COMPONENTS

305.1 Protection against contact. Metallic piping, except for cast iron, ductile iron and galvanized steel, shall not be placed in direct contact with steel framing members, concrete or cinder walls and floors or other masonry. Metallic piping shall not be placed in direct contact with corrosive soil. Where sheathing is used to prevent direct contact, the sheathing shall have a thickness of not less than 0.008 inch (8 mil) (0.203 mm) and the sheathing shall be made of plastic. Where sheathing protects piping that penetrates concrete or masonry walls or floors, the sheathing shall be installed in a manner that allows movement of the piping within the sheathing.

305.2 Stress and strain. Piping in a plumbing system shall be installed so as to prevent strains and stresses that exceed the structural strength of the pipe. Where necessary, provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement.

305.3 Pipes and fittings through foundation wall assemblies. Any pipe or fitting making a through penetration of a foundation wall assembly are to be provided with a relieving arch, or a pipe sleeve pipe is to be built into the foundation wall assembly. The sleeve is to be two pipe sizes greater than the pipe or fitting passing through the foundation wall assembly. Pipe joints or fitting joints are not to occur within the exterior foundation wall assembly.

305.4 Freezing. Water, soil and waste pipes shall not be installed outside of a building, in attics or crawl spaces, concealed in outside walls, or in any other place subjected to freezing temperatures unless adequate provision is made to protect such pipes from freezing by insulation or heat or both. Exterior water supply system piping shall be installed not less than 6 inches (152 mm) below the frost line and not less than 12 inches (305 mm) below grade.

305.4.1 Sewer depth. Deleted.

305.5 Waterproofing of openings. Joints at the roof and around vent pipes shall be made watertight by the use of lead, copper, galvanized steel, aluminum, plastic or other *approved* flashings or flashing material. Exterior wall openings shall be made watertight.

305.6 Protection against physical damage. In concealed locations where piping, other than cast iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than $1^1/_4$ inches (32 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored, and shall extend not less than 2 inches (51 mm) above sole plates and below top plates.

305.7 Protection of components of plumbing system. Components of a plumbing system installed along alleyways, driveways, parking garages or other locations exposed to damage shall be recessed into the wall or otherwise protected in an *approved* manner.

SECTION 306
TRENCHING, EXCAVATION AND BACKFILL

306.1 Support of piping. Buried piping shall be supported throughout its entire length.

306.2 Trenching and bedding. Where trenches are excavated such that the bottom of the trench forms the bed for the pipe, solid and continuous load-bearing support shall be provided between joints. Bell holes, hub holes and coupling holes shall be provided at points where the pipe is joined. Such pipe shall not be supported on blocks to grade. In instances where the material manufacturer's installation instructions are more restrictive than those prescribed by the code, the material shall be installed in accordance with the more restrictive requirement.

306.2.1 Overexcavation. Where trenches are excavated below the installation level of the pipe such that the bottom of the trench does not form the bed for the pipe, the trench shall be backfilled to the installation level of the bottom of the pipe with sand or fine gravel placed in layers not greater than 6 inches (152 mm) in depth and such backfill shall be compacted after each placement.

306.2.2 Rock removal. Where rock is encountered in trenching, the rock shall be removed to not less than 3 inches (76 mm) below the installation level of the bottom of the pipe, and the trench shall be backfilled to the installation level of the bottom of the pipe with sand tamped in place so as to provide uniform load-bearing support for the pipe between joints. The pipe, including the joints, shall not rest on rock at any point.

306.2.3 Soft load-bearing materials. If soft materials of poor load-bearing quality are found at the bottom of the trench, stabilization shall be achieved by overexcavating not less than two pipe diameters and backfilling to the installation level of the bottom of the pipe with fine gravel, crushed stone or a concrete foundation. The concrete foundation shall be bedded with sand tamped

into place so as to provide uniform load-bearing support for the pipe between joints.

306.3 Backfilling. Backfill shall be free from discarded construction material and debris. Loose earth free from rocks, broken concrete and frozen chunks shall be placed in the trench in 6-inch (152 mm) layers and tamped in place until the crown of the pipe is covered by 12 inches (305 mm) of tamped earth. The backfill under and beside the pipe shall be compacted for pipe support. Backfill shall be brought up evenly on both sides of the pipe so that the pipe remains aligned. In instances where the manufacturer's instructions for materials are more restrictive than those prescribed by the code, the material shall be installed in accordance with the more restrictive requirement.

306.4 Tunneling. Where pipe is to be installed by tunneling, jacking or a combination of both, the pipe shall be protected from damage during installation and from subsequent uneven loading. Where earth tunnels are used, adequate supporting structures shall be provided to prevent future settling or caving.

SECTION 307
STRUCTURAL SAFETY

307.1 General. In the process of installing or repairing any part of a plumbing and drainage installation, the finished floors, walls, ceilings, tile work or any other part of the building or premises that must be changed or replaced shall be left in a safe structural condition in accordance with the requirements of the *building code*.

307.2 Cutting, notching or bored holes. A framing member shall not be cut, notched or bored in excess of limitations specified in the *building code*.

307.3 Penetrations of floor/ceiling assemblies and fire-resistance-rated assemblies. Penetrations of floor/ceiling assemblies and assemblies required to have a fire-resistance rating shall be protected in accordance with the *building code*.

307.4 Alterations to trusses. Truss members and components shall not be cut, drilled, notched, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (such as HVAC equipment and water heaters) shall not be permitted without verification that the truss is capable of supporting such additional loading.

307.5 Protection of footings. Trenching installed parallel to footings and walls shall not extend into the bearing plane of a footing or wall. The upper boundary of the bearing plane is a line that extends downward, at an angle of 45 degrees (0.79 rad) from horizontal, from the outside bottom edge of the footing or wall.

307.6 Piping materials exposed within plenums. Piping materials exposed within plenums shall comply with the provisions of the *mechanical code*.

SECTION 308
PIPING SUPPORT

308.1 General. Plumbing piping shall be supported in accordance with this section.

308.2 Piping seismic supports. Where earthquake loads are applicable in accordance with the *building code*, plumbing piping supports, anchorage, and bracing shall be designed and installed for seismic forces in accordance with Chapter 16 of the *building code*.

308.3 Materials. Hangers, anchors and supports shall support the piping and the contents of the piping. Hangers and strapping material shall be of *approved* material that will not promote galvanic action.

308.4 Structural attachment. Hangers and anchors shall be attached to the building construction in an *approved* manner.

308.5 Interval of support. Pipe shall be supported in accordance with Table 308.5.

Exception: The interval of support for piping systems designed to provide for expansion/contraction shall conform to the engineered design in accordance with Section 316.1.

308.6 Sway bracing. Where *horizontal pipes* 4 inches (102 mm) and larger convey drainage or waste, and where a pipe fitting in that piping changes the flow direction greater than 45 degrees (0.79 rad), rigid bracing or other rigid support arrangements shall be installed to resist movement of the upstream pipe in the direction of pipe flow. A change of flow direction into a vertical pipe shall not require the upstream pipe to be braced.

308.7 Anchorage. Anchorage shall be provided to restrain drainage piping from axial movement.

308.7.1 Location. For pipe sizes greater than 4 inches (102 mm), restraints shall be provided for drain pipes at all changes in direction and at all changes in diameter greater than two pipe sizes. Braces, blocks, rodding and other suitable methods as specified by the coupling manufacturer shall be utilized.

308.8 Expansion joint fittings. Expansion joint fittings shall be used only where necessary to provide for expansion and contraction of the pipes. Expansion joint fittings shall be of the typical material suitable for use with the type of piping in which such fittings are installed.

308.9 Parallel water distribution systems. Piping bundles for manifold systems shall be supported in accordance with Table 308.5. Support at changes in direction shall be in accordance with the manufacturer's instructions. Where hot water piping is bundled with cold water piping, hot water piping shall be insulated in accordance with Section 607.5.

308.10 Thermal expansion tanks. A thermal expansion tank shall be supported in accordance with the manufacturer's instructions. Thermal expansion tanks shall not be supported by the piping that connects to such tanks.

TABLE 308.5
HANGER SPACING

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
Acrylonitrile butadiene styrene (ABS) pipe	4	10[b]
Aluminum tubing	10	15
Brass pipe	10	10
Cast-iron pipe	5[a]	15
Chlorinated polyvinyl chloride (CPVC) pipe and tubing, 1 inch and smaller	3	10[b]
Chlorinated polyvinyl chloride (CPVC) pipe and tubing, $1^1/_4$ inches and larger	4	10[b]
Copper or copper-alloy pipe	12	10
Copper or copper-alloy tubing, $1^1/_4$-inch diameter and smaller	6	10
Copper or copper-alloy tubing, $1^1/_2$-inch diameter and larger	10	10
Cross-linked polyethylene (PEX) pipe, 1 inch and smaller	2.67 (32 inches)	10[b]
Cross-linked polyethylene (PEX) pipe, $1^1/_4$ inches and larger	4	10[b]
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	2.67 (32 inches)	4
Lead pipe	Continuous	4
Polyethylene/aluminum/polyethylene (PE-AL-PE) pipe	2.67 (32 inches)	4
Polyethylene of raised temperature (PE-RT) pipe, 1 inch and smaller	2.67 (32 inches)	10[b]
Polyethylene of raised temperature (PE-RT) pipe, $1^1/_4$ inches and larger	4	10[b]
Polypropylene (PP) pipe or tubing, 1 inch and smaller	2.67 (32 inches)	10[b]
Polypropylene (PP) pipe or tubing, $1^1/_4$ inches and larger	4	10[b]
Polyvinyl chloride (PVC) pipe	4	10[b]
Stainless steel drainage systems	10	10[b]
Steel pipe	12	15

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. The maximum horizontal spacing of cast-iron pipe hangers shall be increased to 10 feet where 10-foot lengths of pipe are installed.

b. For sizes 2 inches and smaller, a guide shall be installed midway between required vertical supports. Such guides shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

SECTION 309
FLOOD HAZARD RESISTANCE

309.1 General. Plumbing systems and equipment in structures erected in *flood hazard areas* shall be constructed in accordance with the requirements of this section and the *building code*.

309.2 Flood hazard. For structures located in *flood hazard areas*, the following systems and equipment shall be located and installed as required by Section 1612 of the *building code*.

1. Water service pipes.
2. Deleted.
3. Deleted.
4. Sanitary drainage piping.
5. Storm drainage piping.
6. Deleted.
7. Other plumbing fixtures, faucets, fixture fittings, piping systems and equipment.
8. Water heaters.
9. Vents and vent systems.

Exception: The systems listed in this section are permitted to be located below the elevation required by Section 1612 of the *building code* for utilities and attendant equipment, provided that the systems are designed and installed to prevent water from entering or accumulating within their components and the systems are constructed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

309.3 Coastal high-hazard areas and coastal A zones. Structures located in coastal high-hazard areas and coastal A zones shall meet the requirements of Section 309.2. The plumbing systems, pipes and fixtures shall not be mounted on or penetrate through walls intended to break away under flood loads.

SECTION 310
WASHROOM AND TOILET ROOM REQUIREMENTS

310.1 Light and ventilation. Washrooms and toilet rooms shall be illuminated and ventilated in accordance with the *building* and *mechanical codes*.

310.2 Location of fixtures and compartments. The location of plumbing fixtures and the requirements for compartments and partitions shall be in accordance with Section 405.3.

310.3 Interior finish. Interior finish surfaces of toilet rooms shall comply with the *building code*.

SECTION 311
TOILET FACILITIES FOR WORKERS

311.1 General. Deleted.

SECTION 312
TESTS AND INSPECTIONS

312.1 Required tests. The owner or owner's representative is to cause the applicable tests and inspections, prescribed in Sections 312.2 through 312.11, to be performed to determine that the work will withstand the prescribed test without leakage and to demonstrate the integrity of the device or assembly. In accordance with Section 108.8 of the *building code*, reasonable advanced notice is to be given to the *building official* when the plumbing work is ready for tests. The *building official* may require that the tests be conducted in the presence of the *building official* or certified plumbing inspector. The owner or owner's representative is to keep records of the tests and inspections and submit such records to the *building official* upon request.

312.1.1 New, altered, extended or repaired systems. New *plumbing systems* and parts of existing systems that have been altered, extended, or repaired are to be tested as prescribed herein to disclose leaks and defects, except that testing is not required in the following cases:

1. In any case that does not include addition to, replacement, alteration or relocation of any water supply, drainage or vent piping.
2. In any case where plumbing equipment is set up temporarily for exhibition purposes.

312.1.2 Equipment, material, power and labor for tests. Equipment, material, power and labor necessary for testing a *plumbing system* or part thereof is to be furnished by the owner or the owner's representative. Required tests are to be conducted by and at the expense of the owner or the owner's representative.

312.1.3 Test gauges. Gauges used for testing are to be as follows:

1. Tests requiring a pressure of 10 pounds per square inch (psi) (69 kPa) or less are to utilize a testing gauge having increments of 0.10 psi (0.69 kPa) or less.
2. Tests requiring a pressure of greater than 10 psi (69 kPa) but less than or equal to 100 psi (689 kPa) are to utilize a testing gauge having increments of 1 psi (6.9 kPa) or less.
3. Tests requiring a pressure of greater than 100 psi (689 kPa) are to utilize a testing gauge having increments of 2 psi (14 kPa) or less.

312.1.4 Test media. All *plumbing system* piping, fittings, and shower liners are to be tested with water.

Exception: *Plumbing system* piping and fittings are permitted to be tested as prescribed in Sections 312.2 to 312.8 with air, another compressed gas, vacuum, or other media or method only when the manufacturer of the proposed piping, fittings and solvent cement (if applicable) allows the alternative method of testing. Where this code does not address or prescribe an alternative test method, an alternative test method prescribed by the manufacturer of the piping, fittings, or solvent cement in the published manufacturer's installation instructions will be acceptable as meeting the requirements of this code.

312.1.5 Reinspection and testing. Where any work or installation does not pass any initial test or inspection, the necessary corrections are to be made to comply with this code.

312.2 Drainage and vent rough-in test. Drainage and vent piping and fittings are to be tested prior to the installation of the *plumbing fixtures* and prior to the installation of wall and ceiling coverings to verify the integrity of the system in accordance with one of the following methods prescribed in Section 312.2.1, 312.2.2, or 312.2.3:

312.2.1 Drainage and vent rough-in water test. A water test is to be applied to the *drainage system* either in its entirety or in sections. If applied to the entire system, all openings in the piping are to be tightly closed, except the highest opening, and the system is to be filled with water to the point of overflow. If the system is tested in sections, each opening is to be tightly plugged except the highest openings of the section under test, and each section is to be filled with water, but sections are not to be tested with less than a 10-foot (3048 mm) head of water. In testing successive sections, not less than the upper 10 feet (3048 mm) of the next preceding section is to be tested so that no joint or pipe in the building, except the uppermost 10 feet (3048 mm) of the system, is to have been submitted to a test of less than a 10-foot (3048 mm) head of water. This pressure is to be held for not less than 15 minutes. The system is to be tight at all points.

312.2.2 Drainage and vent rough-in air test. When permitted by the manufacturer of the piping, fittings, and solvent cement (if part of the plumbing system), an air test is to be made by forcing air into the system until there is a uniform gauge pressure of 5 psi (34.5 kPa) or sufficient to balance a 10-inch (254 mm) column of mercury. This pressure is to be held for a test period of not less than 15 minutes. Any adjustments to the test pressure required

because of changes in ambient temperatures or the seating of gaskets are to be made prior to the beginning of the test period. Testing is to be done with dual pressure relief valves rated for 7.5 psig.

312.2.3 Alternative drainage and vent rough–in test. When permitted by the manufacturer of the piping, fittings, and solvent cement (if part of the plumbing system), an alternative method of testing the *drainage* and *vent system*, such as compressed gas or vacuum, may be permitted to meet the drainage and vent rough-in test requirements of this code as long as the test is conducted strictly in accordance with the requirements published in the manufacturer's installation instructions.

312.3 Drainage and vent air test. Deleted.

312.4 Drainage and vent final test. After the *plumbing fixtures* have been set and their *traps* filled with water, the entire *drainage system* is to be subjected to one of the following final tests as prescribed by the *building official*:

312.4.1 Visual and operational final test. All *plumbing fixtures* are to be operated and a visual inspection of accessible piping and joints are to be performed to determine that there are no visible leaks.

312.4.2 Drainage and vent final test. The final test of the completed *drainage* and *vent systems* is to be made, after the fixtures are connected, as follows:

1. Close all stack openings;
2. A manometer tube is to be placed through a *trap seal* to the system side and water is to be added to a fixture until an equivalent of at least 1-inch water column (248.8 Pa) is read on the manometer gauge or water can. Water may be added to a water closet bowl or trap tailpiece extension until the water level is at least 1 inch (25 mm) higher than the original *trap seal*;
3. Maintain the initial water column for fifteen (15) minutes;
4. After fifteen (15) minutes, the system is to be separated at a *trap seal*, air admittance valve (AAV), or other means as directed by the plumbing inspector for verification that the entire system is interconnected.

312.4.3 Alternative drainage and vent final test. Any other testing method equal to the 1 inch water column (248.8 Pa). Except as provided for in Section 312.4.2, compressed or stored air may be used only if permitted by the manufacturer of piping, fittings, and solvent cement (if part of the plumbing system).

312.5 Water supply system test. Upon completion of a section of or the entire *water supply system*, the system, or portion completed, is to be tested to verify the integrity of the system in accordance with one of the following methods prescribed in Sections 312.5.1 or 312.5.2:

312.5.1 Water supply working pressure test. A water pressure test is to be performed to prove the system watertight. The test pressure is to be not less than the working pressure under which the system will be used, and the system will hold the test pressure for at least 15 minutes. The water utilized for tests is to be obtained from a potable source of supply.

312.5.2 Water supply air test. When permitted by the manufacturer of the piping, fittings, and solvent cement (if part of the plumbing system), an air test is to be performed to prove the system airtight. The test pressure is to be not less than 50 psi (344 kPa) and the system will hold the test pressure for at least 15 minutes.

312.6 Gravity sewer test. Deleted.

312.7 Forced sewer test. Deleted.

312.8 Storm drainage system test. *Storm drain* systems within a building shall be tested by water or air in accordance with Section 312.2 or 312.3.

312.9 Shower liner test. Where shower floors and receptors are made watertight by the application of materials required by Section 421.5.2, the completed liner installation shall be tested. The pipe from the shower drain shall be plugged watertight for the test. The floor and receptor area shall be filled with potable water to a depth of not less than 2 inches (51 mm) measured at the threshold. Where a threshold of 2 inches (51 mm) high or greater does not exist, a temporary threshold shall be constructed to retain the test water in the lined floor or receptor area to a level not less than 2 inches (51 mm) deep measured at the threshold. The water shall be retained for a test period of not less than 15 minutes, and there shall not be evidence of leakage.

Exception: The shower liner test is not required for one-, two-, or three-family dwellings unless required by the shower liner manufacturer's installation instructions.

312.10 Inspection and testing of isolation backflow prevention devices required by this code. Inspection and testing of *isolation backflow prevention devices* is to comply with Sections 312.10.1 and 312.10.2.

Exception: Inspection and testing requirements for *containment backflow prevention devices* required by the water supplier is to be in accordance with rule 3745-95-06 of the Administrative Code and enforced by the water supplier.

312.10.1 Inspections. Annual inspections shall be made of all backflow prevention assemblies and *air gaps* to determine whether the assemblies are operable and air gaps exist.

312.10.2 Testing. Reduced pressure principle, double check, pressure vacuum breaker, reduced pressure detector fire protection, double check detector fire protection, and spill-resistant vacuum breaker backflow preventer assemblies and hose connection backflow preventers shall be tested at the time of installation, immediately after repairs or relocation and at least annually. The testing procedure shall be performed in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, CSA B64.10 or CSA B64.10.1. Test gauges shall comply with ASSE 1064.