

## 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.

**P-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 shall not be required to discharge to the sanitary drainage system where such fixtures discharge to an *approved* system in accordance with Chapter 13.

**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 code 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 third-party certified as conforming to NSF 14.

**303.4 Third-party certification.** Plumbing products and materials required by the code to be in compliance with a referenced standard shall be listed by a *third-party certification agency* as complying with the referenced standards. Products and materials shall 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, shall be third-party listed and labeled. Third-party certifiers or inspectors shall comply with the minimum inspection requirements of Annex A or Annex A1 of the ASTM and CISPI product standards indicated in the code for such products.

### 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  $\frac{1}{2}$  inch (12.7 mm) in least dimension.

**P-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* or *water distribution pipe* 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 pas-

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sage 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 through foundation walls.** Any pipe that passes through a foundation wall shall be provided with a relieving arch, or a pipe sleeve pipe shall be built into the foundation wall. The sleeve shall be two pipe sizes greater than the pipe passing through the wall.

**P-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 and water distribution system piping shall be installed not less than 36 inches (914 mm) minimum below grade to the top of the pipe. Where *water distribution pipe* and *water service pipe* connect at the curb or curb stop, the piping shall be a minimum of 48 inches (1219 mm) below grade to the top of the pipe.

**P-305.4.1 Sewer depth.** *Building sewers* that connect to private sewage disposal systems shall be installed not less than 36 inches (914 mm) below finished grade to the top of the pipe at the point of septic tank connection. *Building sewers* shall be installed not less than 36 inches (914 mm) below grade to the top of pipe.

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

**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  $1\frac{1}{4}$  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 materials 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.

**P-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. When drainage is installed in filled or unstable ground, pipe shall be supported on concrete piers, with spacing consistent with Table P-308.5, or a constant bed of concrete or clevis hangers attached to reinforcing rods in the concrete floor above the piping.

**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.

**P-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. The length of tunneling shall be limited to only that required to clear the obstacle above.

**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 *International 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 *International 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 *International Building Code*.

**[BS] 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 *International 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 shall be designed and installed for the seismic forces in accordance with the *International 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.

**TABLE P-308.5  
HANGER SPACING**

| PIPING MATERIAL  | MAXIMUM HORIZONTAL SPACING (feet) | MAXIMUM VERTICAL SPACING (feet) |
|--|-----------------------------------|---------------------------------|
| Acrylonitrile butadiene styrene (ABS) pipe                                     | 4 <sup>c</sup>                    | 10 <sup>b</sup>                 |
| Aluminum tubing  | 10                                | 15                              |
| Brass pipe   | 10                                | 10                              |
| Cast-iron pipe   | 5 <sup>a</sup>                    | 15                              |
| Chlorinated polyvinyl chloride (CPVC) pipe and tubing, 1 inch and smaller      | 3                                 | 10 <sup>b</sup>                 |
| Chlorinated polyvinyl chloride (CPVC) pipe and tubing, 1 1/4 inches and larger | 4 <sup>c</sup>                    | 10 <sup>b</sup>                 |
| 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 <sup>b</sup>                 |
| Cross-linked polyethylene (PEX) pipe 1 1/4 inch and larger                     | 4 <sup>c</sup>                    | 10 <sup>b</sup>                 |
| 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 <sup>b</sup>                 |
| Polyethylene of raised temperature (PE-RT) pipe 1 1/4 inch and larger          | 4 <sup>c</sup>                    | 10 <sup>b</sup>                 |

(continued)

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TABLE P-308.5—continued  
HANGER SPACING

| PIPING MATERIAL  | MAXIMUM HORIZONTAL SPACING (feet) | MAXIMUM VERTICAL SPACING (feet) |
|--|-----------------------------------|---------------------------------|
| Polypropylene (PP) pipe or tubing 1 inch and smaller       | 2.67<br>(32 inches)               | 10 <sup>b</sup>                 |
| Polypropylene (PP) pipe or tubing, 1 1/4 inches and larger | 4 <sup>c</sup>                    | 10 <sup>b</sup>                 |
| Polyvinyl chloride (PVC) pipe                              | 4 <sup>c</sup>                    | 10 <sup>b</sup>                 |
| Stainless steel drainage systems                           | 10                                | 10 <sup>b</sup>                 |
| 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.
- c. The maximum horizontal spacing of hangers shall be decreased to 3 feet where temperatures exceed 120°F (49°C).

**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 or hot water piping, each hot water pipe shall be insulated.

**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.

**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 *International Building Code*.

**[BS] P-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 *International Building Code*.

1. *Water distribution pipe.*
2. Pump seals in individual water supply systems where the pump is located below the *design flood elevation*.
3. Covers on potable water wells shall be sealed, except where the top of the casing well or pipe sleeve is elevated to not less than 1 foot (305 mm) above the *design flood elevation*.
4. Sanitary drainage piping.
5. Storm drainage piping.
6. Manhole covers shall be sealed, except where elevated to or above the *design flood elevation*.
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 *International 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.

**[BS] 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 *International Building Code* and *International Mechanical Code*.

**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 *International Building Code*.

**SECTION 311  
TOILET FACILITIES FOR WORKERS**

**P-311.1 General.** Toilet facilities shall be provided for construction workers and such facilities shall be maintained in a sanitary condition. Construction worker toilet facilities of the

nonsewer type shall conform to PSAI Z4.3 and Table P-311, provided there shall not be less than one water closet on every three floors. The owner and contractors are responsible to prevent any other places on or about the site from being used for toilet purposes. Temporary toilets shall only be utilized until such time as the building drain is installed and there is a concrete slab or permanent flooring to accommodate a water closet. It is the responsibility of the General Contractor to assure that construction of the main drain proceeds as rapidly as is reasonably possible.

**TABLE P-311.1  
MINIMUM NUMBER OF TOILET FACILITIES**

| NUMBER OF EMPLOYEES | MINIMUM NUMBER OF TOILET FACILITIES                    |
|---------------------|--|
|                     | If serviced once per week                              |
| 1-10                | 1  |
| 11-20               | 2  |
| 21-30               | 3  |
| 31-40               | 4  |
| Over 40             | 1 additional facility for each 10 additional employees |
|                     | If serviced more than once per week                    |
| 1-15                | 1  |
| 16-35               | 2  |
| 36-55               | 3  |
| 56-75               | 4  |
| 76-95               | 5  |
| Over 95             | 1 additional facility for each 20 additional employees |

**P-311.2 Removal.** <sup>2</sup>Temporary or permanent water closet facilities shall be provided at all construction sites in accordance with Table P-311.1, but not less than one water closet on every three floors. Water closets shall not be located more than two floors apart. The owner and contractors are responsible to prevent any other places on or about the site from being used for such purposes. Temporary toilets shall only be utilized until such time as the building drain is installed and there is a concrete slab or permanent flooring to accommodate a water closet. It is the responsibility of the General Contractor to assure that construction of the main drain proceeds as rapidly as is reasonably possible. Portable and temporary water closet facilities shall be removed, and the site shall be cleaned upon completion of construction.

**SECTION 312  
TESTS AND INSPECTIONS**

**312.1 Required tests.** The permit holder shall make the applicable tests prescribed in Sections 312.2 through 312.10 to determine compliance with the provisions of this code. The permit holder shall give reasonable advance notice to the code official when the plumbing work is ready for tests. The

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equipment, material, power and labor necessary for the inspection and test shall be furnished by the permit holder and he or she shall be responsible for determining that the work will withstand the test pressure prescribed in the following tests. Plumbing system piping shall be tested with either water or, for piping systems other than plastic, by air. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be submitted to final tests. The code official shall require the removal of any cleanouts if necessary to ascertain whether the pressure has reached all parts of the system.

**312.1.1 Test gauges.** Gauges used for testing shall be as follows:

1. Tests requiring a pressure of 10 pounds per square inch (psi) (69 kPa) or less shall 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) shall 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) shall utilize a testing gauge having increments of 2 psi (14 kPa) or less.

**P-312.2 Drainage and vent water test.** A water test shall be applied to the drainage system either in its entirety or in sections. If tested in sections, not more than 30 feet (9144 mm) in height on any one system shall be tested at any one time. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged (except the highest opening of the water) but no section (except the *building (house) drain* and its connected yard and area drains) shall be tested with less than a 10-foot (3048 mm) head of water. In testing successive sections above the *building (house) drain*, at least the upper 10 feet (3048 mm) of the next preceding section shall be re-tested so that no joint or pipe in the building (except the *building (house) drain* and the uppermost 10 feet (3048 mm) of the system) shall have been submitted to a test of less than a 10-foot (3048 mm) head of water. The water shall be kept in the system or in the portion under test for at least 15 minutes before inspection starts; the system shall then be tight at all points.

**312.3 Drainage and vent air test.** Plastic piping shall not be tested using air. An air test shall 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 shall 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 shall be made prior to the beginning of the test period.

**312.4 Drainage and vent final test.** The final test of the completed drainage and vent systems shall be visual and in sufficient detail to determine compliance with the provisions of this code. Where a smoke test is utilized, it shall be made by filling all traps with water and then introducing into the

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entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at *stack* openings on the roof, the *stack* openings shall be closed and a pressure equivalent to a 1-inch water column (248.8 Pa) shall be held for a test period of not less than 15 minutes.

**312.5 Water supply system test.** Upon completion of a section of or the entire water supply system, the system, or portion completed, shall be tested and proved tight under a water pressure not less than the working pressure of the system; or, for piping systems other than plastic, by an air test of not less than 50 psi (344 kPa). This pressure shall be held for not less than 15 minutes. The water utilized for tests shall be obtained from a potable source of supply. The required tests shall be performed in accordance with this section and Section 107.

**P-312.6 Gravity sewer test.** Gravity *sewer* tests shall consist of plugging the end of the *building sewer* at the curb line, filling the *building sewer* with water, testing with not less than a 10-foot (3048 mm) head of water and maintaining such pressure for 15 minutes.

**P-312.6.1 Separate test.** The *building (house) drain* and yard area drains, including all piping to a height of 10 feet (3048 mm) above the highest point of the *building (house) drain*, shall be tested separately. All traps, pipe fittings and joints shall be exposed to view when the test is made. Water shall be introduced into the system in the quantity deemed necessary by the Department. To be approved, the flow of water through the system shall be unobstructed, and there shall be no leakage through any pipe, joint, trap, or fitting after maintaining such pressure for 15 minutes.

**P-312.7 Forced sewer test.** Forced *sewer* tests shall consist of plugging the end of the *building sewer* at the curb line and applying a pressure of 5 psi (34.5 kPa) greater than the pump rating, and maintaining such pressure for 15 minutes.

**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 water tight 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 water tight for the test. The floor and receptor area shall be filled with potable water to a depth of not less than 2 inch (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.

**312.10 Inspection and testing of backflow prevention assemblies.** Inspection and testing shall comply with Sections 312.10.1 and 312.10.2.

**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.

**P-312.11 Completion of work.** After tests have been made and approved by the inspector, covering, insulation, coating or painting of the drain, vent and water piping shall be permitted. Decals on soil, waste, and vent piping, and hot, cold and return water piping shall be installed every 10 feet (3048 mm) on covered and uncovered lines.

## SECTION 313 EQUIPMENT EFFICIENCIES

**313.1 General.** Equipment efficiencies shall be in accordance with the *International Energy Conservation Code*.

## SECTION 314 CONDENSATE DISPOSAL

**[M] 314.1 Fuel-burning appliances.** Liquid combustion by-products of condensing appliances shall be collected and discharged to an *approved* plumbing fixture or disposal area in accordance with the manufacturer's instructions. Condensate piping shall be of *approved* corrosion-resistant material and shall not be smaller than the drain connection on the appliance. Such piping shall maintain a horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope).

**[M] 314.2 Evaporators and cooling coils.** Condensate drain systems shall be provided for equipment and appliances containing evaporators or cooling coils. Condensate drain systems shall be designed, constructed and installed in accordance with Sections 314.2.1 through 314.2.5.

**[M] 314.2.1 Condensate disposal.** Condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley or other areas so as to cause a nuisance.

**[M] 314.2.2 Drain pipe materials and sizes.** Components of the condensate disposal system shall be cast iron, galvanized steel, copper and copper alloy, cross-linked polyethylene, polyethylene, ABS, CPVC, PVC or polypropylene pipe or tubing. Components shall be selected for the pres-

sure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 relative to the material type. Condensate waste and drain line size shall be not less than 3/4-inch (19.1 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with Table 314.2.2.

[M] TABLE 314.2.2  
CONDENSATE DRAIN SIZING

| EQUIPMENT CAPACITY                         | MINIMUM CONDENSATE PIPE DIAMETER (inch) |
|--|---|
| Up to 20 tons of refrigeration             | 3/4 inch                                |
| Over 20 tons to 40 tons of refrigeration   | 1 inch                                  |
| Over 40 tons to 90 tons of refrigeration   | 1 1/4 inch                              |
| Over 90 tons to 125 tons of refrigeration  | 1 1/2 inch                              |
| Over 125 tons to 250 tons of refrigeration | 2 inch                                  |

For SI: 1 inch = 25.4 mm, 1 ton of capacity = 3.517 kW.

[M] 314.2.3 **Auxiliary and secondary drain systems.** In addition to the requirements of Section 314.2.1, where damage to any building components could occur as a result of overflow from the equipment primary condensate removal system, one of the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired appliance that produces condensate:

1. An auxiliary drain pan with a separate drain shall be provided under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a depth of not less than 1 1/2 inches (38 mm), shall be not less than 3 inches (76 mm) larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet metal pans shall have a thickness of not less than 0.0236-inch (0.6010 mm) (No. 24 gage) galvanized sheet metal. Nonmetallic pans shall have a thickness of not less than 0.0625 inch (1.6 mm).
2. A separate overflow drain line shall be connected to the drain pan provided with the equipment. Such overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.
3. An auxiliary drain pan without a separate drain line shall be provided under the coils on which condensate will occur. Such pan shall be equipped with a water-level detection device conforming to UL 508 that will shut off the equipment served prior to overflow of the pan. The auxiliary drain pan shall be

constructed in accordance with Item 1 of this section.

4. A water-level detection device conforming to UL 508 shall be provided that will shut off the equipment served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

**Exception:** Fuel-fired appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.

[M] 314.2.3.1 **Water-level monitoring devices.** On down-flow units and all other coils that do not have a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside the primary drain pan. This device shall shut off the equipment served in the event that the primary drain becomes restricted. Devices installed in the drain line shall not be permitted.

[M] 314.2.3.2 **Appliance, equipment and insulation in pans.** Where appliances, equipment or insulation are subject to water damage when auxiliary drain pans fill such portions of the appliances, equipment and insulation shall be installed above the *flood level rim* of the pan. Supports located inside of the pan to support the appliance or equipment shall be water resistant and *approved*.

[M] 314.2.4 **Traps.** Condensate drains shall be trapped as required by the equipment or appliance manufacturer.

[M] 314.2.4.1 **Ductless mini-split system traps.** Ductless mini-split equipment that produces condensation shall be provided with an in-line check valve located in the drain line or a trap.

[M] 314.2.5 **Drain line maintenance.** Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

## SECTION 315 PENETRATIONS

**315.1 Sealing of annular spaces.** The annular space between the outside of a pipe and the inside of a pipe sleeve or between the outside of a pipe and an opening in a building envelope wall, floor, or ceiling assembly penetrated by a pipe shall be sealed in an *approved* manner with caulking material, foam sealant or closed with a gasketing system. The caulking material, foam sealant or gasketing system shall be designed for the conditions at the penetration location and shall be compatible with the pipe, sleeve and building materials in contact with the sealing materials. Annular spaces created by pipes penetrating fire-resistance-rated assemblies or membranes of such assemblies shall be sealed or closed in accordance with Section 714 of the *International Building Code*.

**SECTION 316  
ALTERNATIVE ENGINEERED DESIGN**

**316.1 Alternative engineered design.** The design, documentation, inspection, testing and approval of an *alternative engineered design* plumbing system shall comply with Sections 316.1.1 through 316.1.6.

**316.1.1 Design criteria.** An *alternative engineered design* shall conform to the intent of the provisions of this code and shall provide an equivalent level of quality, strength, effectiveness, fire resistance, durability and safety. Material, equipment or components shall be designed and installed in accordance with the manufacturer's instructions.

**316.1.2 Submittal.** The registered design professional shall indicate on the permit application that the plumbing system is an *alternative engineered design*. The permit and permanent permit records shall indicate that an *alternative engineered design* was part of the *approved* installation.

**316.1.3 Technical data.** The registered design professional shall submit sufficient technical data to substantiate the proposed *alternative engineered design* and to prove that the performance meets the intent of this code.

**316.1.4 Construction documents.** The registered design professional shall submit to the code official two complete sets of signed and sealed construction documents for the *alternative engineering design*. The construction documents shall include floor plans and a riser diagram of the work. Where appropriate, the construction documents shall indicate the direction of flow, all pipe sizes, grade of horizontal piping, loading and location of fixtures and appliances.

**316.1.5 Design approval.** Where the code official determines that the *alternative engineered design* conforms to the intent of this code, the plumbing system shall be *approved*. If the *alternative engineered design* is not *approved*, the code official shall notify the registered design professional in writing, stating the reasons thereof.

**316.1.6 Inspection and testing.** The *alternative engineered design* shall be tested and inspected in accordance with the requirements of Sections 107 and 312.