



## 2014 Oregon Plumbing Specialty Code New Oregon Amendments

This document outlines all the new Oregon Amendments adopted during the code promulgation process for the 2014 Oregon Plumbing Specialty Code (OPSC). This code is based on the 2011 OPSC and includes provisions from the 2012 Uniform Plumbing Code (UPC).

### CHAPTER 1 ADMINISTRATION

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### CHAPTER 2 DEFINITIONS

#### 204.0

– B –

**Bathroom Group** – A group of plumbing fixtures consisting of a water closet, one, ~~or~~ two, **or three** lavatories, and either any combination of a bathtub, a combination bath/shower, or a shower and may include a urinal or bidet and an emergency floor drain(s).

#### 208.0

– F –

**Fixture Branch** – A water supply pipe between the fixture supply pipe and the water ~~distributing~~ distribution pipe.

#### 211.0

– I –

**Insanitary** – A condition that is contrary to sanitary principles or is injurious to health.

Conditions to which “insanitary” shall apply include the following:

- (1) Any trap that does not maintain a proper trap seal.
- (2) Any opening in a drainage system, except where lawful, that is not provided with an approved liquid-sealed trap.
- (3) A plumbing fixture or other waste discharging receptor or device that is not supplied with water sufficient to flush and maintain the fixture or receptor in a clean condition.
- (4) Any defective fixture, trap, pipe, or fitting.
- (5) Any trap, except where in this code exempted, directly connected to a drainage system, the seal of which is not protected against siphonage and back-pressure by a vent pipe.
- (6) Any connection, cross-connection, construction, or condition, temporary or permanent, that would permit or make possible by any means whatsoever for any unapproved foreign matter to enter a water distribution system used for domestic purposes.
- (7) The foregoing enumeration of conditions to which the term “insanitary” shall apply, shall not preclude the application of that term to conditions that are, in fact, insanitary.



## CHAPTER 3 GENERAL REGULATIONS

### 301.3 Flood Hazard Resistance.

**301.3.1 General.** Plumbing systems shall be located above the design flood elevation **as determined by the local governing authority.**

**Exception:** Plumbing systems are permitted to be located below the design flood elevation 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 to the design flood elevation.

### 314.0 Hangers and Supports.

**314.1** Suspended piping shall be supported at intervals not to exceed those shown in Table 3-2.

**Exception: Piping supported per the manufacturer's installation instructions.**

## CHAPTER 4 PLUMBING FIXTURES AND FIXTURE FITTINGS

### 402.0 Water-Conserving Fixtures and Fittings.

**402.7 Pre-Rinse Spray Valve.** Commercial food service pre-rinse spray valves shall have a maximum flow rate of 1.6 gallons per minute (gpm) at 60 pounds-force per square inch (psi) (6.0 L/m at 414 kPa) in accordance with ASME A112.18.1/CSA B125.1 and shall be equipped with an integral automatic shutoff.

### 405.0 Prohibited Fixtures.

**405.2 Prohibited Urinals.** Trough urinals and urinals with an invisible seal shall be prohibited.

**Exception:** Non-water urinals.

### 414.0 Dishwashing Machines.

**414.1 Application.** Domestic or commercial dishwashing machines shall comply with the applicable standards referenced in Table 1401.1.

**414.2 Backflow Protection.** The water supply connection to a commercial dishwashing machine shall be protected by an air gap or a backflow prevention device in accordance with Section 603.3.2, Section 603.3.5, or Section 603.3.6.

**414.3 Drainage Connection.** Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.4 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste grinder. Commercial dishwashing machines shall discharge indirectly through an air gap or direct connection in accordance with Section 704.3 with floor drain protection.

### 416.0 Emergency Eyewash and Shower Equipment.

**416.1 Application.** Emergency eyewash and shower equipment shall comply with ISEA Z358.1.

**416.2 Water Supply.** Emergency eyewash and shower equipment shall not be limited in the water supply flow rates. Flow rate, discharge pattern, and temperature of flushing fluids shall be provided in accordance with ISEA Z358.1 based on the hazardous material.

**416.3 Installation. Emergency eyewash and shower equipment shall be installed in accordance with the manufacturer’s installation instructions.**

**416.4 Location. Emergency eyewash and shower equipment shall be located on the same level as the hazard and accessible for immediate use. The path of travel shall be free of obstructions and shall be clearly identified with signage.**

**416.5 Drain. A drain shall not be required for emergency eyewash or shower equipment. Where a drain is provided, the discharge shall be in accordance with Section 811.0.**

## CHAPTER 5 WATER HEATERS

### 501.0 General.

The regulations of this chapter shall govern the construction, location, and installation of fuel-burning, **instantaneous** and other water heaters heating potable water. The minimum capacity for water heaters shall be in accordance with the first hour rating listed in Table 5-1. Design, construction, and workmanship shall be in conformity with accepted engineering practices, manufacturer’s installation instructions, and applicable standards and shall be of such character as to secure the results sought to be obtained by this code. No water heater shall be hereinafter installed that does not comply in all respects with the type and model of each size thereof approved by the ~~Authority Having Jurisdiction~~ **State Plumbing Board**. A list of accepted gas appliance standards are included in Table 14-1.

### 502.0 Definitions.

**502.9** Storage type water heaters regulated by this code are appliances which heat potable water and are equipped with approved safety devices and operate at or below the following:

- (1) Volume of one hundred twenty (120) gallons;
- (2) Water temperature of two hundred ten degrees (210°F);
- (3) One hundred fifty (150) pounds-per-square-inch operating pressure; and
- (4) Two hundred thousand (200,000) BTU input.

Exception: ~~Domestic~~ potable water heaters serving single dwelling units and designed to create hot water instantaneously on demand without the use of a storage tank.

**502.16 Instantaneous-Tankless Water Heater. Potable water heating units, sometimes with a small buffer tank, designed to create hot water instantaneously on demand without the use of a storage tank, regardless of size or BTU input, and shall be listed per table 14-1.**

## CHAPTER 6 WATER SUPPLY AND DISTRIBUTION

### 601.0 Water Required

#### 601.2 Identification of a Potable and Nonpotable Water System.

**601.2.2.1 Alternate Water Sources. Alternate water source systems shall have a purple (Pantone color No. 512, 522C, or equivalent) background with uppercase lettering and shall be field or factory marked as follows:**

- (1) Gray water systems shall be marked in accordance with this section with the words “CAUTION: NONPOTABLE GRAY WATER, DO NOT DRINK” in yellow letters (Pantone 108 or equivalent).**
- (2) Reclaimed (recycled) water systems shall be marked in accordance with this section with**

**the words: “CAUTION: NONPOTABLE RECLAIMED (RECYCLED) WATER, DO NOT DRINK” in black letters.**

**(3) On-site treated water systems shall be marked in accordance with this section with the words: “CAUTION: ON-SITE TREATED NONPOTABLE WATER, DO NOT DRINK” in yellow letters (Pantone 108 or equivalent).**

**(4) Rainwater catchment systems shall be marked in accordance with this section with the words: “CAUTION: NONPOTABLE RAINWATER WATER, DO NOT DRINK” in yellow letters (Pantone 108 or equivalent).**

#### **603.4 Specific requirements**

**603.4.12** Potable water supply to carbonators shall be protected by either an airgap or a vented backflow preventer for carbonated beverage dispensers installed within the carbonated beverage dispenser. The carbonated beverage dispenser shall bear the label of an approved testing agency, certifying and attesting that such equipment has been tested and inspected and meets the requirements of the approved applicable standard. Carbonated beverage dispensers without an approved internal airgap or vented backflow preventer for carbonated beverage dispensers and carbonated beverage dispensing systems shall have the water supply protected with a vented backflow preventer for carbonated beverage dispensers **in accordance with ASSE 1022. For carbonated beverage dispensers, piping material installed downstream of the backflow preventer shall not be affected by carbon dioxide gas.**

#### **604.0 Materials**

**604.10** Water pipe and fittings with a lead content which exceeds ~~eight (8)~~ **.25** percent shall be prohibited in piping systems used to convey potable water.

#### **608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.**

**608.3** Any water system provided with a check valve, backflow preventer, or any other normally closed device that prevents dissipation of building pressure back into the water main shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Such expansion tank or other approved device shall be installed on the building side of the check valve, backflow preventer, or other device and shall be sized and installed in accordance with the manufacturer’s recommendation. **No shutoff valve shall be installed between the expansion tank and the system.**

Exception: Non-storage instantaneous water heaters without a recirculation system.

Any water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination pressure and temperature relief valve, except for listed nonstorage instantaneous heaters having an inside diameter of not more than three (3) inches (80 mm). Each such approved combination temperature and pressure relief valve shall be installed on the water-heating device in an approved location based on its listing requirements and the manufacturer's instructions. Each such combination temperature and pressure relief valve shall be provided with a drain as required in Section 608.5.

**TABLE 6-2  
Backflow Prevention Devices, Assemblies and Methods (continued)**

Device Assembly, or Method <sup>1</sup>	Applicable Standards	Degree of Hazard				Installation <sup>2,3</sup>
		Pollution (Low Hazard)		Contamination (High Hazard)		
		Back-Siphonage	Back-Pressure	Back-Siphonage	Back-Pressure	
Spill-Resistant Pressure-Type Backflow Prevention Assembly (single check valve with air inlet vent and means field testing)	ASSE 1056	X		X		Upright position Minimum of six (6) inches (152 mm) or listed distance above all downstream piping and flood-level rim of receptor. <sup>5</sup>
Double Check Valve Backflow Prevention Assembly (two independent check valves and means of field testing)	ASSE 1015; AWWA C510; CSA B 64.5 or CSA B 64.5.1	X	X			Horizontal unless otherwise listed. Requires one (1) foot (305 mm) clearance at bottom for maintenance. May need platform/ ladder for test and repair. Does not discharge water.
	ASSE 1048	X	X			Horizontal unless otherwise listed. Requires one (1) foot (305 mm) clearance at bottom for maintenance. May need platform/ ladder for test and repair. Does not discharge water. Installation includes a fire protection system and is designed to operate under continuous pressure conditions.
Pressure Vacuum Breaker Backflow Prevention Assembly (loaded air inlet valve, internally loaded check valve and means of field testing)	ASSE 1020 or CSA B 64.1.2	X		X		Upright position. May have valves downstream. Minimum of twelve (12) inches (305 mm) above all downstream piping and flood-level rim of receptor. May discharge water.
Reduced Pressure Principle Backflow Prevention Assembly (two independently acting loaded check valves, a pressure relief valve and means of field testing)	ASSE 1047	X	X	X	X	Horizontal unless otherwise listed. Requires one (1) foot (305 mm) minimum clearance at bottom for maintenance. May need platform/ladder for test and repair. May discharge water. Installation includes a fire protection system and is designed to operate under continuous pressure conditions.
	ASSE 1013; AWWA C511; CSA B64.4 or CSA B 64.4.1	X	X	X	X	Horizontal unless otherwise listed. Requires one (1) foot (305 mm) minimum clearance at bottom for maintenance. May need platform/ladder for test and repair. May discharge water.

<sup>1</sup> See description of devices and assemblies in this chapter.

<sup>2</sup> Installation in pit or vault requires previous approval by the ~~Authority Having Jurisdiction~~ **building official**.

<sup>3</sup> Refer to general and specific requirement for installation.

<sup>4</sup> Not to be subjected to operating pressure for more than twelve (12) hours in any twenty-four (24) hour period.

<sup>5</sup> For deck-mounted and equipment-mounted vacuum breaker, see Section 603.4.15.

## CHAPTER 7 SANITARY DRAINAGE

### 702.0 Fixture Unit Equivalents

**702.3** For a continuous flow into a drainage system, such as from a pump, sump ejector, air conditioning equipment, or similar device, two (2) fixture units shall be ~~allowed for~~ **equal** to each gallon per minute (3.78 L/m) of flow.

### 704.0 Fixture Connections (Drainage)

**704.3** Pot sinks, scullery sinks, dishwashing sinks, silverware sinks, ~~commercial dishwashing machines, silverware washing machines,~~ and other similar fixtures shall be connected directly to the drainage system. A floor drain shall be provided adjacent to the fixture, and the fixture shall be connected on the sewer side of the floor drain trap, provided that no other drainage line is connected between the floor drain waste connection and the fixture drain. The fixture and floor drain shall be trapped and vented as required by this code.

**Exception: The above listed fixtures may be drained indirectly if provided with an approved air gap no less than one (1) inch without the necessity of the adjacent floor drain.**

### 710.0 Drainage of Fixtures Located Below the Next Upstream Manhole or Below the Main Sewer Level.

**710.1** Where a fixture is installed on a floor level that is lower than the next upstream manhole cover of the public or private sewer, serving such drainage piping, shall be protected from backflow of sewage by installing an approved type of backwater valve. Fixtures on floor levels above such elevation shall not discharge through the backwater valve. **Cleanouts for drains that pass through a backwater valve shall be clearly identified with a label, sign or markings, stating “backwater valve downstream”.**

**710.10** Sumps and receiving tanks shall be provided with substantial covers having a bolt-and-gasket-type manhole or equivalent opening **with a minimum of 24” clearance above the lid** to permit access for inspection, repairs, and cleaning. The top shall be provided with a vent pipe that shall extend separately through the roof or, where permitted, be combined with other vent pipes. Such vent shall be large enough to maintain atmospheric pressure within the sump under normal operating conditions and, in no case, shall be less in size than that required by Table 7-5 for the number and type of fixtures discharging into the sump, nor less than one and one-half (1-1/2) inches (40 mm) in diameter. When the foregoing requirements are met and the vent, after leaving the sump, is combined with vents from fixtures discharging into the sump, the size of the combined vent need not exceed that required for the total number of fixtures discharging into the sump. No vent from an air-operating sewage ejector shall combine with other vents.

**710.14 Elevator Pit Drains.** Permanent means of drainage shall be provided for ~~elevator pits~~ **each elevator car**. Gravity drains, when installed, shall be provided with an approved type backwater valve to prevent drain line backup and the trap seal shall be protected with an automatic trap seal primer. Sumps and pumps may be installed when provided with the following:

- (1) A check valve to prevent water, gases, and odors from entering the pit.
- (2) A secured and level cover over the sump.
- (3) An automatic activation switch.
- (4) ~~A minimum 1/3 hp rating.~~ **A minimum of a 50 gpm pump per each elevator car shall be installed.**
- (5) ~~A minimum 1-1/4 inch (32 mm) discharge pipe.~~ **A minimum of a 2 inch discharge pipe.**
- (6) Sump size as recommended by the pump manufacturer.
- (7) The outlet pipe of the pump shall be directly or indirectly connected to the sanitary drainage system.

(8) Single pumps shall be permitted.

**(7) A minimum of a 4 inch receiving gravity drain at ¼ inch per foot slope shall serve the branch connected through the trap.**

**(8) Dual pumps and oil water separator are not required.**

#### **712.0 Testing.**

**712.4 Where circumstances exist that make air and water tests described in Section 712.2 and Section 712.3 impractical, see Section 103.5.6.3.**

#### **715.0 Building Sewer Materials.**

**715.3** Replacement of existing building sewer and building storm sewers using trenchless methodology and materials shall be installed in accordance with IAPMO IS-26 **and ASTM F 1216.**

#### **718.0 Grade, Support, and Protection of Building Sewers.**

**718.3** No building sewer or other drainage piping or part thereof, which is constructed of materials other than those approved for use under or within a building, shall be installed under or within ~~two (2)~~ **five (5)** feet (610 mm) of any building or structure, or part thereof, nor less than one (1) foot (305 mm) below the surface of the ground. The provisions of this subsection include structures such as porches and steps, whether covered or uncovered; breezeways; roofed porte cocheres; roofed patios; carports; covered walks; covered driveways; and similar structures or appurtenances.

#### **723.0 Building Sewer Test.**

**723.1** Building sewers shall be tested by plugging the end of the building sewer at its points of connection with the public sewer or private sewage disposal system and completely filling the building sewer with water from the lowest to the highest point thereof, or by approved equivalent low-pressure air test. The building sewer shall be water-tight ~~at all points.~~

**723.2 Where circumstances exist that make air and water tests described in Section 712.2 and Section 712.3 impractical, see Section 103.5.6.3.**

## **CHAPTER 9 VENTS**

#### **904.0 Size of Vents.**

**904.1** The size of vent piping shall be determined from its length and the total number of fixture units connected thereto, as set forth in Table 7-5. The diameter of an individual vent shall be not less than one and one-fourth (1-1/4) inches (32 mm) nor less than one-half (1/2) the diameter of the drain to which it is connected. In addition, the drainage piping of each building and each connection to a public sewer or a private sewage disposal system shall be vented by means of one (1) or more vent pipes, the aggregate cross-sectional area of which shall be not less than that of the largest required building sewer, as determined from Table 7-5. Vent pipes from fixtures located upstream from pumps, ejectors, backwater valves, or other devices that ~~in any way~~ obstruct the free flow of air and other gases between the building sewer and the outside atmosphere shall not be used for meeting the cross-sectional area venting requirements of this section.

## **908.2 Horizontal Wet Venting for Bathroom Groups.**

**908.2.1 Where Permitted.** Water closets, bathtubs, showers and floor drains within one (1) or two (2) bathroom groups located on the same floor level **and for private use** shall be permitted to be vented by a wet vent. The wet vent shall be considered the vent for the fixtures and shall extend from the connection of the dry vent along the direction of the flow in the drain pipe to the most downstream fixture drain or trap arm connection to the horizontal branch drain. Each wet-vented fixture drain or trap arm shall connect independently to the wet-vented horizontal branch drain. Each individual fixture drain or trap arm shall connect horizontally to the wet-vented horizontal branch drain or shall be provided with a dry vent. The trap to vent distance shall be in accordance with Table 10-1. Only the fixtures within the bathroom groups shall connect to the wet-vented horizontal branch drain. The water closet fixture drain or trap arm connection to the wet vent shall be downstream of any fixture drain or trap arm connections. Any additional fixtures shall discharge downstream of the wet vent system and be conventionally vented.

## **CHAPTER 10 TRAPS AND INTERCEPTORS**

### **1002.0 Traps Protected by Vent Pipes.**

**1002.1** Each plumbing fixture trap, except as otherwise provided in this code, shall be protected against siphonage, back-pressure, and air circulation shall be assured throughout ~~all parts of~~ the drainage system by means of a vent pipe installed in accordance with the requirements of this code.

### **1006.0 Floor Drain Traps**

Floor drains, floor sinks, funnel drains and similar fixtures shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The drain inlet shall be so located that it is ~~at all times~~ in full view.

Traps for floor drains, floor sinks, funnel drains, area drains, catch basins and receptors within a building discharging to a vented horizontal soil or waste pipe are exempt from the provision requiring individual vents for each trap, provided that the trap arm, or distance from the trap to the vented horizontal soil or waste pipe to which it discharges, measuring the developed length, does not exceed the maximum distances as shown in Table 10-1.1, and that the branch waste pipe from the trap connects to a soil or waste pipe which is vented with a pipe having a diameter not less than that which would be required to vent a floor drain, floor sink, funnel drain, area drain, catch basin and receptors, computed on the units allowed in Tables 7-3 and 7-5. Common vent sizing shall be the sum of fixture units served, but in no case smaller than the minimum vent size required for any fixture served or as determined from Table 75 whichever is larger.

**Exception:** Floor sinks installed to receive the discharge waste from sinks may be individually vented. Trap arms shall not exceed distances as per Table 10-1.1. Priming of traps for above vented floor sinks are not required.

### **1014.3.4 Location.**

**1014.3.4.1 Each** grease interceptor shall be so installed and connected that it shall be ~~at all times~~ easily accessible for inspection, cleaning, and removal of the intercepted grease. A gravity grease interceptor complying with IAPMO Z1001, shall not be installed in any part of a building where food is handled. Location of the grease interceptor shall meet the approval of the building official.



## CHAPTER 11 STORM DRAINAGE

### 1101.0 General.

**1101.1 Where Required.** Roofs, paved areas, yards, courts, ~~and~~ courtyards, vent shafts, light wells, or similar areas having rain water, shall be drained into a separate storm sewer system, or into a combined sewer system where a separate storm sewer system is not available, or to some other place of disposal satisfactory to the ~~Authority Having Jurisdiction~~ building official.

### 1109.0 Testing.

**1109.1 Testing Required.** New building storm drainage systems and parts of existing systems that have been altered, extended, or repaired shall be tested as described in Sections 1109.2.1 or 1109.2.2 to disclose leaks and defects.

**1109.2 Methods of Testing Storm Drainage Systems.** Except for outside leaders and perforated or open-jointed drain tile, the piping of storm drain systems shall be tested upon completion of the rough piping installation by water or air, and proved tight. The ~~Authority Having Jurisdiction~~ building official shall be permitted to require the removal of any cleanout plugs to ascertain whether the pressure has reached parts of the system. One (1) of the following test methods shall be used:

**1109.2.1 Water Test.** After piping has been installed, the water test shall be applied to the drainage system, either to the entire system or to sections. If the test is applied to the entire system, all openings in the piping shall be tightly closed except for 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 for the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a ten (10) foot (3,048 mm) head of water. In testing successive sections, not less than the upper ten (10) feet (3,048 mm) of the next preceding section shall be tested so that no joint of pipe in the building (except the uppermost ten (10) feet (3,048 mm) of a roof drainage system, which shall be filled with water to the flood level of the uppermost roof drain) shall have been submitted to a test of less than a ten (10) foot (3,048 mm) head of water. The water shall be kept in the system or in the portion under test for not less than fifteen (15) minutes before inspection starts; the system shall then be tight at all points.

**1109.2.2 Air Test.** The air test shall be made by attaching an air compressor testing apparatus to any suitable opening after closing other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of five (5) psi (34.5 kPa) or sufficient pressure to balance a column of mercury ten (10) inches (254 mm) in height. This pressure shall be held without introduction of additional air for a period of not less than fifteen (15) minutes.

**1109.2.3 Exceptions. Where circumstances exist that make air and water tests described in Section 1109.2.1 and Section 1109.2.2 impractical, see Section 103.5.6.3.**

## CHAPTER 13 HEALTH CARE FACILITIES AND MEDICAL GAS AND VACUUM SYSTEMS

Updated to the Medical Gas Vacuum Systems provisions of the NFPA 99 2012 Edition.

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## APPENDIX I INSTALLATION STANDARDS

This section has been added back into the code for reference only.

APPENDIX L  
ALTERNATE PLUMBING SYSTEMS

**L 7.0 Vacuum Drainage Systems.**

**L 7.1 General. This section regulates the design and installation provisions for vacuum waste drainage systems. Plans for vacuum waste drainage systems shall be submitted to the building official for approval and shall be considered an engineered designed system. Such plans shall be prepared by a registered or licensed person to perform plumbing design work. Details are necessary to ensure compliance with the requirements of this section, together with a full description of the complete installation including quality, grade of materials, equipment, construction, and methods of assembly and installation. Components, materials, and equipment shall comply with standards and specifications listed in Table 1401.1 of this code or approved by the building official and other national consensus standards applicable to plumbing systems and materials. Where such standards and specifications are not available, alternate materials and equipment shall be approved in accordance with Section 301.2.**

**L 7.2 System Design. Vacuum waste drainage systems shall be designed and installed in accordance with the manufacturer's installation instructions. A vacuum waste drainage system shall include a vacuum generating system, waste collection center, piping network, vacuum valve, and control components used to isolate the vacuum piping network from atmospheric pressure and to collect waste at its point of origin. Where a vacuum system provides the only means of sanitation, duplicate vacuum generating equipment set to operate automatically shall be installed to allow the system to continue in operation during periods of maintenance.**

**L 7.2.1 Vacuum Generating System. The vacuum generating station shall include vacuum pumps to create a constant vacuum pressure within the piping network and storage tanks. The discharge from the tank shall be through an air gap in accordance with Table 603.3.1. Operation of pumps, collection tanks, and alarms shall be automated by controls. The vacuum pumps shall be activated on demand and accessible for repair or replacement. The vent from the vacuum pump shall be provided for vacuum pump air exhaust, and shall be of a size capable of handling the total air volume of the vacuum pump.**

**L 7.2.2 Waste Collection Center or Storage Tanks. Vacuum collection center or storage tanks shall be of such capacity as to provide storage of waste to prevent fouling of the system. Such collection or storage tank shall be capable of withstanding 150 percent of the rated vacuum (negative pressure) created by the vacuum source without leakage or collapse. Waste collection center or storage tanks shall be accessible for adjustment, repair, or replacement.**

**L 7.2.3 Piping Network. The piping network shall be under a continuous vacuum and shall be designed to withstand 150 percent of the vacuum (negative pressure) created by the vacuum source within the system without leakage or collapse. Sizing the piping network shall be in accordance with the manufacturer's instructions. The water closet outlet fitting shall connect with a piping network having not less than a 1 1/2 inch (40 mm) nominal inside diameter.**

**L 7.2.4 Vacuum Interface Valve. A closed vacuum interface valve shall be installed to separate the piping network vacuum from atmospheric pressure. A control device shall open the vacuum interface valve where a signal is generated to remove waste from the plumbing fixture.**

**L 7.2.5 Control Components. Where a pneumatic signal is generated at the controller, a vacuum from the system to open the extraction valve shall be designed to operate where vacuum pressure exists to remove the accumulated waste. Each tank shall incorporate a level indicator switch that automatically controls the discharge pump and warns of malfunction or blockage as follows:**

- (1) Start discharge.**
- (2) Stop discharge.**
- (3) Activate an audible alarm where the level of effluent is usually high.**
- (4) Warning of system shutdown where tank is full.**

**L 7.3 Fixtures. Fixtures utilized in a vacuum waste drainage system shall be in accordance with referenced standards listed in Table 1401.1. Components shall be of corrosion resistant materials. The water closet outlet shall be able to pass a 1 inch (25 mm) diameter ball and shall have a smooth, impervious surface. The waste outlet and passages shall be free of obstructions, recesses, or chambers that are capable of permitting fouling. The mechanical valve and its seat shall be of such materials and design to provide a leak-free connection where at atmospheric pressure or under vacuum. The flushing mechanism shall be so designed as to ensure proper cleansing of the interior surfaces during the flushing cycle at a minimum operating flow rate. Mechanical seal mechanisms shall withdraw completely from the path of the waste discharge during flushing operation. Each mechanical seal vacuum water closet shall be equipped with a listed vacuum breaker. The vacuum breaker shall be mounted with the critical level or marking not less than 1 inch (25.4 mm) above the flood-level rim of the fixture. Vacuum breakers shall be installed on the discharge side of the last control valve in the potable water supply line and shall be located so as to be protected from physical damage and contamination.**

**L 7.4 Drainage Fixture Units. Drainage fixture units shall be determined by the manufacturer's instructions. The pump discharge load from the collector tanks shall be in accordance with this appendix.**

**L 7.5 Water Supply Fixture Units. Water supply fixture units shall be determined by the manufacturer's instructions.**

**L 7.6 Materials. Materials used for water distribution pipe and fittings shall be in accordance with Table 604.1. Materials used for aboveground drainage shall be in accordance with Table 701.1 and shall have a smooth bore, and be constructed of non-porous material.**

**L 7.7 Traps and Cleanouts. Traps and cleanouts shall be installed in accordance with Chapter 7 and Chapter 10.**

**L 7.8 Testing. The entire vacuum waste system shall be subjected to a vacuum test of 29 inches of mercury (98 kPa) or not less than the working pressure of the system for 30 minutes. The system shall be gastight and watertight at all points. Verification of test results shall be submitted to the building official.**

**L 7.9 Manufacturer's Instructions. Manufacturer's instructions shall be provided for the purpose of providing information regarding safe and proper operating instructions whether or not as part of the condition of listing in order to determine compliance. Such instructions shall be submitted and approved by the building official.**

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