Advanced Water Supply and Distribution

- Instructor: Otto Vinas
- Course #: BCAIB CILB
- Location: Nova Southeastern University
- Hour(s): One
602.2 Only potable water shall be supplied to plumbing fixtures that provide water for drinking bathing or culinary purposes, or for the process of foods, medical or pharmaceutical products. Unless otherwise provided in this code, potable water shall be supplied to all plumbing fixtures.
Reclaim Water. Chapter 62-610.

- Reclaim water shall be permitted to be used for flushing water closets and urinals and other fixtures which do not required potable water in accordance with Florida Department of Environmental Protection Chapter 62-610.

- “Reclaim Water” is water that has received treatment and is reused after flowing out of a domestic wastewater treatment facility.
602.3 **Individual water supply.** Where a potable public water supply is not available, individual sources of potable water supply meeting *Florida Statute 373* shall be utilized.

602.3.3 **Water quality.** Water from an individual water supply shall be *approved* as potable by the authority having jurisdiction prior to connection to the water system.
Florida Statute 373

- State Water Resource Plan
- Permitting Of Consumptive Uses Of Water
- Regulations Of Wells
- Management And Storage Of Surface Waters
- Finances And Taxation
- Miscellaneous Provisions
- Water Supply Policy, Planning, Production, And Funding
Disinfection of system

- **602.3.4** After construction or major repair, the individual water supply system shall be purged of deleterious matter and disinfected in accordance with section 610.

- **602.3.5** **Pumps.** Pumps shall be designed to maintain a prime and installed such that ready access is provided to the pump parts of the entire assembly for repair.
Sizing and Installation of Water Service Piping

- 603.1 Size of water service pipe. The water service pipe shall be sized to supply water to the structure in the quantities and at the pressures required in this code. The minimum size water service is ¾". Water service pipe shall be sized in accordance with table 603.1 or other approved methods.
The required separation distance shall not apply where the bottom of the water service pipe within 5 feet of the sewer is a minimum of 12 inches above the top of the highest point of the sewer and the pipe materials conform to Table 702.3.
603.2 Exceptions

2. Water service pipe is permitted to be located in the same trench with a building sewer, provided such sewer is constructed of materials listed in Table 702.2
603.2 Exceptions

3. The required separation distance shall nor apply where a water service pipe crosses a sewer pipe, provided the water service pipe is sleeved to at least 5 feet horizontally from the sewer center line on both sides of the crossing with pipe materials listed in Table 605.3, 702.2, or 702.3
## Tables 702.2 and 702.3

### Underground Building Drainage and Vent Pipe
- ABS
- Cast-iron
- PVC
- Copper
- Polyolefin (acid waste)
- PVC cellular
- PVDF (acid waste)
- Stainless steel

### Building Sewer Pipe
- SDR 35
- Concrete
- Clay
Water Distribution Design Criteria.

- 604.1 The design of the water distribution system shall conform to accepted engineering practice. Methods utilized to determine pipe sizes shall be approved. Table 603.1 shall be permitted to be used to size the water distribution system. (It is the Code Official responsibility to determine that the water supply system meets code, you may accept or reject the designers design system)
vided the water service pipe is sleeved to at least 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials listed in Table 605.3, 702.2 or 702.3.

603.2.1 Water service near sources of pollution. Potable water service pipes shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits (see Section 605.1 for soil and groundwater conditions).

<table>
<thead>
<tr>
<th>TABLE 603.1</th>
<th>MINIMUM WATER SERVICE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO. OF FIXTURE UNITS</td>
<td>DIA</td>
</tr>
<tr>
<td>Flush Tank</td>
<td>in</td>
</tr>
<tr>
<td>18</td>
<td>3/4</td>
</tr>
<tr>
<td>19-55</td>
<td>1</td>
</tr>
<tr>
<td>56-88</td>
<td>1 1/2</td>
</tr>
<tr>
<td>86-225</td>
<td>1 1/2</td>
</tr>
<tr>
<td>226-350</td>
<td>2</td>
</tr>
<tr>
<td>351-550</td>
<td>2</td>
</tr>
<tr>
<td>551-640</td>
<td>2 1/2</td>
</tr>
<tr>
<td>641-1340</td>
<td>3</td>
</tr>
</tbody>
</table>

a. Table is applicable for both copper and plastic water piping.

b. See Table 509.1 for fixture unit values.

c. Minimum water service shall be 3/4 inch to control valve.

d. All secondary submeters and backflow assemblies shall be at least the same size as the line in which they are installed.
e. Table based on minimum water main pressure of 50 psi.

SECTION 604
DESIGN OF BUILDING WATER DISTRIBUTION SYSTEM

604.1 General. The design of the water distribution system shall conform to accepted engineering practice. Methods utilized to determine pipe sizes shall be approved. Table 603.1 shall be permitted to be used to size the water distribution system.

604.2 System interconnection. At the points of interconnection between the hot and cold water supply piping systems and the individual fixtures, appliances or devices, provisions shall be made to prevent flow between such piping systems.

604.3 Water distribution system design criteria. The water distribution system shall be designed, and pipe sizes shall be selected such that under conditions of peak demand, the capacities at the fixture supply pipe outlets shall not be less than shown in Table 604.3. The minimum flow rate and flow pressure provided to fixtures and appliances not listed in Table 604.3 shall be in accordance with the manufacturer's installation instructions.

<table>
<thead>
<tr>
<th>TABLE 604.2</th>
<th>WATER DISTRIBUTION SYSTEM DESIGN CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXTURE SUPPLY OUTLET SERVING</td>
<td>FLOW RATE* (gpm)</td>
</tr>
<tr>
<td>Bathtub, balanced-pressure, thermostatic or combination balanced-pressure/thermostatic mixing valve</td>
<td>4</td>
</tr>
<tr>
<td>Bidet, thermostatic mixing valve</td>
<td>2</td>
</tr>
<tr>
<td>Combination fixture</td>
<td>4</td>
</tr>
<tr>
<td>Dishwasher, residential</td>
<td>2.75</td>
</tr>
<tr>
<td>Drinking fountain</td>
<td>0.75</td>
</tr>
<tr>
<td>Laundry tray</td>
<td>4</td>
</tr>
<tr>
<td>Lavatory</td>
<td>2</td>
</tr>
<tr>
<td>Shower</td>
<td>3</td>
</tr>
<tr>
<td>Shower, balanced-pressure, thermostatic or combination balanced-pressure/thermostatic mixing valve</td>
<td>3</td>
</tr>
<tr>
<td>Siphon trap, hose bibb</td>
<td>5</td>
</tr>
<tr>
<td>Sink, residential</td>
<td>2.5</td>
</tr>
<tr>
<td>Sink, service</td>
<td>3</td>
</tr>
<tr>
<td>Urinal, valve</td>
<td>12</td>
</tr>
<tr>
<td>Water closet, flush out, flushometer valve</td>
<td>25</td>
</tr>
<tr>
<td>Water closet, flushometer tank</td>
<td>1.6</td>
</tr>
<tr>
<td>Water closet, siphonic, flushometer valve</td>
<td>25</td>
</tr>
<tr>
<td>Water closet, tank, close coupled</td>
<td>3</td>
</tr>
<tr>
<td>Water closet, tank, one piece</td>
<td>6</td>
</tr>
</tbody>
</table>

For SI: 1 pound per square inch = 6.895 kPa.
1 gallon per minute = 3.785 L/min.

a. For additional requirements for flow rates and quantities, see Section 604.4.

604.4 Maximum flow and water consumption. The maximum water consumption flow rates and quantities for all plumbing fixtures and fixture fittings shall be in accordance with Table 604.4.

Exceptions:
1. Blowout design water closets having a maximum water consumption of 3 1/2 gallons (13 L) per flushing cycle.
2. Vegetable sprays.
3. Clinical sinks having a maximum water consumption of 4 1/2 gallons (17 L) per flushing cycle.
4. Service sinks.
5. Emergency showers.
# TABLE 604.4
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND Fixture FITTINGS

<table>
<thead>
<tr>
<th>PLUMBING FIXTURE OR FIXTURE FITTING</th>
<th>MAXIMUM FLOW RATE OR QUANTITY(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lavatory, private</td>
<td>2.2 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory, public (metering)</td>
<td>0.25 gallon per metering cycle</td>
</tr>
<tr>
<td>Lavatory, public (other than metering)</td>
<td>0.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Shower head(^a)</td>
<td>2.5 gpm at 80 psi</td>
</tr>
<tr>
<td>Sink faucet</td>
<td>2.2 gpm at 60 psi</td>
</tr>
<tr>
<td>Urinal</td>
<td>1.0 gallon per flushing cycle</td>
</tr>
<tr>
<td>Water closet</td>
<td>1.6 gallons per flushing cycle</td>
</tr>
</tbody>
</table>

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. A hand-held shower spray is a shower head.
b. Consumption tolerances shall be determined from referenced standards.
605.5 **Fittings.** Pipe fittings shall be *approved* for the installation with the piping material installed and shall comply with the applicable standards listed in Table 605.5. All pipe fittings utilized in water supply systems shall comply with NSF 61. Ductile and gray iron pipe fittings shall be mortar lined in accordance with AWWA C104.
605.6 **Flexible water connectors.** Flexible water connectors exposed to continuous pressure shall conform to ASME A112.18.6. Access shall be provided to all flexible water connectors.
605.7 **Valves.** All valves shall be of an approved type and compatible with the type of piping material installed in the system. Ball valves, gate valves, globe valves and plug valves intended to supply drinking water shall meet the requirements of NSF 61.
605.9 Prohibited joints and connections.
1. Cement or concrete joints.
2. Joints made with a fittings not approved for specific installation.
3. Solvent-cement joints between different types of plastic pipe.
4. Saddle-type fittings.
Fittings and Joints.

- **605.14.3 Soldered joints.** Solder joints shall be made in accordance with methods of ASTM B 828. All cut tube ends shall be reamed to the full inside diameter of the tube end. All joints shall be cleaned. A flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32. The joining of water supply piping shall be made with lead-free solder and fluxes. “Lead free” shall mean a chemical composition equal to or less than 0.2 percent lead.
605.14.4 **Threaded joints.** Threads shall conform to ASTM B1.20.1. Pipe joints shall be applied on male ends only.

605.16 **CPVC plastic.**

605.16.2 **Solvent cementing.** Joint surfaces shall be clean and free from moisture, and an approved primer shall be applied. Solvent cement, orange in color and conforming to ASTM F493, shall be applied to all joint surfaces. The joint shall be made while the cement is wet, and accordance with ASTM D 2846 or ASTM F 493. Solvent- cements joints are permitted above or below ground.
Exceptions

A primer is not required where all of the following conditions apply:

1. The solvent used is third party certified as to conforming to ASTM F 493.
2. The solvent cement is yellow in color.
3. The solvent cement is used only joining ½ inch through 2 inch diameter CPVC pipe and fittings.
4. The CPVC pipe and fittings are manufactured in accordance with ASTM D D 2846.
605.18.1 Threaded joints. Threads shall conform to ASME B 1.20.1. Pipe –joint compound or tape shall be applied on the male threads only.
Polyethylene plastic.

605.19.4 Installation. Polyethylene pipe shall be cut square, with a cutter designed for plastic pipe. Except where joined by heat fusion, pipe ends shall be chamfered to remove sharp edges. Kinked pipe shall not be installed. The minimum pipe bending radius shall be less than 30 pipe diameters, or the minimum coil radius, whichever is greater. Piping shall not be bent beyond straightening of the curvature of the coil. Bends shall not be permitted within 10 pipe diameters of any fitting or valve. Stiffener inserts installed with compression-type couplings and fittings shall not extend beyond clamp or nut of the coupling or fitting.
605.22.2 Solvent cementing. Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F 656 shall be applied. Solvent cement not purple in color and conforming to ASTM D 2564 or CSA-B137.3 shall be applied to all joints surfaces. The joint shall be made while the cement is wet and shall in accordance with ASTM D 2855. Solvent-cement joints shall be permitted above and below ground.

605.24.2 Joints between different grades of plastic pipe or between plastic pipes and other piping material shall be made with an approved Adapter.
Copper to galvanized steel pipe

- **605.24.1 Copper to galvanized steel pipe.** Joints between copper and galvanized steel pipe shall be made with a brass fitting or dielectric union conforming to ASSE1079. The copper fitting shall be soldered to the fitting in an approved manner, and the fitting shall be screwed to the threaded pipe.
**Metal nipple on hot water heater tank:**

These nipples are supplied by the water heater manufacturer for this purpose and also that the plastic inner-lining of the nipples separates the two dissimilar metals from the water medium. It was the consensus of the committee that these factory installed plastic lined metal nipples on the water heater tanks are permitted as a connection of dissimilar metals.

*2004 plumbing technical*
606.1 Location of full-open valves.

1. On the water service pipe from the public water supply near the curb.

2. On the water distribution supply pipe at the entrance into the structure.

3. Reserved

4. On the base of every water riser pipe in occupancies other than multi-family residential occupancies that are two stories or less in height and in one- and two-family residential occupancies.
5. On the top of every water down-feed pipe in *occupancies* other than one- and two-family residential *occupancy*.

6. On the entrance to every water supply pipe to a dwelling unit, except where supplying a single fixture equipped with individual stops.

7. On the water supply pipe to a gravity or pressurized water tank.

8. On the water supply to every water heater.
606.2 Location of shutoff valves.

Shutoff valves shall be installed in the following locations:

1. On the fixture supply to each plumbing fixture other than bathtubs and shower in one- and two-family residential occupancies, and other than in individual sleeping units that are provided with unit shutoff valves in hotels, motels, boarding houses and similar occupancies.
2. On the water supply pipe to each sillcock or hose bibb in other than one- and two-family residential occupancies.

3. On the water supply to each appliance or mechanical equipment.

**Exception:** Shutoff valves are not required on tubs and showers in residential occupancies.
607.1 Where required. In occupied structures, hot water shall be supplied to all plumbing fixtures and equipment utilized for bathing, washing, culinary purposes, cleansing, laundry or building maintenance. Exception: In nonresidential occupancies, hot water or tempered water shall be supplied for bathing and washing purposes. The delivery of cold water only shall be permitted to be delivered from all hand washing facilities except where hot water is required by law.
607.1 Hand washing lavatories.

In public food service establishments, food establishments or otherwise required by law, lavatories intended for the purpose of employee hand washing shall be equipped with hot or tempered water.
607.2 Hot water supply temperature maintain. Where the *developed length of hot water* piping from the source of hot water supply to the farthest fixtures exceeds 100 feet, the water supply system shall be provided with a method of maintaining the temperature in accordance with the *Florida Building Code, Energy Conservation.* (100 feet)
607.2.1 Minimum pipe insulation. Circulating hot water piping and domestic and service hot water systems with fluid design operating temperatures greater than 105°F shall be insulated in accordance with Table 607.2.1.
• **607.3 Thermal expansion control.** A means of controlling increased pressure caused by thermal expansion shall be provided where required with sections 607.3.1 and 607.3.2

- **607.3.1 Pressure-reducing valve.** For water service systems sized up to 2 inches, a device for controlling pressure shall be installed where, because of thermal expansion, the pressure on the downstream side of a pressure-reducing valve exceeds the pressure-reducing valve setting.

- **607.3.2 Backflow prevention device or check valve.** Where a backflow prevention device, check valve or other device is installed on the water supply system utilizing storage water heating equipment such that thermal expansion causes an increase in pressure, a device shall be installed.
Recirculating Pump

- **607.2.3 Recirculating pump.** Where a thermostatic mixing valve is used in a system with hot water recirculating pump, the *hot water* or *tempered water* return line shall be routed to the cold water inlet pipe of the water heater and the cold water inlet pipe or the hot water the hot water return connection of the thermostatic mixing valve.
Backflow Protection

- **608.1 General.** A potable water supply system shall be designed, installed and maintained in such a manner so as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply through cross-connections or any other piping connections to the system. Backflow preventer applications shall conform to Table 608.1, except specifically stated in Sections 608.2 through 608.16.10.
608.2 Plumbing fixtures.

608.3 Devices, appurtenances, appliances and apparatus. All devices, appurtenances, appliances and apparatus intended to serve some special function, such as sterilization, distillation, processing, cooling, or storage of ice or foods, and that connect to the water supply system, shall be provided with protection against backflow and contamination of water supply systems. Water pumps, filters, softeners, tanks, commercial drinking water dispensers and all other appliances and devices that handle or treat potable water shall be protected against contamination.
Identification of nonpotable water. In buildings where nonpotable water systems are installed, the piping conveying the nonpotable water shall be identified either by color marking or metal tags in accordance with Sections 608.8.1 through 608.8.3. All nonpotable outlets such as hose connections, open end pipes, and faucets shall be identified at the point of use of each outlet with the word “Nonpotable-not safe for drinking”. The words shall be in indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material or shall be indelibly printed on the fixtures. The letters of the words shall not be less than .5 inches in height and color in contrast to the background on which they are applied.
• **608.8.1 Information.** Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow. Hazardous piping systems shall also contain information addressing the nature of hazard. Pipe identification shall be repeated at maximum intervals of 25 feet and at each point where the piping passes through wall, floor or roof. Lettering shall be readily observable within the room or space where the piping is located.

• **608.8.2 Color.** The color of the pipe identification shall be discernable and consistent throughout the building. The color purple shall be used to identify reclaim, rain and gray water systems.
• Beverage dispensers
• Connections to automatic fire sprinkler systems and standpipes systems.
• Connections to lawn irrigation systems.
• Chemical dispensers.
• Portable cleaning equipment.
• Dental pump equipment.
• Coffee machines and noncarbonated beverage dispensers
Florida Administrative 62-610

- AWWA Manual M14
- Legal authority (Water Purveyor)
- Policy establishing appropriate backflow preventers at service connections.
- Policy regarding the testing and maintenance of backflow preventers.
- Procedures for keeping records of assemblies, devices and testers.
Minimum Testing Pressures

- **RPZ**
  1\(^{st}\) check: 5 psi
  Relief valve opening: 2 psi
  2\(^{nd}\) check: 1 psi

- **DC**
  1\(^{st}\) check: 1 psi
  2\(^{nd}\) check: 1 psi

- **PVB**
  Check valve: 1 psi
  Air inlet: 1 psi
Questions and Answers