

**GENERAL:**

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1. The objective of this guideline is to provide minimum standards for the design and installation of plumbing piping and specialties including:
  - 1.1. Water Supply and Distribution
  - 1.2. Sanitary Drainage
  - 1.3. Vents
  - 1.4. Traps
  - 1.5. Special Piping
  - 1.6. Roof Drains
  - 1.7. Floor Drains
  - 1.8. Hose Bibs
  - 1.9. Wall Hydrants

**DESIGN GUIDELINES:**

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1. Refer also to section 220100 Plumbing System Design.
2. Water supply and distribution shall be one of the following:
  - a. Copper pipe and fittings, hard drawn, type L with soldered connections. Mechanical pressed copper fittings are also acceptable of the double pressed type complying with ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements shall be EPDM and factory installed. Viega, Mueller or approved equal.
  - b. Galvanized steel pipe and galvanized cast iron fittings.
  - c. Ball valves, 2 piece, full port bronze, lead free.
  - d. Butterfly valves, lug-type, ductile iron, aluminum bronze or neoprene coated ductile iron disc.
3. Sanitary waste and venting, above grade, use solid-wall, Schedule 40, PVC Pipe. (Note – N/A for UMHC projects designated as I-2 occupancy.)
  - a. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns. Fittings shall come from the same manufacturer as the piping.
  - b. PVC Special Fittings: ASTM F 409, drainage-pattern tube and tubular fittings with ends as required for application. Fittings shall come from the same manufacturer as the piping.
  - c. When installed within an air plenum, the pipe, fittings and pipe insulation shall have a flame spread index of 25 or less and a smoke developed index of 50 or less when tested as an assembly. Note: The fire-retardant insulation **tested with the pipe** must be certified to meet IMC 602.2.1 Exception 5.3 or NFPA 90A section 4.3.3.1.
  - d. Where kitchen sanitary sewer piping, such as floor drains serving dish washers may exceed 140 °F, use CPVC. CPVC drainage piping installed according to ASTM D 2321 and ASTM F 1668
  - e. No-Hub standard weight cast iron pipe and fittings conforming to ASTM A-888 or CISPI 301 may be used in main risers or air plenums only, when approved by the campus PM.

- 1.) Join with No-Hub Heavy Duty couplings, neoprene sleeve gasket, ASTM C-564, stainless steel shield, clamps and screws, ASTM C1540, all conforming to CISPI 310.
4. Sanitary waste, below grade, use solid-wall schedule 40 PVC pipe with socket fittings, and solvent-cemented joints.
  - a. When mechanical rooms or other areas where steam condensate may be present, use hub and spigot **cast iron** pipe and fittings, **service** class. Compression gaskets shall be made from an elastomeric compound meeting the requirements of ASTM C564.
5. Laboratory Waste and vent, above grade shall be one of the following:
  - a. Fuse seal Polypropylene pipe and fittings manufactured to ASTM F1412 and fittings manufactured to ASTM D4101 and D3311.
  - b. CPVC Lab Waste pipe manufactured to ASTM F441 and fittings manufactured to ASTM D3311. (Note – N/A for UMHC projects designated as I-2 occupancy.)
  - c. (Plenum Areas) Fuseal PVDF pipe manufactured to ASTM D1673 and fittings manufactured to ASTM D1637 and D3311 and CPVC pipe as specified above must be compliant with UL723/ASTM E084 for Flame and Smoke.
  - d. Lab waste piping shall be used only on the piping from the sink to the nearest main riser for most University laboratory projects. Federally funded projects may have additional requirements.
6. Traps
  - a. See section 224000 for information on fixture traps for standard fixtures.
  - b. Laboratory sink traps shall have 2 slip joints and/or two-piece trap for ease of trap maintenance.
7. Storm drainage, above grade, use solid-wall PVC pipe with socket fittings and solvent cemented joints. (Note – N/A for UMHC projects designated as I-2 occupancy.)
  - a. When installed within an air plenum, the pipe, fittings and pipe insulation shall have a flame spread index of 25 or less and a smoke developed index of 50 or less when tested as an assembly. Note: The fire-retardant insulation **tested with the pipe** must be certified to meet IMC 602.2.1 Exception 5.3 or NFPA 90A section 4.3.3.1.
8. Storm drainage, below grade, shall be PVC DWV pipe and fittings manufactured to ASTM D3311 and ASTM D1785.
  - a. Piping shall be a minimum of 4" diameter.
9. Special piping: Distilled, RO, and DI Water Systems shall be assembled using one of the following:
  - a. Fuse seal polypropylene unpigmented schedule 80 pipe and fittings manufactured from product conforming to ASTM D4101.
  - b. Low Extractable (LXT) Schedule 80 PVC solvent weld pipe and fittings manufactured from product conforming to ASTM D1784 and a Cell Classification of 12343 and specialty solvent cement conforming to ASTM D2564.

#### 10. Roof drains

- a. Main roof drain shall have a minimum 4" diameter outlet with a 15" flange diameter.
- b. Overflow roof drain shall have a minimum 6" diameter outlet with a 15" flange diameter per Table 4 in ASME A112.6.4.
- c. Piping shall be supported at each drain.

#### 11. Floor drains

- a. Minimum floor drain shall be 3" diameter. Provide deep seal traps in all locations when possible.
- b. Refer to drawing detail for mechanical room floor drain locations and open top drain detail for typical plumbing equipment.

#### 12. Hose bibs

- a. Anti-Siphon protection shall be built into the hose bib.

#### 13. Wall Hydrants

- a. Encased hydrant with recessed door and loose key access and operation.
- b. Anti-siphon protection shall be incorporated into the hydrant.
- c. Roof hydrants (where necessary) will have ASSE 1052 hose connection backflow protection that is field testable and does not have to be removed for hydrant drain down. Roof hydrant comes with a cast iron mounting system that allows for the removal and service of the hydrant after installation.

#### 14. Water Hammer Arresters

- a. Diaphragm type only. Shall be accessible.