

## SECTION 22 11 16

### DOMESTIC WATER PIPING

#### PART 1 GENERAL

##### 1.1 OPERATING AND MAINTENANCE DATA

- A. Include documentation of inspections and tests performed, including logs, curves, and certificates.
- B. Documentation shall note replacement of equipment or components that failed during testing.

#### PART 2 PRODUCTS

##### 2.1 MATERIALS

- A. Domestic Hot and Cold Water:
  1. Copper tube Type L soldered to wrought copper fittings or to cast bronze tensile strength.
  2. Fittings using low-liquidus/solidus solder, which does not contain lead or antimony, with a shear strength equal or greater than 10,000 psi.
  3. Meet ASTM B 88.
  4. Approved solder/flux manufacturer: All-State Aquasafe 100 or equal.
  5. The Viega ProPress and/or Appollo/Elkhart press technology systems are allowed for potable water piping only. System valves to be Viega and/or Appollo ball valves up to 2". Appollo is approved for 2-1/2" sizes and larger. Victaulic Vic-Press stainless steel piping system may be used in lieu of copper piping systems for 2" and smaller sizes.
  6. Grooved joint fittings shall be ASME B16.22 wrought copper or ASME B16.18 cast bronze, with copper-tubing sized grooved ends. (Flaring of tube or fitting ends to accommodate alternate sized couplings is not permitted.) Make: Victaulic Copper Connection.
  7. Grooved joint couplings consisting of two ductile iron housing segments cast with offsetting angle-pattern bolt pads, grade EHP center-leg gasket with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth, and ASTM A449 compliant bolts and nuts. Installation-Ready, for direct stab installation without field disassembly. Make: Victaulic Style 607.
  8. Victaulic Installation-Ready™ fittings for grooved end copper tubing shall be manufactured to copper-tube dimensions. Fittings shall be ductile iron conforming to ASTM A-536, Grade 65-45-12, with Installation-Ready™ ends, complete with PVDF (Poly Vinylidene Fluoride) and Grade "EHP" EPDM-HP [Grade "T" Nitrile] gasket; and ASTM A449 electroplated steel bolts and nuts. System shall be rated to 300 psi (2065 kPa) with Type K or L Copper Tubing.
  9. Saddle tee fittings are not allowed on domestic water.
  10. All products shall be UL classified in accordance with NSF-61 for potable water service, and meet the low-lead requirements of NSF-372 under the U.S. Safe Drinking Water Act.
  11. All domestic water filtration systems shall include certified filters that meet NSF/ANSI 42 for aesthetic effects and NSF/ANSI 53 for health-related contaminants.
- B. Compressed Air:
  1. Shop and industrial use (less than 250 psi and less than 200°F).
    - Type L copper tubing and wrought copper fittings with soldered joints (same as domestic water)
    - Victaulic Vic-Press stainless steel piping system may be used in lieu of copper piping systems for 2" and smaller sizes.
  2. Laboratory
    - Use tubing material as required by laboratory needs.
- C. Laboratory Vacuum (Classroom and Industrial Use)

1. Type L copper tubing and wrought copper fittings with soldered joints (same as domestic water)

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Underground plumbing shall be surrounded by a minimum of 6" of "squeegee."
- B. Pipe shall be accurately cut and set in place without springing or forcing.
- C. Structure of the building shall not be compromised.
- D. Above ground piping shall run parallel with the lines of the building unless otherwise indicated.
- E. Bare, uninsulated pipe shall not bear directly on structural elements so as to transmit sound to the structure or prevent flexible movement of the lines.
- F. Change in direction of piping shall be made with fittings.
- G. Allowance shall be made for expansion and contraction of hot water piping. Provide expansion loops where required.
- H. Braided domestic water piping tubes not allowed on any fixture.
- I. Joints shall be made with fittings of compatible material and for the specific purpose intended.
- J. All domestic water branches to be valved.
- K. Grooved joints shall be installed in accordance with the manufacturer's latest published instructions. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products.
- L. Installation of Victaulic products for hydronic services require a Victaulic Certified trained contractor and the Victaulic Inspection Service to verify the proper installation of each Victaulic joint. A Victaulic pre warranty letter must be submitted to the engineer detailing system parameters, warranty obligations, and cost of the inspection. The mechanical contractor is responsible to coordinate each inspection directly with Victaulic to ensure a timely commissioning of the Victaulic Piping System. Upon the completion of the Inspections Service, a 40 year warranty will be provided to the owner.
- M. Piping runs are prohibited above or in the following locations:
  1. Elevator machine rooms.
  2. Telephone or computer equipment rooms.
  3. Sensitive instrument and equipment rooms.
  4. Electrical switchgear, busways and equipment rooms.
- N. Pipes passing through concrete or masonry walls, floors, or roofs shall be provided with pipe sleeves fitted into place at the time of construction.
- O. Caulking of screwed joints or holes is not acceptable.
- P. Maximum waste arm distance between trap and vent (dirty Arm).
  1. 1 ¼" and 1 ½" – 3'-0" Max.
  2. 2" – 5'-0" Max.
- Q. Minimum water closet waste to be 4" line.

### **3.2 FIELD QUALITY CONTROL**

- A. Plumbing piping and fixtures shall be installed under the direct, on-site supervision of a journeyman plumber licensed by the State of Colorado. The ratio of plumbing apprentice-helpers shall not exceed two apprentice-helpers for each journeyman.

- B. Defective work found during tests and inspections shall be corrected and the tests repeated before acceptance.
- C. Plumbing systems shall be tested in accordance with NAPHCC Plumbing Code and other applicable codes.
- D. System Flushing:
  - 1. Before operational tests or disinfection, potable piping systems shall be flushed with potable water.
  - 2. Sufficient water shall be used to produce a minimum velocity of 2.5 feet/sec through the piping.
  - 3. Flushing shall continue until all the dirt and other material is removed and the water is not discolored.
  - 4. Drain the system at low points.
- E. Operational tests shall be performed after flushing and before disinfecting. Operational tests shall last not less than 8 hours for each system and shall include the following:
  - 1. Time, date, and duration of the test.
  - 2. Water pressure at most remote and highest fixture.
  - 3. Operation of each fixture and trim.
  - 4. Operation of each valve, hydrant, and faucet.
  - 5. Pump suction and discharge pressure (if applicable).
  - 6. Temperature of domestic water supply. Hot water must reach spout within 30 seconds or less.
  - 7. Operation of each floor and roof drain (if applicable) by flooding with water.
  - 8. Operation of each vacuum breaker and backflow preventer.
  - 9. Operation of the water booster system including pump start and stop pressure (if applicable).
  - 10. Compressed air reading at each compressor inlet and outlet.
  - 11. Laboratory piping shall be tested in accordance with the manufacturer's recommendations.
- F. Disinfection:
  - 1. After flushing and operational testing is complete, the domestic hot and cold water system shall be disinfected with chlorinated water.
  - 2. The chlorination procedure shall be in accordance with AWWA M20.
  - 3. The chlorinated water shall remain in the system for a minimum of 24 hours.
  - 4. Each valve shall be opened a minimum of 2 times during the testing period to ensure proper disinfection.
  - 5. After disinfection the piping system shall be flushed so that not more than 25 ppm of chlorine is present.
  - 6. Test results provided to DPS and/or QA.

**END OF SECTION 22 11 16**