

## SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following domestic water piping specialties:
  - 1. Vacuum breakers.
  - 2. Backflow preventers.
  - 3. Water pressure-reducing valves.
  - 4. Balancing valves.
  - 5. Temperature-actuated water mixing valves.
  - 6. Strainers.
  - 7. Hose bibbs.
  - 8. Wall hydrants.
  - 9. Water hammer arresters.
  - 10. Air vents.
  - 11. Trap-seal primer valves.
  - 12. Trap-seal primer systems.
  - 13. Flexible connectors
  - 14. Water Meters
- B. Related Sections include the following:
  - 1. Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
  - 2. Division 22 Section "Domestic Water Piping" for water meters.
  - 3. Division 22 Section "Domestic Water Filtration Equipment" for water filters in domestic water piping.
  - 4. Division 22 Section "Emergency Plumbing Fixtures" for water tempering equipment.
  - 5. Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

Retain paragraph below if retaining Part 2 "Trap-Seal Primer Systems" Article.

- B. Shop Drawings: Diagram power, signal, and control wiring.

#### 1.5 INFORMATION SUBMITTALS

- A. Field quality-control test reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

Retain both options in paragraph below if plastic piping specialties are required.

- A. Potable-water piping and components shall comply with NSF 61 and NSF 14. Mark "NSF-pw" on plastic piping components.

#### 2.2 PERFORMANCE REQUIREMENTS

Coordinate this article with Division 22 Section "Domestic Water Piping."

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

#### 2.3 VACUUM BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Ames Co.
  - b. Apollo Valves by Conbraco Industries, Inc.
  - c. Conbraco Industries, Inc.
  - d. FEBCO; SPX Valves & Controls.
  - e. Sioux Chief.
  - f. Watts Industries, Inc.; Water Products Div.
  - g. Woodford Manufacturing Company.
  - h. Zurn Plumbing Products Group; Wilkins Div.

B. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Standard: ASSE 1001.
2. Body: Bronze.
3. Inlet and Outlet Connections: Threaded.
4. Finish: Rough bronze.

C. Hose-Connection Vacuum Breakers:

1. Standard: ASSE 1011
2. Body: Brass, nonremovable, with automatic drain.
3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
4. Finish: Rough bronze.

D. Pressure Vacuum Breakers:

1. Standard: ASSE 1020.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
4. Accessories: Ball valves, on inlet and outlet.

E. Laboratory-Faucet Vacuum Breakers:

1. Standard: ASSE 1035.
2. Body: Bronze.
3. End Connections: Threaded.
4. Finish: Chrome plated.

F. Spill-Resistant Vacuum Breakers:

1. Standard: ASSE 1056.
2. Operation: Continuous-pressure applications.
3. Accessories: Ball valves, on inlet and outlet.

## 2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Valves by Conbraco Industries, Inc.
  - b. FEBCO; SPX Valves & Controls.
  - c. Watts Industries, Inc.; Water Products Div.
  - d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.

4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved steel with interior lining complying with AWWA C550 or that is FDA approved stainless steel for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Accessories:
  - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
  - b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Beverage-Dispensing-Equipment Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Watts Industries, Inc.; Water Products Div.
  - b. Zurn Plumbing Products Group; Wilkins Div.
  - c. Apollo Valves by Conbraco Industries, Inc.
  - d.
2. Standard: ASSE 1022.
3. Operation: Continuous-pressure applications.
4. Size: NPS 1/4 or NPS 3/8.
5. Body: Stainless steel.
6. End Connections: Threaded.

C. Reduced-Pressure-Detector, Fire-Protection Backflow-Preventer Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Ames Co.
  - b. FEBCO; SPX Valves & Controls.
  - c. Watts Industries, Inc.; Water Products Div.
  - d. Zurn Plumbing Products Group; Wilkins Div.
  - e. Apollo Valves by Conbraco Industries, Inc.
  - f.
2. Standard: ASSE 1047 and FM Global approved or UL listed.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved Steel with interior lining complying with AWWA C550 or that is FDA approved Stainless steel.
6. End Connections: Flanged.
7. Accessories:
  - a. Valves: Outside screw and yoke gate-type with flanged ends on inlet and outlet.

- b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

## 2.5 WATER PRESSURE-REDUCING VALVES

### A. Water Regulators

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Conbraco Industries, Inc.
  - b. Watts Industries, Inc.; Water Products Div.
  - c. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial working pressure of 150 psig.
4. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
5. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

## 2.6 BALANCING VALVES

### A. Copper-Alloy Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong International, Inc.
  - b. ITT Industries; Bell & Gossett Div.
  - c. Taco, Inc.
2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Brass or bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

### B. Cast-Iron Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong International, Inc.
  - b. ITT Industries; Bell & Gossett Div.
  - c. Taco, Inc.
2. Type: Adjustable with Y-pattern globe valve, two readout ports, and memory-setting indicator.
3. Size: Same as connected piping, but not smaller than NPS 2-1/2.

4. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

## 2.7 TEMPERATURE-ACTUATED WATER MIXING VALVES

### A. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong International, Inc.
  - b. Leonard Valve Company.
  - c. Powers; a Watts Industries Co.
  - d. Symmons Industries, Inc.
  - e. Apollo Valves by Conbraco Industries, Inc.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig.
4. Type: Cabinet-type as indicated, thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Pressure Rating: 125 psig minimum, unless otherwise indicated.
9. Valve Finish: Rough bronze.
10. Piping Finish: Copper.
11. Cabinet: Factory-fabricated, stainless steel, for surface mounting and with hinged, stainless-steel door.

### B. Individual-Fixture, Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Valves by Conbraco Industries, Inc.
  - b. Leonard Valve Company.
  - c. Powers; a Watts Industries Co.; Hydroguard Series e480.
  - d. Symmons.
  - e. Apollo Valves by Conbraco Industries, Inc.
2. Standard: ASSE 1016/1070, thermostatically controlled water tempering valve.
3. Pressure Rating: 125 psig minimum, unless otherwise indicated.
4. Body: Solid brass construction with corrosion-resistant interior components.
5. Temperature Control: Adjustable temperature selection with locknut to prevent tampering.
6. Inlets and Outlet: Threaded. Integral checks on inlets.

## 2.8 STRAINERS FOR DOMESTIC WATER PIPING

### A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum, unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations, unless otherwise indicated.
5. Perforation Size: 0.094 inch.
6. Drain: Pipe plug.

## 2.9 HOSE BIBBS

### A. Hose Bibbs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Chicago Faucet.
  - b. Nibco.
  - c. T.S. Brass
  - d. Watts Regulator.
  - e. Woodford.
2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Vacuum Breaker: Integral or field-installation, non-removable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
10. Finish for Service Areas: Rough bronze.
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation: Wheel handle.
13. Include wall flange with each chrome- or nickel-plated hose bibb.

## 2.10 WALL HYDRANTS

### A. Non-freeze Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Tyler Pipe; Wade Div.; Cat. No. 8601,175
  - b. Woodford.

- c. Zurn Plumbing Products Group; Specification Drainage Operation.
  - 2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
  - 3. Pressure Rating: 125 psig.
  - 4. Operation: Loose key.
  - 5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
  - 6. Inlet: NPS 3/4 or NPS 1.
  - 7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
  - 8. Box: Deep, flush mounting with cover.
  - 9. Box and Cover Finish: Nickel-Bronze.
  - 10. Operating Keys(s): Two with each wall hydrant.
- B. Moderate-Climate/Vestibule Wall Hydrants:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Tyler Pipe; Wade Div.; Cat. No. 8600MT
    - b. Zurn Plumbing Products Group; Specification Drainage Operation.
  - 2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
  - 3. Pressure Rating: 125 psig.
  - 4. Operation: Loose key.
  - 5. Inlet: NPS 3/4 or NPS 1.
  - 6. Outlet: Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011; and garden-hose thread complying with ASME B1.20.7.
  - 7. Box: Deep, flush mounting with cover.
  - 8. Box and Cover Finish: Polished nickel bronze.
  - 9. Operating Keys(s): Two with each wall hydrant.

## 2.11 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AMTROL, Inc.
    - b. Josam Company.
    - c. MIFAB, Inc.
    - d. PPP Inc.
    - e. Sioux Chief Manufacturing Company, Inc.
    - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    - g. Tyler Pipe; Wade Div.
    - h. Watts Drainage Products Inc.
    - i. Zurn Plumbing Products Group; Specification Drainage Operation.



2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows or copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

## 2.12 AIR VENTS

### A. Manual Air Vents:

1. Manufacturers:
  - a. Bell & Gossett; No. 4V
2. Type: Loosed key screwdriver stop.
3. Pressure Rating: 150 psi minimum pressure rating at 250 degree F.
4. Material: Stainless steel.
5. Connections: ½" FPT / ¾" MPT.

### B. Automatic Air Vents:

1. Manufacturers:
  - a. Bell & Gossett; No. 4V
2. Material: Brass body with non-ferrous internals.
3. Pressure Rating: 150 psi minimum pressure rating at 240 degree F.
4. Connections: ½" FPT / ¾" MPT.

## 2.13 TRAP-SEAL PRIMER VALVES

### A. Supply-Type, Trap-Seal Primer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. MIFAB, Inc.
  - b. PPP Inc.
  - c. Sioux Chief Manufacturing Company, Inc.
  - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - e. Watts Industries, Inc.; Water Products Div.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type, Trap-Seal Primer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
3. Size: NPS 1-1/4 minimum.
4. Material: Chrome-plated, cast brass.

2.14 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. PPP Inc.
2. Standard: ASSE 1044.
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.
4. Cabinet: Recessed-mounting steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
6. Vacuum Breaker: ASSE 1001.
7. Number Outlets: Four, Six or Eight as indicated.
8. Size Outlets: NPS 1/2 or NPS 5/8.

2.15 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.

2.16 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Flex-Hose Co., Inc.
  2. Metraflex, Inc.
- B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
1. Working-Pressure Rating: Minimum 250 psig (1725 kPa).
  2. End Connections NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.

3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.
- C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
  1. Working-Pressure Rating: Minimum 250 psig (1725 kPa).
  2. End Connections NPS 2 (DN 50) and Smaller: Threaded steel-pipe nipple.
  3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged steel nipple.

## 2.17 WATER METERS

- A. Description: Magnetic drive turbo meter type with an accuracy of not less than  $\pm 2\%$ , cast iron body with flanged connections, trim as required for the type of service, and rated for 150 psi working pressure.
- B. Meters shall be provided with output to remote monitoring equipment for Building Energy Management System and mechanical register. Provide pulse accumulators with dry switching contacts. Pulse shall have a minimum pulse duration of 20 ms, minimum pulse interval of 20 ms, maximum bounce time of 10 ms, maximum pulse frequency of 25 Hz, and a maximum power consumption of 0.75 VA. Appropriate value shall be assigned to each pulse to keep frequency below 25 Hz.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Meters 6" and larger: Yokogawa ADMAG AXF Magnetic Flowmeters.
  2. Meters below 6": Sensus Omni T2 programmed for 1000 gallons display multiplier and 100 gallons per pulse output.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
  1. Install in an accessible location to facilitate testing and servicing with the height between 12" and 60" above the floor or grade unless instructed otherwise by applicable code.
  2. Locate backflow preventers in same room as connected equipment or system.
  3. Install backflow preventers with an air gap drain cup provided by same manufacturer, located under the pressure differential section, and piped full size of the air gap to the nearest floor drain.
  4. Do not install bypass piping around backflow preventers.

- C. Install vacuum breakers on all outlets where hoses can be attached, such as laboratory faucets, service sinks, wall hydrant, etc.
- D. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
  - 1. Install thermometers and water regulators if specified.
  - 2. Install cabinet-type units recessed in or surface mounted on wall as specified.
- E. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve, and pump.
- F. Install water hammer arresters in water piping according to PDI-WH 201. Water hammer arresters, where concealed, shall be accessible by means of access doors/panels.
- G. Install air vents at high points of water piping.
- H. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- I. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.
- J. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.
- K. Install trap primers in accessible locations. Do not install trap primers in ceilings.
- L. Install temperature and pressure relief valves in the shell of each domestic hot water generators, and as indicated on the drawings. Pipe the discharge connection from each valve to the drainage system through an open drain.
- M. Install integral spring check on all two-handle faucets where hoses can be attached.

### 3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

### 3.3 FLEXIBLE CONNECTOR INSTALLATION

- A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.
- B. Install bronze-hose flexible connectors in copper domestic water tubing.
- C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

### 3.4 WATER METER INSTALLATION

- A. Install water meters according to AWWA M6.
- B. Provide water sample test ports in conjunction with installation of water meters in both new constructions and renovations. Exact locations will be determined by MSU T.B. Simon Power Plant through MSU PDC Construction Representative.
- C. Install turbine-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.

### 3.5 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
  - 1. Pressure vacuum breakers.
  - 2. Reduced-pressure-principle backflow preventers.
  - 3. Carbonated-beverage-machine backflow preventers.
  - 4. Reduced-pressure-detector, fire-protection backflow-preventer assemblies.
  - 5. Water pressure-reducing valves.
  - 6. Calibrated balancing valves.
  - 7. Primary, thermostatic, water mixing valves.
  - 8. Supply-type, trap-seal primer valves.
  - 9. Trap-seal primer systems.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

### 3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
  - 1. Test each pressure vacuum breaker and reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.7 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.

- B. Set field-adjustable flow set points of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 221119