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For more information, contact Acorn Controls; Morris Group International, 15125 Proctor Ave., City of Industry, CA 91746; Phone: (626) 336-4561 | (800) 488-8999; Fax: (626) 961-2200; Website: [www.acorneng.com](http://www.acorneng.com); Email: [jgraves@acorneng.com](mailto:jgraves@acorneng.com).

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## SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

### **TIPS:**

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## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Automatic water shutoff valve systems.
5. Balancing valves.
6. Temperature-actuated, water mixing valves.
7. Strainers for domestic water piping.
8. Outlet boxes.

9. Hose stations.
10. Hose bibbs.
11. Wall hydrants.
12. Ground hydrants.
13. Post hydrants.
14. Roof hydrants.
15. Drain valves.
16. Water-hammer arresters.
17. Trap-seal primer device.
18. Trap-seal primer systems.
19. Flexible connectors.
20. Water meters.

B. Related Requirements:

1. Section 211100 "Facility Fire-Suppression Water-Service Piping" for fire water-service backflow prevention devices.
2. Section 220519 "Meters and Gauges for Plumbing Piping" for thermometers, pressure gauges, and flow meters in domestic water piping.
3. Section 221116 "Domestic Water Piping" for water meters.
4. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
5. Section 224300 "Healthcare Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
6. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.
7. Section 224716 "Pressure Water Coolers" for water filters for water coolers.
8. Section 224723 "Remote Water Coolers" for water filters for water coolers.
9. Section 230923.18 "Leak Detection Instruments" for leak detection devices related to HVAC applications.

## 1.2 DEFINITIONS

- A. AMI: Advanced Metering Infrastructure.
- B. AMR: Automatic Meter Reading.
- C. FKM: A family of fluoroelastomer materials defined by ASTM D1418.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For domestic water piping specialties.
  1. Include diagrams for power, signal, and control wiring.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Test and inspection reports.
- B. Field quality-control reports.

## 1.5 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

- A. Domestic water piping specialties intended to convey or dispense water for human consumption are to comply with the SDWA, requirements of authorities having jurisdiction, and NSF 61 and NSF 372, or to be certified in compliance with NSF 61 and NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: [**125 psig (860 kPa)**] <Insert value> unless otherwise indicated.

## 2.3 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers <Insert drawing designation if any>:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. FEBCO; A WATTS Brand.
    - d. WATTS.
    - e. Zurn Industries, LLC.
    - f. <Insert manufacturer's name>.
  - 2. Standard: ASSE 1001.
  - 3. Size: **NPS 1/4 to NPS 3 (DN 8 to DN 80)**, as required to match connected piping.
  - 4. Body: Bronze.
  - 5. Inlet and Outlet Connections: Threaded.
  - 6. Finish: [**Rough bronze**] [**Chrome plated**].

## B. Hose-Connection Vacuum Breakers &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Cash Acme, A Division of Reliance Worldwide Corporation.
  - c. Champion - Arrowhead.
  - d. Legend Valve & Fitting, Inc.
  - e. MIFAB, Inc.
  - f. WATTS.
  - g. Woodford Manufacturing Company.
  - h. Zurn Industries, LLC.
  - i. <Insert manufacturer's name>.
2. Standard: ASSE 1011.
3. Body: Bronze, nonremovable, with manual drain.
4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
5. Finish: [**Chrome or nickel plated**] [**Rough bronze**].

## C. Pressure Vacuum Breakers &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. FEBCO; A WATTS Brand.
  - c. WATTS.
  - d. Zurn Industries, LLC.
  - e. <Insert manufacturer's name>.
2. Standard: ASSE 1020.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: [**5 psig (35 kPa)**] <Insert value> maximum, through middle third of flow range.
5. Size: <Insert **NPS (DN)**>.
6. Design Flow Rate: <Insert **gpm (L/s)**>.
7. Selected Unit Flow Range Limits: <Insert **gpm (L/s)**>.
8. Pressure Loss at Design Flow Rate: <Insert **psig (kPa)**>.
9. Accessories:
  - a. Valves: Ball type, on inlet and outlet.

## D. Laboratory-Faucet Vacuum Breakers &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. WATTS.

- c. Zurn Industries, LLC.
  - d. **<Insert manufacturer's name>**.
2. Standard: ASSE 1035.
  3. Size: **NPS 1/4 or NPS 3/8 (DN 8 or DN 10)** matching faucet size.
  4. Body: Bronze.
  5. End Connections: Threaded.
  6. Finish: Chrome plated.
- E. Spill-Resistant Vacuum Breakers **<Insert drawing designation if any>**:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Zurn Industries, LLC.
    - c. **<Insert manufacturer's name>**.
  2. Standard: ASSE 1056.
  3. Operation: Continuous-pressure applications.
  4. Size: **[NPS 3/8 (DN 10)] [NPS 1/2 (DN 15)] [NPS 3/4 (DN 20)] [NPS 1 (DN 25)]**.
  5. Accessories:
    - a. Valves: Ball type, on inlet and outlet.

## 2.4 BACKFLOW PREVENTERS

- A. Intermediate Atmospheric-Vent Backflow Preventers **<Insert drawing designation if any>**:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. Legend Valve & Fitting, Inc.
    - d. WATTS.
    - e. Zurn Industries, LLC.
    - f. **<Insert manufacturer's name>**.
  2. Standard: ASSE 1012.
  3. Operation: Continuous-pressure applications.
  4. Size: **[NPS 1/2 (DN 15)] [NPS 3/4 (DN 20)]**.
  5. Body: Bronze.
  6. End Connections: **[Union, solder] [Solder]** joint.
  7. Finish: **[Rough bronze] <Insert finish>**.
- B. Reduced-Pressure-Principle Backflow Preventers **<Insert drawing designation if any>**:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Ames Fire & Waterworks; A WATTS Brand.
    - b. Apollo Flow Controls; Conbraco Industries, Inc.
    - c. FEBCO; A WATTS Brand.
    - d. WATTS.
    - e. Zurn Industries, LLC.
    - f. **<Insert manufacturer's name>**.
  2. Standard: ASSE 1013.
  3. Operation: Continuous-pressure applications.
  4. Pressure Loss: [**12 psig (83 kPa)**] **<Insert value>** maximum, through middle third of flow range.
  5. Size: **<Insert NPS (DN)>**.
  6. Design Flow Rate: **<Insert gpm (L/s)>**.
  7. Selected Unit Flow Range Limits: **<Insert gpm (L/s)>**.
  8. Pressure Loss at Design Flow Rate: **<Insert psig (kPa)>** for sizes **NPS 2 (DN 50)** and smaller; **<Insert psig (kPa)>** for **NPS 2-1/2 (DN 65)** and larger.
  9. Body: [**Bronze**] [**cast silicon copper alloy**] [**or**] [**stainless steel**] for **NPS 2 (DN 50)** and smaller; [**ductile or cast iron with interior lining that complies with AWWA C550 or that is FDA approved**] [**or**] [**stainless steel**] for **NPS 2-1/2 (DN 65)** and larger.
  10. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; [**flanged**] **<Insert type>** for **NPS 2-1/2 (DN 65)** and larger.
  11. Configuration: Designed for [**horizontal, straight-through**] [**vertical-inlet, horizontal-center-section, and vertical-outlet**] [**vertical**] **<Insert configuration>** flow.
  12. Accessories:
    - a. Valves **NPS 2 (DN 50)** and Smaller: Ball type with threaded ends on inlet and outlet.
    - b. Valves **NPS 2-1/2 (DN 65)** and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
    - c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
- C. Double-Check, Backflow-Prevention Assemblies **<Insert drawing designation if any>**:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Ames Fire & Waterworks; A WATTS Brand.
    - b. Apollo Flow Controls; Conbraco Industries, Inc.
    - c. FEBCO; A WATTS Brand.
    - d. WATTS.
    - e. Zurn Industries, LLC.
    - f. **<Insert manufacturer's name>**.
  2. Standard: ASSE 1015.
  3. Operation: Continuous-pressure applications unless otherwise indicated.

4. Pressure Loss: [**5 psig (35 kPa)**] <Insert value> maximum, through middle third of flow range.
5. Size: <Insert **NPS (DN)**>.
6. Design Flow Rate: <Insert **gpm (L/s)**>.
7. Selected Unit Flow Range Limits: <Insert **gpm (L/s)**>.
8. Pressure Loss at Design Flow Rate: <Insert **psig (kPa)**> for sizes **NPS 2 (DN 50)** and smaller; <Insert **psig (kPa)**> for **NPS 2-1/2 (DN 65)** and larger.
9. Body: [**Bronze**] [**cast silicon copper alloy**] [or] [**stainless steel**] for **NPS 2 (DN 50)** and smaller; [**ductile or cast iron with interior lining that complies with AWWA C550 or that is FDA approved**] [or] [**stainless steel**] for **NPS 2-1/2 (DN 65)** and larger.
10. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; [**flanged**] <Insert type> for **NPS 2-1/2 (DN 65)** and larger.
11. Configuration: Designed for [**horizontal, straight-through**] <Insert configuration> flow.
12. Accessories:
  - a. Valves **NPS 2 (DN 50)** and Smaller: Ball type with threaded ends on inlet and outlet.
  - b. Valves **NPS 2-1/2 (DN 65)** and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

D. Beverage-Dispensing-Equipment Backflow Preventers <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. WATTS.
  - c. Zurn Industries, LLC.
  - d. <Insert manufacturer's name>.
2. Standard: ASSE 1022.
3. Operation: Continuous-pressure applications.
4. Size: **NPS 1/4 or NPS 3/8 (DN 8 or DN 10)**.
5. Body: [**Stainless steel or non-metallic**] <Insert material>.
6. End Connections: Threaded or flare.

E. Dual-Check-Valve Backflow Preventers <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. A.Y. McDonald Mfg. Co.
  - b. Apollo Flow Controls; Conbraco Industries, Inc.
  - c. Cash Acme, A Division of Reliance Worldwide Corporation.
  - d. Flomatic Corporation.
  - e. WATTS.
  - f. Zurn Industries, LLC.
  - g. <Insert manufacturer's name>.

2. Standard: ASSE 1024.
3. Operation: Continuous-pressure applications.
4. Size: [NPS 1/2 (DN 15)] [NPS 3/4 (DN 20)] [NPS 1 (DN 25)] [NPS 1-1/4 (DN 32)].
5. Body: Bronze with union inlet.

F. Carbonated-Beverage-Dispenser, Dual-Check-Valve Backflow Preventers <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. WATTS.
  - b. <Insert manufacturer's name>.
2. Standard: ASSE 1032.
3. Operation: Continuous-pressure applications.
4. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10).
5. Body: Stainless steel.
6. End Connections: Threaded or flare.

G. Hose-Connection Backflow Preventers <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. WATTS.
  - c. Woodford Manufacturing Company.
  - d. Zurn Industries, LLC.
  - e. <Insert manufacturer's name>.
2. Standard: ASSE 1052.
3. Operation: Up to 10-foot head of water (30-kPa) back pressure.
4. Inlet Size: NPS 3/4 (DN 20).
5. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
6. Capacity: At least 3-gpm (0.19-L/s) flow.

H. Backflow-Preventer Test Kits <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Ames Fire & Waterworks; A WATTS Brand.
  - b. Apollo Flow Controls; Conbraco Industries, Inc.
  - c. FEBCO; A WATTS Brand.
  - d. WATTS.
  - e. Zurn Industries, LLC.
  - f. <Insert manufacturer's name>.



2. Description: Factory calibrated, with gauges, fittings, hoses, and carrying case with test-procedure instructions.

## 2.5 WATER PRESSURE-REDUCING VALVES

### A. Water Regulators <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Cash Acme, A Division of Reliance Worldwide Corporation.
  - c. WATTS.
  - d. Zurn Industries, LLC.
  - e. <Insert manufacturer's name>.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial working pressure of 150 psig (1035 kPa).
4. Size: <Insert NPS (DN)>.
5. Design Flow Rate: <Insert gpm (L/s)>.
6. Design Inlet Pressure: <Insert psig (kPa)>.
7. Design Outlet Pressure Setting: <Insert psig (kPa)>.
8. Body: Bronze[ with chrome-plated finish] for NPS 2 (DN 50) and smaller; [bronze] [cast iron with interior lining that complies with AWWA C550 or that is FDA approved] for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
9. Valves for Booster Heater Water Supply: Include integral bypass.
10. End Connections: Threaded or solder for NPS 2 (DN 50) and smaller; flanged or solder for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

### B. Water-Control Valves <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. CLA-VAL.
  - c. Flomatic Corporation.
  - d. OCV Control Valves.
  - e. WATTS.
  - f. Zurn Industries, LLC.
  - g. <Insert manufacturer's name>.
2. Description: Pilot-operated, diaphragm-type, single-seated, main water-control valve.
3. Pressure Rating: Initial working pressure of 150 psig (1035 kPa) minimum with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot-control valve, restrictor device, specialty fittings, and sensor piping.
4. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless steel body.

- a. Size: <Insert **NPS (DN)**>.
  - b. Pattern: [**Angle**] [**Globe**]-valve design.
  - c. Trim: Stainless steel.
5. Design Flow: <Insert **gpm (L/s)**>.
  6. Design Inlet Pressure: <Insert **psig (kPa)**>.
  7. Design Outlet Pressure Setting: <Insert **psig (kPa)**>.
  8. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; [**flanged**] <Insert **type**> for **NPS 2-1/2 (DN 65)** and larger.

## 2.6 AUTOMATIC WATER SHUTOFF VALVE SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. FloLogic, Inc.
  2. OnSite PRO Inc.
  3. QMI Manufacturing Inc.
  4. Reliance Detection Technologies.
  5. WaterCop.
  6. <Insert **manufacturer's name**>.
- B. Shutoff Control Ball Valves and Actuators <Insert **drawing designation if any**>:
  1. Size: [**NPS 1/2 (DN 15)**] [**NPS 3/4 (DN 20)**] [**NPS 1 (DN 25)**] [**NPS 1-1/4 (DN 32)**] [**NPS 1-1/2 (DN 40)**] [**NPS 2 (DN 50)**] <Insert **pipe size**>.
  2. Design Flow Rate: <Insert **gpm (L/s)**>.
  3. Design Inlet Pressure: <Insert **psig (kPa)**>.
  4. Control Valve: Two-piece, full-port brass ball valve, MSS SP-110.
    - a. End Connections: Threaded, female.
    - b. Fittings: One **3/8-by-1/2-inch (9.5-by-12.7-mm)** male compression and one **3/8-by-1/2-inch (9.5-by-12.7-mm)** female compression.
    - c. Seats: PTFE.
    - d. O-Rings: FKM.
    - e. Stem: Low-lead brass. Blowout proof.
    - f. CWP Rating: [**600 psig (4140 kPa)**] <Insert **value**>.
  5. Manual-override control turn-knob for emergency operation of valve.
  6. Valve Actuator: Motor operated, with or without gears, electric and electronic. Capable of closing valve against inlet pressure. Direct mount, fails closed.
    - a. Power Supply: [**Battery**] [**120 V ac**] [**120 V ac step-down transformer**][**with cord and plug**].
    - b. Manual Intervention: Allowed.
    - c. Position Indicator: Standard.
  7. Actuator Enclosure: Suitable for ambient conditions encountered by application.
  8. Wireless Leak Detection System:

- a. Sensor-Water Flow Type: Pipe-mounted to detect water flow.
  - b. Sensor-Rope Type: Absorbent water sensing rope constructed from twisted metal conductor wires insulated from one another and surrounded by polyethylene mesh braid jacket to detect water presence.
  - c. Wireless Signal Range: **100 ft. (30.5 m)** minimum between sensors and receiver.
  - d. Self-monitoring enabled system; faults for lost communication between receiver and sensor(s).
  - e. Onboard Battery Backup: 48 hours of protection. [ **Valve to close prior to backup failure.** ]
  - f. LED Indicators: Wireless signal strength, communication loss, water fault, low-temperature fault, and low battery.
  - g. FCC-Approved Wireless Communication System: Between sensors, repeaters, and receivers.
  - h. Output Contacts: Interface with home security or BAS, cellular text notification service, or auto dialer accessories.
  - i. Wireless Signal Repeater: Boosts signal performance between wireless sensors and receiver.
    - 1) Push-button pairing and unpairing, into and out of the network.
    - 2) Visual indication of wireless signal strength, low battery, and lost communication.
    - 3) Standard wall outlet, 120 V ac, power.
    - 4) Battery Backup: Two (2) AA batteries for battery backup to maintain system integrity during a power outage.
  - j. Wireless Water Switch: Allows manual override or wireless system functionality and closes the valve to shut off water flow.
  - k. Hard-Wired Water Switch: Allows manual override or wireless system functionality and closes the valve to shut off water flow.
9. Wired Leak Detection System:
- a. Power Supply: Class II transformer with cord and plug, 120 V ac, UL listed.
  - b. Power Cord Length: [ **12 ft. (3.66 m)** ] <Insert dimension>.
  - c. Control Panel: LED power and LED valves indicator.
  - d. Alarms: Audible alarm[, **with external output**].
  - e. Output Contacts: Interface with home security or BAS, cellular text notification service, or auto dialer accessories.
  - f. Wired Sensors:
    - 1) Quantity Per Receiver: [ **One** ] [ **Two** ] [ **Three** ] [ **Four** ] [ **Five** ] [ **Six** ].
  - g. Cable Length: [ **8 ft. (2.44 m)** ] [ **25 ft. (7.62 m)** ] [ **50 ft. (15.2 m)** ] [ **100 ft. (30.5 m)** ] <Insert dimension>.
  - h. Cable Adder: [ **10 ft. (3 m)** ] [ **25 ft. (7.62 m)** ] [ **50 ft. (15.2 m)** ] [ **100 ft. (30.5 m)** ] <Insert dimension> in length.

C. Shutoff Control Butterfly Valve and Actuator <Insert drawing designation if any>:

- 1. Size: [ **NPS 2-1/2 (DN 65)** ] [ **NPS 3 (DN 80)** ] [ **NPS 4 (DN 100)** ] <Insert pipe size>.
- 2. Compliance: MSS SP-67.

3. Full-port, epoxy-coated, ductile-iron lug body.
4. Seat: EPDM, **minus 30 deg F to plus 250 deg F** (minus 34 deg C to plus 121 deg C).
5. Face-to-Face Flange: ASME B16.5 flanges.
6. Disc Design: Floating stainless steel dual shaft.
7. Disc Material: Coated ductile iron.
8. Locating Pin: Carbon steel.
9. Bushings: PTFE.
10. O-Rings: EPDM.
11. Ten-position stop.
12. Manual-override control turn-knob for emergency operation of valve.
13. Valve Actuator: Motor operated, with or without gears, electric and electronic. Capable of closing valve against inlet pressure. Direct mount, fails closed.
  - a. Power Supply: [**Battery**] [**120 V ac**] [**120 V ac step-down transformer**][ **with cord and plug**].
  - b. Manual Intervention: Allowed.
  - c. Position Indicator: Standard.
14. Actuator Enclosure: Suitable for ambient conditions encountered by application.
15. Wireless Leak Detection System:
  - a. Sensor-Water Flow Type: Pipe-mounted to detect water flow.
  - b. Sensor-Rope Type: Absorbent water sensing rope constructed from twisted metal conductor wires insulated from one another and surrounded by polyethylene mesh braid jacket to detect water presence.
  - c. Wireless Signal Range: **100 ft. (30.5 m)** minimum between sensors and receiver.
  - d. Self-monitoring enabled system; faults for lost communication between receiver and sensor(s).
  - e. Onboard Battery Backup: 48 hours of protection.[ **Valve to close prior to backup failure.**]
  - f. LED Indicators: Wireless signal strength, communication loss, water fault, low-temperature fault, and low battery.
  - g. FCC-Approved Wireless Communication System: Between sensors, repeaters, and receivers.
  - h. Output Contacts: Interface with home security or BAS, cellular text notification service, or auto dialer accessories.
  - i. Wireless Signal Repeater: Boosts signal performance between wireless sensors and receiver.
    - 1) Push-button pairing and unpairing, into and out of the network.
    - 2) Visual indication of wireless signal strength, low battery, and lost communication.
    - 3) Standard wall outlet, 120 V ac, power.
    - 4) Battery Backup: Two (2) AA batteries for battery backup to maintain system integrity during a power outage.
  - j. Wireless Water Switch: Allows manual override or wireless system functionality and closes the valve to shut off water flow.
  - k. Hard-Wired Water Switch: Allows manual override or wireless system functionality and closes the valve to shut off water flow.

## 16. Wired Leak Detection System:

- a. Power Supply: Class II transformer with cord and plug, 120 V ac, UL listed.
- b. Power Cord Length: [12 ft. (3.66 m)] <Insert dimension>.
- c. Control Panel: LED power and LED valves indicator.
- d. Alarms: Audible alarm[, with external output].
- e. Output Contacts: Interface with home security or BAS, cellular text notification service, or auto dialer accessories.
- f. Wired Sensors:
  - 1) Quantity Per Receiver: [One] [Two] [Three] [Four] [Five] [Six].
- g. Cable Length: [8 ft. (2.44 m)] [25 ft. (7.62 m)] [50 ft. (15.2 m)] [100 ft. (30.5 m)] <Insert dimension>.
- h. Cable Adder: [10 ft. (3 m)] [25 ft. (7.62 m)] [50 ft. (15.2 m)] [100 ft. (30.5 m)] <Insert dimension> in length.

## D. Clothes Washer Shutoff Control Valve and Actuator &lt;Insert drawing designation if any&gt;:

1. Brass or stainless steel ball valve.
2. End Connections: Male hose connections, NPS 3/4 (DN 20).
3. Pressure Rating: 400 psi (2758 kPa) at 32 to 150 deg F (0 to 65.6 deg C).
4. Valve Actuator:
  - a. Enclosure: Suitable for ambient conditions encountered by application.
  - b. Power Supply: [Battery] [120 V ac] [120 V ac step-down transformer][ with cord and plug].
  - c. Position Indicator: Standard.
5. Wired Leak Detection System:
  - a. Water sensor with minimum 6-foot (1.8-m) length of wire.
  - b. 120 V ac step-down transformer with cord and plug.
  - c. LED operation and leak notification.
  - d. Audible alarm.
  - e. Power failure or manual disconnection of power causes valves to close.

## E. Accessories:

1. Electrical Plug Interrupter: Plugs into standard 120 V ac wall outlet.
2. Gas Flow Interrupter: ECO connector with female spade connectors. Factory prewired, 8 ft. (2.44 m).
3. Gas Interface Cable: Interface cable with male and female connectors.
4. Step-Down Transformer: [120] [208] [240] V ac to 24 V ac with mounting plate, 12-foot (3.66-m) plenum wire to power, and 8-foot (2.44-m) plenum wire to sensor.
5. Liquid Level Sensors: Monitor fluid levels in addition to detecting plumbing leaks.
6. Auto Dialer: Send and receive automatic alerts when a fault condition occurs. Standard output contacts trigger up to nine predetermined telephone number calls.
  - a. Prerecord message for future playback.
  - b. 10-second recordable message.
  - c. Built-in tamper switch.

- d. DC adaptor with battery backup.
  - e. Programmable as a silent (dialer only) or audible (siren and dialer) alarm.
  - f. Easy "Stop Call Sequence" - push "#" on phone to acknowledge the alarm and stop the dialing sequence.
7. Cellular Text Notification System:
- a. Event SMS text notification to up to three cell phones.
  - b. Battery Backup: Four (4) AA batteries.
  - c. 12-foot (3.66-m) interface cable to leak detection system.
  - d. Customized messaging.
  - e. <Insert wireless network service provider>.

## 2.7 BALANCING VALVES

### A. Copper-Alloy Calibrated Balancing Valves <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Bell & Gossett; a Xylem brand.
  - b. IMI Hydronic Engineering Inc.
  - c. Nexus Valve, Inc.
  - d. NIBCO INC.
  - e. WATTS.
  - f. <Insert manufacturer's name>.
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 (DN 50).
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

### B. Memory-Stop Balancing Valves <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Crane; a Crane brand.
  - c. Hammond Valve.
  - d. Jenkins Valves; a Crane brand.
  - e. Milwaukee Valve Company.
  - f. NIBCO INC.
  - g. Red-White Valve Corp.
  - h. Stockham; a Crane brand.
  - i. <Insert manufacturer's name>.
2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.

3. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
4. Size: NPS 2 (DN 50) or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass or stainless steel.
8. Seats and Seals: Replaceable.
9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

C. Automatic Flow Control Balancing Valves <Insert drawing designation if any>:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; TempFlow Thermostatic Zone Balancing Valve Model TZV-2 or comparable product by one of the following:
  - a. IMI Hydronic Engineering Inc.
  - b. TACO Comfort Solutions, Inc.
  - c. <Insert manufacturer's name>.
2. Flow Regulation: Modulates its Cv from a maximum of 0.7 to a minimum of 0.05 with a 10 deg F (12.2 deg C) change in zone temperature.
3. Temperature Range: Factory set to <Insert deg F (deg C)> and field adjustable from 100 to 160 deg F (37.8 to 71.1 deg C) is required.
4. Pressure Rating: 125 psig (861 kPa).
5. Size: NPS 2 (DN 50) or smaller.
6. Body: Lab-certified DZR brass.
7. Flow Cartridge: Noryl with stainless steel springs and paraffin sensor.
8. Connections: 1/2 inch (12.7 mm) male threaded.
9. Features: Test port, cartridge-style check, inlet strainer, three ball valve shut-offs, inlet temperature gauge, and union for ease of servicing.

## 2.8 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices <Insert drawing designation if any>:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; Model [ST70] [ST7017] [ST7069] [STP7079] or comparable product by one of the following:
  - a. Symmons Industries, Inc.
  - b. TACO Comfort Solutions, Inc.
  - c. <Insert manufacturer's name>.
2. Standard: ASSE 1070, with additional control accuracy requirement of  $\pm 7$  deg F (13.8 deg C).
3. Pressure Rating: 125 psig (861 kPa).
4. Type: Thermostatically controlled, water mixing valve utilizing paraffin sensor technology.
5. Material: Lab-certified DZR brass body with corrosion-resistant interior components.

6. Connections: Threaded NPT inlets and outlet.
  7. Accessories: Cartridge-style checks and inlet strainers on hot- and cold-water supplies.
  8. Field Adjustable Setpoint Range: [85 to 115 deg F (29 to 46 deg C)] [90 to 115 deg F (32 to 46 deg C)], tamper resistant.
  9. Factory Setting: [105 deg F (41 deg C)] <Insert deg F (deg C)>.
  10. Tempered-Water Design Flow Rate: [3 gpm (11.4 L/m)] [8 gpm (30.2 L/m)] at 20 psid (138 kPa) <Insert gpm (L/m) at psid (kPa)>.
  11. Valve Finish: [Chrome plated] [Rough bronze].
- B. Primary, Thermostatic, Water Mixing Valves <Insert drawing designation if any>:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; MV17 Series, Model MV17[-1] [-2] [-3] [-4] [-5] or comparable product by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. Zurn Industries, LLC.
    - d. <Insert manufacturer's name>.
  2. Sensing Technology: Paraffin temperature sensor.
  3. Control Accuracy: Certified to ASSE 1017 by independent test lab at manufacturer's advertised minimum flow rate in accordance with valve size selected. Compliance in lieu of certification to ASSE 1017 is not acceptable.
  4. Pressure Rating: 125 psig (861 kPa) minimum unless otherwise indicated.
  5. Type: Thermostatically controlled, water mixing valve.
  6. Material: Lab-certified DZR brass body with corrosion-resistant interior components.
  7. Connections: Threaded NPT inlets and outlet.
  8. Valve shall be tamper-resistant using locknut, and feature integral single-piece cartridge-style checks easily accessible strainers, plus two full-port lockable ball valves for use as inlet shut-offs, provided separately.
  9. Factory Tempered-Water Setting: <Insert deg F (deg C)>. Must be field-adjustable.
  10. Tempered-Water Design Flow Rate: [10 gpm (37.9 L/m)] [30 gpm (113.6 L/s)] [60 gpm (227.1 L/s)] [100 gpm (378.5 L/s)] [150 gpm (567.8 L/s)] at 20 psid (138 Kpa) <Insert gpm (L/m) at psid (kPa)>.
  11. Valve Finish: [Chrome] [Rough brass].
- C. Primary, Supply Fixture Thermostatic, Water Mixing Valves, Pre-piped <Insert drawing designation if any>:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; SFMV Series, Model SFMV17[-1] [-2] [-3] [-4] [-5] or comparable product by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. Zurn Industries, LLC.
    - d. <Insert manufacturer's name>.
  2. Sensing Technology: Paraffin temperature sensor.



3. Control Accuracy: Certified to ASSE 1017 by independent test lab at manufacturer's advertised minimum flow rate in accordance with valve size selected. Compliance in lieu of certification to ASSE 1017 is not acceptable.
  4. Setpoint Temperature Range: 100 to 160 deg F (38 to 71 deg C).
  5. Factory Tempered-Water Setting: [120 deg F (48.9 deg C)] <Insert deg F (deg C)>. Must be field-adjustable.
  6. Pressure Rating: 125 psig (861 kPa) minimum unless otherwise indicated.
  7. Type: Thermostatically controlled, water mixing valve.
  8. Material: Lab-certified DZR brass body with corrosion-resistant interior components.
  9. Connections: Threaded FNPT inlets and outlet.
  10. Valve shall be tamper-resistant using locknut and feature integral single-piece cartridge-style checks and easily accessible strainers.
  11. Tempered-Water Design Flow Rate: [10 gpm (37.9 L/m)] [30 gpm (113.6 L/m)] [60 gpm (227.1 L/m)] [100 gpm (378.5 L/s)] [150 gpm (567.8 L/s)] at 20 psid (138 kPa) <Insert gpm (L/m) at psid (mPa)>.
  12. Valve Finish: [Rough Chrome plated] [Rough Brass].
  13. Inlet/Outlet Piping and Accessories:
    - a. Include factory-assembled inlet and outlet piping.
    - b. Include Inlet Temperature Gauge (-ITG).
    - c. Include Cold Water Bypass valves for isolation (-CWB).
    - d. Include [Recessed Cabinet (-RC)] [Surface Mounted Cabinet (-SMC)].
      - 1) Cabinet Material: [Stainless steel (-SSTL)] [Prime painted (-PRC)].
      - 2) Door Option: [Solid door (-DRS)] [Door viewport (-DRV)].
      - 3) Cabinet door hinge on [right] [left].
- D. Primary, Command Station Thermostatic, Water Mixing Valves, Pre-piped <Insert drawing designation if any>:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; CSMV Series, Model CSMV17[-1] [-2] [-3] [-4] [-5] or comparable product by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. Zurn Industries, LLC.
    - d. <Insert manufacturer's name>.
  2. Sensing Technology: Paraffin temperature sensor.
  3. Control Accuracy: Certified to ASSE 1017 by independent test lab at manufacturer's advertised minimum flow rate in accordance with valve size selected. Compliance in lieu of certification to ASSE 1017 is not acceptable.
  4. Setpoint Temperature Range: 100 to 160 deg F (38 to 71 deg C).
  5. Factory Tempered-Water Setting: [120 deg F (48.9 deg C)] <Insert deg F (deg C)>. Must be field-adjustable.
  6. Pressure Rating: 125 psig (861 kPa) minimum unless otherwise indicated.
  7. Type: Thermostatically controlled, water mixing valve.
  8. Material: Lab-certified DZR brass body with corrosion-resistant interior components.
  9. Connections: Threaded FNPT inlets and outlet.

10. Valve shall be tamper-resistant using locknut and feature integral single-piece cartridge-style checks and easily accessible strainers, plus two full port lockable ball valve for use as inlet shut-offs, provided separately.
  11. Tempered-Water Design Flow Rate: [**10 gpm (37.9 L/m)**] [**30 gpm (113.6 L/m)**] [**60 gpm (227.1 L/m)**] [**100 gpm (378.5 L/s)**] [**150 gpm (567.8 L/s)**] at **20 psid (138 kPa)** <Insert **gpm (L/m)** at **psid (mPa)**>.
  12. Valve Finish: [**Chrome plated**] [**Rough Brass**].
  13. Inlet/Outlet Piping and Accessories:
    - a. Include factory-assembled inlet and outlet piping.
    - b. Include Hot Water Bypass valves (-HWB).
    - c. Include Cold Water Bypass valves (-CWB).
    - d. Include Return Piping.
    - e. Include hose bib with drain valve for setup use.
    - f. Include [**pump**] [**and**] [**AquaStat**].
      - 1) <Insert **pump make and model**>.
    - g. Include circuit setter balancing valve.
    - h. Include thermostatic diverting balancing valve (-TBV).
    - i. Include thermostatic HW return limiting balancing valve (-TLV).
- E. Primary, Electronic, Water Mixing Valve Assemblies <Insert drawing designation if any>:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; BASyC Valve System or comparable product by one of the following:
    - a. Caleffi.
    - b. Heat Timer.
    - c. <Insert manufacturer's name>.
  2. Sensing Technology: Paraffin temperature sensor, thermistor temperature sensors, pressure transducers.
  3. Control Accuracy: Certified to ASSE 1017 by independent test lab at manufacturer's advertised minimum flow rate in accordance with valve size selected. Compliance in lieu of certification to ASSE 1017 is not acceptable.
  4. Include "zero error" control algorithm-based on ASSE 1017 defined application terms. Control electronics and input/output process based on Honeywell's Niagara open architecture hardware and software. System can digitally control up to four valves and up to two temperature loops in any combination.
  5. Supply with **6 ft. (1.8 m)** long 120V power cord with three-prong plug.
  6. Control cabinet will include internal transformer for 24V operation.
  7. Minimum certified flow rate and maximum capacity to meet demand.
  8. Electronic Actuator: Belimo or equivalent nonproprietary actuator with manual override.
  9. LCD Operator Interface: Portable and capable of being used with multiple systems.
  10. Temperature Control upon Power Failure: System shall maintain ASSE 1017 certified control accuracy with manual setpoint change capability utilizing integral outlet temperature gauge.
  11. Setpoint Temperature Range: **100 to 160 deg F (37.8 to 71.1 deg C)**.

12. Network Capability: Primary and secondary ethernet LAN adapters included with guaranteed isolation for third-party access using the secondary adapter.
    - a. Include inlet and outlet pressure transducers.
    - b. Include calculated flow and BTU data.
    - c. Include flow meter.
  13. Pressure Rating: **125 psig (860 kPa)** minimum unless otherwise indicated.
  14. Mixing Valve Material: Lab-certified DZR brass body with corrosion-resistant interior components.
  15. Connections: Solder joint inlets and outlet.
  16. Accessories: Supply and outlet piping, integral inlet, outlet and return temperature gauges and full port lockable ball valves, supply inlet cartridge-style checks, and strainers integral to the mixing valve, hose bib on outlet, and capability to add pump control at a later date.
    - a. Include pump control.
    - b. Pump: **<Insert make and model>**.
    - c. Include pump load relay and relay-energized LED in electrical box. Control wiring from control relay to load relay will be included.
    - d. Include control and auto-alternating of backup pump.
    - e. Time Intervals for Pump Alternation: **[7, 15, 30, and 90 days] [1, 3, 7, and 10 days]**.
  17. Include BAS protocol adapter.
    - a. BAS Protocol Adapter: **[BACnet MSTP] [BACnet TCP/IP] [Modbus RTU/ASCII] [Modbus TCP/IP] [Lonworks] [Obix] <Identify other option>**.
- F. Manifold, Supply Fixture Thermostatic, Water Mixing Valve Assemblies **<Insert drawing designation if any>**:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; SFMMV Series, Model SFMMV[-23] [-24] [-25] [-33] [-34] [-35] [-44] [-45] [-55] [-555] or comparable product by one of the following:
    - a. Bradley.
    - b. Symmons Industries, Inc.
    - c. **<Insert manufacturer's name>**.
  2. Description: Factory-fabricated, thermostatically controlled, master mixing valve station in multivalve arrangement.
  3. Sensing Technology: Paraffin temperature sensor.
  4. Include Low Flow (single valve isolation technology).
    - a. Low Flow Isolation Technology: **[Acorn CVS] [PRV]**.
  5. Certification: Certified to ASSE 1017 by independent test lab at manufacturer's advertised minimum flow rate in accordance with valve size selected. Compliance in lieu of certification to ASSE 1017 is not acceptable.

6. Certified Minimum Flow Required: <Insert **gpm (L/s)**>.
  7. Valves shall be tamper-resistant using locknut and feature integral, single-piece cartridge-style checks and easily accessible strainers.
  8. Tempered-Water Design Flow Rate: [**90 gpm (341 L/m)**] [**130 gpm (492 L/m)**] [**180 gpm (681 L/m)**] [**120 gpm (454 L/m)**] [**160 gpm (606 L/m)**] [**210 gpm (795 L/m)**] [**200 gpm (757 L/m)**] [**250 gpm (946 L/m)**] [**300 gpm (1137 L/m)**] [**450 gpm (1703 L/m)**] at **20 psid (138 kPa)** <Insert **gpm (L/m) at psid (mPa)**>.
  9. Mixing Stations shall include sensor tees in order to allow the mixing station to be upgradeable to a digital mixing station utilizing existing mixing valve.
  10. Pressure Rating: **125 psig (861 kPa)** minimum unless otherwise indicated.
  11. Inlet/Outlet Piping and Accessories:
    - a. Include factory-assembled inlet and outlet piping.
    - b. Include Controlled Valve Staging assembly (-CVS).
    - c. Include Cold Water Bypass valves for isolation (-CWB).
    - d. Include Hot Water Bypass valves for isolation (-HWB).
    - e. Include Thermostatic Balancing Valve (-TBV).
- G. Photographic-Process, Thermostatic, Water Mixing Valve Assemblies <Insert **drawing designation if any**>:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. POWERS; A WATTS Brand.
    - b. <Insert **manufacturer's name**>.
  2. Standard: ASSE 1017, thermostatically controlled, water mixing valve made for precise, process-water temperature control.
  3. Pressure Rating: **125 psig (860 kPa)** minimum unless otherwise indicated.
  4. Material: Bronze body with corrosion-resistant interior components.
  5. Connections: Threaded inlets and outlet.
  6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, thermometer, shutoff valve, and adjustable, temperature-control handle.
  7. Cabinet: Factory fabricated, stainless steel, for surface mounting; with controls and thermometer mounted on front.
  8. Tempered-Water Setting: <Insert **deg F (deg C)**>.
  9. Tempered-Water Design Flow Rate: <Insert **gpm (L/s)**>.
  10. Tempered-Water Outlet Size: <Insert **NPS (DN)**> end connection.
  11. Hot- and Cold-Water Inlet Size: <Insert **NPS (DN)**> end connections.
- H. Individual-Fixture, Water Tempering Valves <Insert **drawing designation if any**>:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; Model SV16 or comparable product by one of the following:
    - a. Lawler Manufacturing Company, Inc.
    - b. Leonard Valve Company.
    - c. POWERS; A WATTS Brand.

- d. Zurn Industries, LLC.
  - e. **<Insert manufacturer's name>**.
2. Standard: ASSE 1016, Type T/P thermostatically controlled, water tempering valve.
  3. Pressure Rating: **125 psig (860 kPa)** minimum unless otherwise indicated.
  4. Material: Bronze body with corrosion-resistant interior components.
  5. Temperature Control: Adjustable.
  6. Connections: Threaded inlets and outlet.
  7. Finish: Chrome plated.
  8. Tempered-Water Setting: **<Insert deg F (deg C)>**.
  9. Tempered-Water Design Flow Rate: **<Insert gpm (L/s)>**.
- I. Primary Water Tempering Valves **<Insert drawing designation if any>**:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Acorn Controls; Morris Group International; Model [MV16] [ST7017] or comparable product by one of the following:
    - a. Heat-Timer Corporation.
    - b. Holby Valve Inc.
    - c. **<Insert manufacturer's name>**.
  2. Standard: ASSE 1017, thermostatically controlled, water tempering valve, listed as tempering valve.
  3. Pressure Rating: **125 psig (860 kPa)** minimum unless otherwise indicated.
  4. Material: Bronze body.
  5. Temperature Control: Manual.
  6. Connections: Threaded inlets and outlet.
  7. Selected Primary Water Tempering Valve Size: **<Insert size>**.
  8. Tempered-Water Setting: **<Insert deg F (deg C)>**.
  9. Tempered-Water Design Flow Rate: **<Insert gpm (L/s)>**.
  10. Pressure Drop at Design Flow Rate: **<Insert psig (kPa)>**.
  11. Tempered-Water Outlet Size: **<Insert NPS (DN)>** end connection.
  12. Cold-Water Inlet Size: **<Insert NPS (DN)>** end connection.
  13. Hot-Water Inlet Size: **<Insert NPS (DN)>** end connection.
  14. Valve Finish: [**Rough bronze**] **<Insert finish>**.

## 2.9 STRAINERS FOR DOMESTIC WATER PIPING

- A. Y-Pattern Strainers **<Insert drawing designation if any>**:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Keckley Company.
    - b. Titan Flow Control, Inc.
    - c. WATTS.
    - d. Zurn Industries, LLC.
    - e. **<Insert manufacturer's name>**.

2. Pressure Rating: **125 psig (860 kPa)** minimum unless otherwise indicated.
3. Body: Bronze for **NPS 2 (DN 50)** and smaller; cast iron[ **with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and**] for **NPS 2-1/2 (DN 65)** and larger.
4. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; flanged for **NPS 2-1/2 (DN 65)** and larger.
5. Screen: Stainless steel with round perforations unless otherwise indicated.
6. Perforation Size:
  - a. Strainers **NPS 2 (DN 50)** and Smaller: [**0.020 inch (0.51 mm)**] [**0.033 inch (0.84 mm)**] [**0.062 inch (1.57 mm)**] <Insert dimension>.
  - b. Strainers **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: [**0.045 inch (1.14 mm)**] [**0.062 inch (1.57 mm)**] [**0.125 inch (3.18 mm)**] <Insert dimension>.
  - c. Strainers **NPS 5 (DN 125)** and Larger: [**0.10 inch (2.54 mm)**] [**0.125 inch (3.18 mm)**] [**0.25 inch (6.35 mm)**] <Insert dimension>.
7. Drain: [**Pipe plug**] [**Factory-installed, hose-end drain valve**].

## 2.10 OUTLET BOXES

### A. Clothes Washer Outlet Boxes <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Guy Gray, IPS Corporation.
  - b. LSP Products Group.
  - c. Oatey.
  - d. Sioux Chief Manufacturing Company, Inc.
  - e. Symmons Industries, Inc.
  - f. Water-Tite, IPS Corporation.
  - g. <Insert manufacturer's name>.
2. Mounting: Recessed. [**Fire rated**].
3. Material and Finish: [**Enameled-steel or epoxy-painted-steel**] [**Enameled-steel, epoxy-painted-steel, or plastic**] [**Plastic**] [**Stainless steel**] box and faceplate.
4. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
5. Drain Outlet Connection: [**NPS 1-1/2 (DN 40)**] [**NPS 2 (DN 50)**].
6. Accessory: Water hammer arresters.
7. Supply Shutoff Fittings: **NPS 1/2 (DN 15)** gate, globe, or ball valves and **NPS 1/2 (DN 15)** copper, water tubing.
8. Drain: [**NPS 1-1/2 (DN 40)**] [**NPS 2 (DN 50)**] standpipe and P-trap for direct waste connection to drainage piping.
9. Inlet Hoses: Two **60-inch- (1500-mm-)** long, rubber, household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
10. Drain Hose: One **48-inch- (1200-mm-)** long, rubber, household clothes washer drain hose with hooked end.

## B. Icemaker Outlet Boxes &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Guy Gray, IPS Corporation.
  - b. LSP Products Group.
  - c. Oatey.
  - d. Sioux Chief Manufacturing Company, Inc.
  - e. Water-Tite, IPS Corporation.
  - f. <Insert manufacturer's name>.
2. Mounting: Recessed. **[Fire rated.]**
3. Material and Finish: **[Enameled-steel or epoxy-painted-steel]** **[Enameled-steel, epoxy-painted-steel, or plastic]** **[Plastic]** **[Stainless steel]** box and faceplate.
4. Faucet: Valved fitting complying with ASME A112.18.1. Include **NPS 1/2 (DN 15)** or smaller copper tube outlet.
5. Accessory: Water hammer arrestor.
6. Supply Shutoff Fitting: **NPS 1/2 (DN 15)** gate, globe, or ball valve and **NPS 1/2 (DN 15)** copper, water tubing.

## 2.11 HOSE STATIONS

## A. Single-Temperature-Water Hose Stations &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ARCHON Industries, Inc.
  - b. Armstrong International, Inc.
  - c. DynaFluid Ltd.
  - d. Strahman Valves, Inc.
  - e. T&S Brass and Bronze Works, Inc.
  - f. <Insert manufacturer's name>.
2. Standard: ASME A112.18.1.
3. Cabinet: Stainless steel enclosure with exposed valve handle, hose connection, and hose rack. Include thermometer in front.
4. Hose-Rack Material: Stainless steel.
5. Body Material: Bronze **[with stainless steel wetted parts]**.
6. Body Finish: Rough bronze, (chrome plated).
7. Mounting: **[Wall, with reinforcement]** **[Floor, with stainless steel pedestal]**.
8. Supply Fittings: **[NPS 1/2 (DN 15)]** **[NPS 3/4 (DN 20)]** gate, globe, or ball valve and check valve and **[NPS 1/2 (DN 15)]** **[NPS 3/4 (DN 20)]** copper, water tubing. Omit check valve if check stop is included with fitting.
9. Hose: Manufacturer's standard, for service fluid, temperature, and pressure; **[25 ft. (7.6 m)]** **[50 ft. (15 m)]** <Insert dimension> long.
10. Nozzle: With hand-squeeze, on-off control.

## 11. Vacuum Breaker:

- a. Integral or factory-installed, nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
- b. Garden-hose thread complying with ASME B1.20.7 on outlet.

## B. Hot- and Cold-Water Hose Stations &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ARCHON Industries, Inc.
  - b. Armstrong International, Inc.
  - c. Cooney Brothers, Inc.
  - d. DynaFluid Ltd.
  - e. Strahman Valves, Inc.
  - f. T&S Brass and Bronze Works, Inc.
  - g. <Insert manufacturer's name>.
2. Standard: ASME A112.18.1.
3. Faucet Type: [Blending] [Thermostatic mixing] valve.
4. Cabinet: Stainless steel enclosure with exposed valve handles, hose connection, and hose rack. Include thermometer in front.
5. Hose-Rack Material: Stainless steel.
6. Body Material: Bronze [with stainless steel wetted parts].
7. Body Finish: Rough bronze [or chrome plated].
8. Mounting: [Wall, with reinforcement] [Floor, with stainless steel pedestal].
9. Supply Fittings: Two [NPS 1/2 (DN 15)] [NPS 3/4 (DN 20)] gate, globe, or ball valves and check valves and [NPS 1/2 (DN 15)] [NPS 3/4 (DN 20)] copper, water tubing. Omit check valves if check stops are included with fitting.
10. Hose: Manufacturer's standard, for service fluid, temperature, and pressure; [25 ft. (7.6 m)] [50 ft. (15 m)] <Insert dimension> long.
11. Nozzle: With hand-squeeze, on-off control.
12. Vacuum Breaker: Integral or factory-installed, nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose thread complying with ASME B1.20.7 on outlet.

## C. Cold-Water and Steam Hose Stations &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ARCHON Industries, Inc.
  - b. Armstrong International, Inc.
  - c. DynaFluid Ltd.
  - d. Strahman Valves, Inc.
  - e. <Insert manufacturer's name>.



2. Standard: ASME A112.18.1.
3. Faucet Type: [**Blending**] [**Thermostatic mixing**] valve.
4. Cabinet: Stainless steel enclosure with exposed valve handles, hose connection, and hose rack. Include thermometer in front.
5. Hose-Rack Material: Stainless steel.
6. Body Material: Bronze[ **with stainless steel wetted parts**].
7. Body Finish: Rough bronze[ **or chrome plated**].
8. Mounting: [**Wall, with reinforcement**] [**Floor, with stainless steel pedestal**].
9. Supply Fittings: Two [**NPS 1/2 (DN 15)**] [**NPS 3/4 (DN 20)**] gate, globe, or ball valves and check valves and [**NPS 1/2 (DN 15)**] [**NPS 3/4 (DN 20)**] copper, water tubing. Omit check valves if check stops are included with fitting.
10. Hose: Manufacturer's standard, for service fluid, temperature, and pressure; [**25 ft. (7.6 m)**] [**50 ft. (15 m)**] <Insert dimension> long.
11. Nozzle: With hand-squeeze, on-off control.
12. Vacuum Breaker:
  - a. Integral or factory-installed, nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
  - b. Garden-hose thread complying with ASME B1.20.7 on outlet.

## 2.12 HOSE BIBBS

### A. Hose Bibbs <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. Prier Products, Inc.
  - d. Woodford Manufacturing Company.
  - e. Zurn Industries, LLC.
  - f. <Insert manufacturer's name>.
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 (DN 15 or DN 20)** threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: **125 psig (860 kPa)**.
8. Vacuum Breaker: Integral[ **or field-installation,**] nonremovable, 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**] [**Chrome or nickel plated**].
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation for Equipment Rooms: Wheel handle or operating key.

13. Operation for Service Areas: [**Wheel handle**] [**Operating key**].
14. Operation for Finished Rooms: [**Wheel handle**] [**Operating key**].
15. Include operating key with each operating-key hose bibb.
16. Include[ **integral**] wall flange with each chrome- or nickel-plated hose bibb.

## 2.13 WALL HYDRANTS

### A. Nonfreeze Wall Hydrants <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. Josam Company.
  - c. MIFAB, Inc.
  - d. Prier Products, Inc.
  - e. WATTS.
  - f. Woodford Manufacturing Company.
  - g. Zurn Industries, LLC.
  - h. <Insert manufacturer's name>.
2. Standard: ASME A112.21.3M for [**concealed**] [**exposed**]-outlet, self-draining wall hydrants.
3. Pressure Rating: **125 psig (860 kPa)**.
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 (DN 20 or DN 25)**.
7. Outlet, Concealed: With integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Box: Deep, flush mounted with cover.
9. Box and Cover Finish: [**Polished nickel bronze**] [**Rough bronze**] <Insert finish>.
10. Outlet, Exposed: With integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
11. Nozzle and Wall-Plate Finish: [**Polished nickel bronze**] [**Rough bronze**] [**Chrome plated**] <Insert finish>.
12. Operating Keys(s): [**One**] [**Two**] with each wall hydrant.

### B. Nonfreeze, Hot- and Cold-Water Wall Hydrants <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. Josam Company.
  - c. MIFAB, Inc.
  - d. Prier Products, Inc.
  - e. WATTS.
  - f. Woodford Manufacturing Company.

- g. Zurn Industries, LLC.
  - h. <Insert manufacturer's name>.
2. Standard: ASME A112.21.3M for [concealed] [exposed]-outlet, self-draining wall hydrants.
  3. Pressure Rating: 125 psig (860 kPa).
  4. Operation: Loose key.
  5. Casing and Operating Rods: Of length required to match wall thickness. Include wall clamps.
  6. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
  7. Outlet: Concealed.
  8. Box: Deep, flush mounted with cover.
  9. Box and Cover Finish: [Polished nickel bronze] [Chrome plated] <Insert finish>.
  10. Vacuum Breaker:
    - a. Nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
    - b. Garden-hose thread complying with ASME B1.20.7 on outlet.
  11. Operating Key(s): [One] [Two] with each wall hydrant.
- C. Moderate-Climate Wall Hydrants <Insert drawing designation if any>:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
    - b. MIFAB, Inc.
    - c. Prier Products, Inc.
    - d. WATTS.
    - e. Woodford Manufacturing Company.
    - f. Zurn Industries, LLC.
    - g. <Insert manufacturer's name>.
  2. Standard: ASME A112.21.3M for [concealed] [exposed]-outlet, self-draining wall hydrants.
  3. Pressure Rating: 125 psig (860 kPa).
  4. Operation: Loose key.
  5. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
  6. Outlet, Concealed:
    - a. With integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
    - b. Garden-hose thread complying with ASME B1.20.7.
  7. Box: Deep, flush mounted with cover.
  8. Box and Cover Finish: [Polished nickel bronze] [Chrome plated] <Insert finish>.
  9. Outlet, Exposed:

- a. With integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
  - b. Garden-hose thread complying with ASME B1.20.7.
10. Nozzle and Wall-Plate Finish: [**Polished nickel bronze**] [**Rough bronze**] <Insert finish>.
11. Operating Key(s): [**One**] [**Two**] with each wall hydrant.
- D. Nonfreeze Vacuum Breaker Wall Hydrants <Insert drawing designation if any>:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. A.Y. McDonald Mfg. Co.
    - b. Champion - Arrowhead.
    - c. Jay R. Smith Mfg. Co.; a division of Morris Group International.
    - d. Prier Products, Inc.
    - e. WATTS.
    - f. Woodford Manufacturing Company.
    - g. Zurn Industries, LLC.
    - h. <Insert manufacturer's name>.
  - 2. Standard: ASSE 1019, Type A or Type B.
  - 3. Type: Automatic draining with integral air-inlet valve.
  - 4. Classification: [**Type A, for automatic draining with hose removed or**] Type B, for automatic draining with hose removed or with hose attached and nozzle closed.
  - 5. Pressure Rating: **125 psig (860 kPa)**.
  - 6. Operation: [**Loose key**] [**or**] [**wheel handle**].
  - 7. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
  - 8. Inlet: **NPS 1/2 or NPS 3/4 (DN 15 or DN 20)**.
  - 9. Outlet: Exposed with garden-hose thread complying with ASME B1.20.7.

## 2.14 GROUND HYDRANTS

- A. Nonfreeze Ground Hydrants <Insert drawing designation if any>:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
    - b. Josam Company.
    - c. MIFAB, Inc.
    - d. Murdock Manufacturing; A Division of Morris Group International.
    - e. Prier Products, Inc.
    - f. WATTS.
    - g. Woodford Manufacturing Company.
    - h. Zurn Industries, LLC.
    - i. <Insert manufacturer's name>.

2. Standard: ASME A112.21.3M.
3. Type: Nonfreeze, concealed-outlet ground hydrant with box.
4. Operation: Loose key.
5. Casing and Operating Rod: Of at least length required for burial of valve below frost line.
6. Inlet: [NPS 3/4 (DN 20)] <Insert pipe size>.
7. Outlet: Garden-hose thread complying with ASME B1.20.7.
8. Drain: Designed with hole to drain into ground when shut off.
9. Box: [Standard] [Deep] pattern with cover.
10. Box and Cover Finish: [Rough] [Polished nickel] <Insert finish> bronze.
11. Operating Key(s): [One] [Two] with each ground hydrant.
12. Vacuum Breaker: ASSE 1011.

## 2.15 POST HYDRANTS

### A. Nonfreeze, Draining-Type Post Hydrants <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. WATTS.
  - d. Woodford Manufacturing Company.
  - e. Zurn Industries, LLC.
  - f. <Insert manufacturer's name>.
2. Standard: ASME A112.21.3M.
3. Type: Nonfreeze, exposed-outlet post hydrant.
4. Operation: Loose key.
5. Casing and Operating Rod: Of at least length required for burial of valve below frost line.
6. Casing: Bronze with casing guard.
7. Inlet: [NPS 3/4 (DN 20)] <Insert pipe size>.
8. Outlet: Garden-hose thread complying with ASME B1.20.7.
9. Drain: Designed with hole to drain into ground when shut off.
10. Vacuum Breaker:
  - a. Nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
  - b. Garden-hose thread complying with ASME B1.20.7 on outlet.
11. Operating Key(s): [One] [Two] with each loose-key-operation wall hydrant.

### B. Nonfreeze Sanitary Yard Hydrants <Insert drawing designation if any>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. Hoepfner Products.
  - c. Murdock Manufacturing; A Division of Morris Group International.
  - d. Woodford Manufacturing Company.
  - e. **<Insert manufacturer's name>**.
2. Standard: ASSE 1057.
  3. Operation: Wheel handle or lever.
  4. Head: Cast iron or brass, with pail hook.
  5. Inlet: **NPS 3/4 or NPS 1 (DN 20 or DN 25)** threaded.
  6. Length: As required for burial of valve and canister below frost line.
  7. Canister: [**Stainless steel**] **<Insert material>**.
  8. Vacuum Breaker:
    - a. Removable hose-connection backflow preventer complying with ASSE 1052.
    - b. Garden-hose thread complying with ASME B1.20.7 on outlet for field installation.

## 2.16 ROOF HYDRANTS

### A. Nonfreeze, Draining-Type Roof Hydrants **<Insert drawing designation if any>**:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. WATTS.
  - d. Woodford Manufacturing Company.
  - e. Zurn Industries, LLC.
  - f. **<Insert manufacturer's name>**.
2. Standard: ASME A112.21.3M.
3. Type: Nonfreeze, exposed-outlet roof hydrant with coated cast-iron head and lift handle with lock option. Provide with deck flange and under deck clamp.
4. Casing and Operating Rod: Bronze interior parts, galvanized-steel casing, and bronze valve housing designed with hole to drain.
5. Inlet: [**NPS 3/4 (DN 20)**] **<Insert pipe size>**.
6. Outlet: Garden-hose thread complying with ASME B1.20.7.
7. Vacuum Breaker:
  - a. Nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
  - b. Garden-hose thread complying with ASME B1.20.7 on outlet.

## 2.17 DRAIN VALVES

### A. Ball-Valve-Type, Hose-End Drain Valves **<Insert drawing designation if any>**:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: **400-psig (2760-kPa)** minimum CWP.
3. Size: **NPS 3/4 (DN 20)**.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Gate-Valve-Type, Hose-End Drain Valves **<Insert drawing designation if any>**:

1. Standard: MSS SP-80 for gate valves.
2. Pressure Rating: Class 125.
3. Size: **NPS 3/4 (DN 20)**.
4. Body: ASTM B62 bronze.
5. Inlet: **NPS 3/4 (DN 20)** threaded or solder joint.
6. Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

C. Stop-and-Waste Drain Valves **<Insert drawing designation if any>**:

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: **200-psig (1380-kPa)** minimum CWP or Class 125.
3. Size: **NPS 3/4 (DN 20)**.
4. Body: Copper alloy or ASTM B62 bronze.
5. Drain: **NPS 1/8 (DN 6)** side outlet with cap.

## 2.18 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters **<Insert drawing designation if any>**:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AMTROL, Inc.
  - b. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - c. Josam Company.
  - d. MIFAB, Inc.
  - e. Precision Plumbing Products.
  - f. Sioux Chief Manufacturing Company, Inc.
  - g. WATTS.
  - h. Zurn Industries, LLC.
  - i. **<Insert manufacturer's name>**.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: **[Metal bellows] [Piston] [Diaphragm]**.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

## 2.19 TRAP-SEAL PRIMER DEVICE

## A. Supply-Type, Trap-Seal Primer Device &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. Josam Company.
  - c. MIFAB, Inc.
  - d. Precision Plumbing Products.
  - e. Sioux Chief Manufacturing Company, Inc.
  - f. WATTS.
  - g. Zurn Industries, LLC.
  - h. <Insert manufacturer's name>.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig (860 kPa) 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 Device &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. Precision Plumbing Products.
  - d. Zurn Industries, LLC.
  - e. <Insert manufacturer's name>.
2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 (DN 10) minimum, trap makeup connection.
3. Size: NPS 1-1/4 (DN 32) minimum.
4. Material: Chrome-plated, cast brass.

## 2.20 TRAP-SEAL PRIMER SYSTEMS

## A. Trap-Seal Primer Systems &lt;Insert drawing designation if any&gt;:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Precision Plumbing Products.
  - b. Sioux Chief Manufacturing Company, Inc.



- c. Zurn Industries, LLC.
  - d. <Insert manufacturer's name>.
2. Standard: ASSE 1044.
  3. Inlet Size: **NPS 3/4, ASTM B88, Type L (DN 20, ASTM B88M, Type B)**; copper, water tubing.
  4. Cabinet: [**Recessed**] [**Surface**]-mounted steel box with stainless steel cover.
  5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120 V ac power.
    - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  6. Vacuum Breaker: ASSE 1001.
  7. Number Outlets: [**Four**] [**Six**] [**Eight**] <Insert number>.
  8. Size Outlets: [**NPS 1/2 (DN 15)**] [**NPS 5/8 (DN 18)**].

## 2.21 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Flex-Hose Co., Inc.
  2. Mason Industries, Inc.
  3. Metraflex Company (The).
  4. <Insert manufacturer's name>.
- B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
  1. Working-Pressure Rating: Minimum [**200 psig (1380 kPa)**] [**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 [**200 psig (1380 kPa)**] [**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.

## 2.22 WATER METERS

- A. Displacement-Type Water Meters:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Aaliant; a brand of Niagara Meters.
  - b. Badger Meter, Inc.
  - c. Carlon Meter.
  - d. Master Meter, Inc.
  - e. Neptune Technology Group Inc.
  - f. **<Insert manufacturer's name>**.
2. Standard: AWWA C700.
  3. Pressure Rating: **150-psig (1035-kPa)** working pressure.
  4. Body Design: Nutating disc; totalization meter.
  5. Registration: In **gallons (liters)** or **cubic feet (cubic meters)** as required by utility company.
    - a. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
      - 1) System shall be capable of transmitting data using AMR/AMI technology.
  6. Case: **[Bronze] [Stainless steel]**.
  7. End Connections: Threaded or flanged.
- B. Turbine-Type Water Meters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Aaliant; a brand of Niagara Meters.
    - b. Badger Meter, Inc.
    - c. Neptune Technology Group Inc.
    - d. **<Insert manufacturer's name>**.
  2. Standard: AWWA C701.
  3. Pressure Rating: **[150 psig (1035 kPa)] <Insert value>** working pressure.
  4. Body Design: Turbine; totalization meter.
  5. Registration: In **gallons (liters)** or **cubic feet (cubic meters)** as required by utility company.
    - a. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
      - 1) System shall be capable of transmitting data using AMR/AMI technology.
  6. Case: **[Bronze] [Epoxy-coated cast iron]**.
  7. End Connections: Threaded or flanged.
- C. Compound-Type Water Meters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Badger Meter, Inc.
  - b. Neptune Technology Group Inc.
  - c. Sensus; a Xylem brand.
  - d. **<Insert manufacturer's name>**.
2. Standard: AWWA C702.
  3. Pressure Rating: **150-psig (1035-kPa)** working pressure.
  4. Body Design: With integral mainline and bypass meters; totalization meter.
  5. Registration: In **gallons (liters)** or **cubic feet (cubic meters)** as required by utility company.
    - a. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
      - 1) System shall be capable of transmitting data using AMR/AMI technology.
  6. Case: **[Bronze] [Coated ductile iron]**.
  7. End Connections: Flanged.

D. Ultrasonic-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Badger Meter, Inc.
  - b. Master Meter, Inc.
  - c. Neptune Technology Group Inc.
  - d. **<Insert manufacturer's name>**.
2. Standard: Applicable portions of AWWA C700.
3. Pressure Rating: **[150 psig (1035 kPa)] <Insert value>** working pressure.
4. Body Design: Ultrasonic open flow tube; totalization meter.
5. Registration: In **gallons (liters)** or **cubic feet (cubic meters)** as required by utility company.
  - a. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
    - 1) System shall be capable of transmitting data using AMR/AMI technology.
6. Case: **[Bronze] [Stainless steel] [Engineered polymer] [Epoxy-coated ductile iron]**.
7. End Connections: Threaded or flanged.

## PART 3 - EXECUTION

## 3.1 INSTALLATION OF PIPING SPECIALTIES

- A. Backflow Preventers: Install 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. Locate backflow preventers in same room as connected equipment or system.
  2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
  3. Do not install bypass piping around backflow preventers.
- B. Water Regulators: Install with inlet and outlet shutoff valves[ **and bypass with memory-stop balancing valve**]. Install pressure gauges on inlet and outlet.
- C. Water Control Valves: Install with inlet and outlet shutoff valves[ **and bypass with globe valve**]. Install pressure gauges on inlet and outlet.
- D. Automatic Water Shutoff Valves: Test for signal strength before valve installation. Install automatic shutoff valve downstream from main domestic water shutoff valve. Install valve controller in an accessible location with sensors in areas where water is likely to accumulate.
- E. Balancing Valves: Install in locations where they can easily be adjusted. Set at indicated design flow rates.
- F. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.
1. Install cabinet-type units recessed in or surface mounted on wall as specified.
- G. Y-Pattern Strainers: For water, install on supply side of each [**control valve**] [**water pressure-reducing valve**] [**solenoid valve**] [**and**] [**pump**].
- H. Outlet Boxes: Install boxes recessed in wall or surface mounted on wall. Install **1-1/2-by-3-1/2-inch (38-by-89-mm)** fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."
- I. Hose Stations: Install with check stops or shutoff valves on inlets and with thermometer on outlet.
1. Install cabinet-type units recessed in or surface mounted on wall as specified. Install **1-1/2-by-3-1/2-inch (38-by-89-mm)** fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

- J. Ground Hydrants: Install with [1 cu. yd. (0.75 cu. m)] <Insert dimension> of crushed gravel around drain hole. Set ground hydrants with box flush with grade.
- K. Nonfreeze, Draining-Type Post Hydrants: Install with [1 cu. yd. (0.75 cu. m)] <Insert dimension> of crushed gravel around drain hole. Set post hydrants in concrete paving or in [1 cu. ft. (0.03 cu. m)] <Insert dimension> of concrete block at grade.
- L. Nonfreeze, Nondraining-Type Post Hydrants: Set in concrete or pavement.
- M. Nonfreeze, Sanitary Yard Hydrants: Set with riser pipe in concrete or pavement. Do not encase canister in concrete.
- N. Nonfreeze, Draining-Type Roof Hydrants: Install with drain connection piped to nearest floor drain or to the exterior.
- O. Water-Hammer Arresters: Install in water piping in accordance with PDI-WH 201.
- P. Supply-Type, Trap-Seal Primer Device: Install 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.
- Q. Drainage-Type, Trap-Seal Primer Device: Install 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.
- R. Trap-Seal Primer Systems: Install 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.

### 3.2 PIPING CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

### 3.3 ELECTRICAL CONNECTIONS

- A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

### 3.4 CONTROL CONNECTIONS

- A. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

### 3.5 IDENTIFICATION

- A. Plastic Labels for Equipment: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
  - 1. Vacuum breakers.
  - 2. Backflow preventers.
  - 3. Water pressure-reducing valves.
  - 4. Automatic water shutoff valve systems.
  - 5. Balancing valves.
  - 6. Temperature-actuated, water mixing valves.
  - 7. Outlet boxes.
  - 8. Hose stations.
  - 9. Wall hydrants.
  - 10. Ground hydrants.
  - 11. Post hydrants.
  - 12. Roof hydrants.
  - 13. Trap-seal primer device.
  - 14. Trap-seal primer systems.
  - 15. Water meters.
- 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 Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.6 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.
- D. Adjust each [**pressure vacuum breaker**] [**reduced-pressure-principle backflow preventer**] [**double-check, backflow-prevention assembly**] [**and**] [**double-check, detector-assembly backflow preventer**] <Insert type> in accordance with manufacturer's written instructions, authorities having jurisdiction and the device's reference standard.

## 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections **[with the assistance of a factory-authorized service representative]**.
  - 1. Test each **[pressure vacuum breaker]** **[reduced-pressure-principle backflow preventer]** **[double-check, backflow-prevention assembly]** **[and]** **[double-check, detector-assembly backflow preventer]** **<Insert type>** in accordance with authorities having jurisdiction and the device's reference standard.
  - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 221119