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**SECTION 22 10 06**  
**PLUMBING PIPING SPECIALTIES****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Roof Drains.
- B. Floor Drains.
- C. Trench Drains.
- D. Cleanouts.
- E. Miscellaneous Sanitary Drainage Piping Specialties.
- F. Hose Bibbs.
- G. Wall Hydrants.
- H. Wall Box.
- I. Water Hammer Arrestors.
- J. Mixing Valves.
- K. Pilot Operated Pressure Reducing Valve.
- L. Calibrated Balancing Valve.
- M. Strainers.

**1.2 RELATED REQUIREMENTS**

- A. Section 22 00 00 - Common Work Results for Plumbing; for administrative requirements
- B. Section 22 00 00 - Plumbing Common Work Results; for product requirements
- C. Section 22 00 00 - Plumbing Common Work Results; for closeout requirements
- D. Section 22 00 00 - Plumbing Common Work Results
- E. Section 22 10 05 - Plumbing General Duty Valves.
- F. Section 22 10 05 - Plumbing Piping.
- G. Section 22 30 00 - Plumbing Equipment.
- H. Section 22 40 00 - Plumbing Fixtures.
- I. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

**1.3 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASME A112.6.3 - Floor and Trench Drains 2019.
- C. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.
- D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).
- E. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- F. NSF 372 - Drinking Water System Components - Lead Content 2022.
- G. PDI-WH 201 - Water Hammer Arresters 2017.

**1.4 SUBMITTALS**

- A. See Section 22 00 00 - Plumbing Common Work Results; for submittal procedures.
- B. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference, and should not be used as an ordering model number. Accessories and

options may be custom components purchased separately.

- C. Product Data: Provide manufacturer's most current catalog data sheet for equipment indicating rough-in size, finish, and accessories. Manufacturer's data sheets on each item of equipment and device, shall be clearly marked up to identify the items, accessories and options to be used on the project.
1. Provide component sizes, rough-in requirements, service sizes, and finishes. Indicate dimensions, weights, and placement of openings and holes.
  2. Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
  3. Roof Drains (22 10 06 - 001 - A)
  4. Floor Drains (22 10 06 - 002 - A)
  5. Trench Drains (22 10 06 - 002 - A)
  6. Cleanouts (22 10 06 - 002 - A)
  7. Hose Bibbs (22 10 06 - 003 - A)
  8. Hydrants (22 10 06 - 003 - A)
  9. Wall Box (22 10 03 - 003 - A)
  10. Water Hammer Arrestors (22 10 06 - 005 - A)
  11. Mixing Valves (22 10 06 - 007 - A)
  12. Pilot Operated Pressure Reducing Valve (22 10 06 - 008 - A)
  13. Calibrated Balancing Valve (22 10 06 - 009 - A)
  14. Strainers (22 10 06 - 009 - A)
- D. Start-up Report: Indicate start-up results.
1. Refer to section 22 00 00 - Plumbing Common Work Results.
  2. Mixing Valves (22 10 06 - 013 - A)
  3. Calibrated Balancing Valve (22 10 06 - 014 - A)
  4. Pilot Operated Pressure Reducing Valve (22 10 06 - 015 - A)
- E. Test Report: Indicate procedures and results.
1. Refer to section 22 00 00 - Plumbing Common Work Results.
- F. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
1. Refer to Section 22 00 00 - Plumbing Common Work Results; for closeout Submittals.
  2. Record Documents (22 00 00 - 005 - A)
- G. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
1. Refer to Section 22 00 00 - Plumbing Common Work Results
  2. Operation and Maintenance Data Books (22 00 00 - 006 - A)
  3. Operation and Maintenance DVD (22 00 00 - 007 - A)
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 22 00 00 - Plumbing Common Work Results; for additional provisions.
  2. 2 additional dome covers for each type of roof drain.
  3. 2 additional full grate covers for each type of floor drain.
  4. 2 additional covers for each type of clean out and 1 clean out wrench for each type.
  5. 2 additional handles / keys for each type of hose bibb.
  6. 2 additional handles / keys for each type of wall hydrant.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
1. Submit under Operation and Maintenance Data books (22 00 00 - 006 - A)

2. Roof Drains.
3. Floor Drains.
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11. Pilot Operated Pressure Reducing Valve.
12. Calibrated Balancing Valve.
13. Strainers.

#### **1.5 WARRANTY**

- A. See Section 22 00 00 - Plumbing Common Work Results; for additional warranty requirements.
- B. Provide 3 year warranty, including parts, materials and labor for defective parts, for the following:
  1. Include in Closeout Submittals Book.
  2. Roof Drains.
  3. Floor Drains.
  4. Trench Drains.
  5. Cleanouts.
  6. Hose Bibbs.
  7. Hydrants.
  8. Wall Box.
  9. Water Hammer Arrestors.
  10. Mixing Valves.
  11. Pilot Operated Pressure Reducing Valve.
  12. Calibrated Balancing Valve.
  13. Strainers.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Accept specialties on site in original factory packaging. Inspect for damage.

### **PART 2 PRODUCTS**

#### **2.1 GENERAL REQUIREMENTS**

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

#### **2.2 ROOF DRAINS**

- A. Roof Drains, RD1.#:
    1. Body: Lacquered cast iron with sump with deck clamp.
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2. Strainer: Removable cast iron dome with vandal proof screws.
3. Accessories: Coordinate with roofing type, refer to Division 07.
  - a. Membrane flange and membrane clamp with integral gravel stop.
  - b. Adjustable under deck clamp.
  - c. Waterproofing flange.
  - d. Leveling frame.
  - e. Adjustable extension sleeve for roof insulation.
4. Manufacturer:
  - a. Jay R. Smith Manufacturing Company, Series 1015.

## **2.3 FLOOR DRAINS**

- A. Load Classifications:
  1. All items and covers shall have a live load as follows:
  2. Light Duty: 1,500 - 2,000 pounds.
  3. Medium Duty: 2,001 - 4,999 pounds.
  4. Heavy Duty: 5,000 - 7,499 pounds.
  5. Extra Heavy Duty: 8,000 - 10,000 pounds.
- B. Floor Drain, FD1.:#:
  1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and square, adjustable stainless steel strainer.
  2. Vandal Proof Screws.
  3. Adjustable Head.
  4. Elastomeric PVC material molded to fit floor drain. Closes under no flow condition to prevent sewer gas from escaping.
    - a. Manufacturer: Pro-Set Trap Guard.
  5. Deep Seal Cast Iron Trap:
    - a. Manufacturer: Charlotte pipe.
  6. Manufacturer:
    - a. Jay R. Smith Manufacturing Company, Series 2010.
- C. Floor Drain, FD2.3:
  1. ASME A112.6.3; lacquered cast iron, two piece body with double drainage flange, weep holes, reversible clamping collar, and square, adjustable square stainless steel strainer with removable perforated sediment bucket.
  2. Vandal proof screws.
  3. Elastomeric PVC material molded to fit floor drain. Closes under no flow condition to prevent sewer gas from escaping.
    - a. Manufacturer: Pro-Set Trap Guard.
  4. Deep Seal Cast Iron Trap:
    - a. Manufacturer: Charlotte pipe.
  5. Manufacturer:
    - a. Jay R. Smith Manufacturing Company, Series 2230.
- D. Floor Drain, FD6.4:
  1. ASME A112.6.3; Heavy Duty, 8"x12" by 8" deep, and Rectangular, Institutional Type for padded safety cells, washdown flushing rim, Stainless steel construction, Welded bar grates, Provide

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- manufacture remotely mounted flush valve access panel.
  - 2. Vandal proof screws.
  - 3. Elastomeric PVC material molded to fit floor drain. Closes under no flow condition to prevent sewer gas from escaping.
    - a. Manufacturer: Pro-Set Trap Guard.
  - 4. Deep Seal Cast Iron Trap:
    - a. Manufacturer: Charlotte pipe.
  - 5. Manufacturer:
    - a. Acorn Engineering Company, Series 1699.
  - E. Floor Drain, FD5.4:
    - 1. ASME A112.6.3; 12"x12" by 8" deep, Heavy Duty, Coated cast iron construction, two piece body with double drainage flange, weep holes, reversible clamping collar, square, coated cast iron sediment bucket, and coated cast iron grate
    - 2. Elastomeric PVC material molded to fit floor drain. Closes under no flow condition to prevent sewer gas from escaping.
      - a. Manufacturer: Pro-Set Trap Guard.
    - 3. Deep Seal Cast Iron Trap:
      - a. Manufacturer: Charlotte pipe.
    - 4. Manufacturer:
      - a. Zurn Manufacturing Company, Series Z610
  - F. Floor Drain, FD4.4:
    - 1. ASME A112.6.3; Cast iron construction, two piece body with double drainage flange, weep holes, reversible clamping collar, square, Vandal proof chrome plated strainer grate with 1/4 inch perforations.
    - 2. Elastomeric PVC material molded to fit floor drain. Closes under no flow condition to prevent sewer gas from escaping.
      - a. Manufacturer: Pro-Set Trap Guard.
    - 3. Deep Seal Cast Iron Trap:
      - a. Manufacturer: Charlotte pipe.
    - 4. Manufacturer:
      - a. Jay R. Smith Manufacturing Company, Series 2050.
  - G. Stainless Steel Security Floor Drain, FD3.4:
    - 1. 14 gauge 304 Stainless steel Construction, 6 inch deep, two piece body with double drainage flange, weep holes, reversible clamping collar, square, chrome-plated strainer.
    - 2. Slotted Grate.
    - 3. Vandal proof screws.
    - 4. Sediment bucket
    - 5. Elastomeric PVC material molded to fit floor drain. Closes under no flow condition to prevent sewer gas from escaping.
      - a. Manufacturer: Pro-Set Trap Guard.
    - 6. Deep Seal Cast Iron Trap:
      - a. Manufacturer: Charlotte Pipe.
    - 7. Manufacturer:
      - a. Jay R. Smith Manufacturing Company, Series 2108.
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**2.4 TRENCH DRAIN**

- A. Trench Drain, TD1.:#:
  - 1. 12" wide trench drain to extend width as indicated on plans. Precast Polyester Concrete Channel of interlocking design with a built in slope of .5%. Double drainage flange. Radius bottom of channel design. Integral ductile iron edge rail.
  - 2. Approximate length of drain based off of construction drawings.
  - 3. Stainless steel medium duty ADA grate. 28,000 lbs. rated with quick lock security feature.
  - 4. Manufacturer:
    - a. Zurn Manufacturing Company, Series ZFV812 trench drain.

**2.5 CLEANOUTS**

- A. Load Classifications:
    - 1. All items and covers shall have a live load as follows:
      - a. Light Duty: 1,500 - 2,000 pounds.
      - b. Medium Duty: 2,001 - 4,999 pounds.
      - c. Heavy Duty: 5,000 - 7,499 pounds.
      - d. Extra Heavy Duty: 8,000 - 10,000 pounds.
  - B. Cleanouts at Exterior Surfaced Areas, CO1.4:
    - 1. Heavy Duty, round cast nickel bronze access frame, flange type, and round gasketed "YCO" scored non-skid cover.
    - 2. Plug to accept plug closure handle.
    - 3. Cast iron body design to be set within concrete; blacktop, rated for medium vehicle traffic.
    - 4. Cast iron body design to be set within grade rated for light traffic, mowing tractors.
    - 5. Vandal proof top and bronze plug.
    - 6. Manufacturer:
      - a. Jay R. Smith Manufacturing Company, Series 4225.
  - C. General Duty Cleanouts at Interior Finished Floor Areas, CO2.:#:
    - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed "CO" scored cover. Stainless Steel Cover.
    - 2. Plug to accept plug closure handle.
    - 3. Manufacturer:
      - a. Jay R. Smith Manufacturing Company, Series 4120.
  - D. Heavy Duty Cleanouts at Interior Finished Floor Areas, CO3.:#:
    - 1. Extra, heavy duty, Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed "CO" scored cover. Stainless Steel Cover
    - 2. Plug to accept plug closure handle.
    - 3. Manufacturer:
      - a. Jay R. Smith Manufacturing Company, Series 4100.
  - E. Cleanouts Interior Inline, CO5.:#:
    - 1. Provide tee within pipe for cleanout plug.
    - 2. Bronze plug to accept plug closure handle with center tap.
    - 3. Vandal proof screws.
    - 4. Manufacturer:
      - a. Jay R. Smith Manufacturing Company, Series 4435.
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**F. Cleanouts at Wall Areas, CO4.#:**

1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
2. Provide tee within pipe for cleanout plug
3. Bronze plug to accept plug closure handle with center tap.
4. Vandal proof screws.
5. Manufacturer:
  - a. Jay R. Smith Manufacturing Company, Series 4435C.

**2.6 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES****A. Open Drains:**

1. Description: Shop or field fabricate from ASTM A74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C564, rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of 2 size larger than connection size.

**B. Deep Seal Traps:**

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.
  - a. NPS 2: 4-inch- minimum water seal.
  - b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

**C. Air-Gap Fittings:**

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

**D. Sleeve Flashing Device:**

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

**E. Stack Flashing Fittings:**

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

**F. Vent Caps:**

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

**G. Frost-Resistant Vent Terminals:**

1. Description: Manufactured or shop-fabricated assembly constructed of copper, lead-coated copper, or galvanized steel.
  2. Design: To provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.
- H. Expansion Joints:
1. Standard: ASME A112.21.2M.
  2. Body: Cast iron with bronze sleeve, packing, and gland.
  3. End Connections: Matching connected piping.
  4. Size: Same as connected soil, waste, or vent piping.

## **2.7 HOSE BIBBS**

- A. Interior Hose Bibbs, HB-1:
1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in compliance with ASSE 1011.
    - a. Removable handwheel.
    - b. Refer to section 20 10 07 - Valves, for drain valves with hose threads.
    - c. Manufacturer:
      - 1) Watts; Series SC8.

## **2.8 WALL HYDRANTS**

- A. Wall Hydrants, WH-1:
1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.
  2. Stainless steel, recessed box with locking cover. Provide "WATER" on cover, adjustable wall clamp.
  3. Manufacturer:
    - a. Zurn Company, Series Z1327-EZ.

## **2.9 FLEXIBLE CONNECTORS**

- A. 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.
  2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
  3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- B. 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.
  2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
  3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

## **2.10 WALL BOXES AND VALVES, WB-1:**

- A. Description: 304 Stainless Steel, rough-in box with quarter turn valves, slip in finishing cover.
1. Manufacturer:
    - a. IPS Corporation, Guy Gray, Series 88527 for ice makers 4.125"x4.75" clear interior.
- B. 72 inch long stainless steel braided hose, for cold water connection.



**2.11 WATER HAMMER ARRESTORS**

- A. Water Hammer Arrestors: WHA-X
  - 1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.
  - 2. Manufacturer:
    - a. Watts regulator Company, Series LF15M2.

**2.12 MIXING VALVES**

- A. Point-of-Use Thermostatic Mixing Valves: TMV-1:
  - 1. Valve: Cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
  - 2. Lead Free with adjustment locking screw, integral checks and screens.
  - 3. 0.5 GPM minimum Flow, 4.0 GPM flow with 5 PSI pressure loss. 120 degrees fahrenheit inlet on hot, 110 degree Fahrenheit outlet.
  - 4. Manufacturer:
    - a. Powers Valve Company, Series LFLM495.
- B. Electronic Thermostatic Mixing Valve: TMV-2
  - 1. Manufacturers:
    - a. Armstrong International, The Brain Digital Recirculating Valve.
    - b. Leonard Valve Company, The Nucleus Digitally Controlled Valve.
    - c. No substitutions.
  - 2. General: Electronic controlled mixing valve with associated controls and panels.
  - 3. Features: Tamperproof temperature adjustment control panel capable of three programmable temperature settings and shall maintain setpoint within 2 degrees, union inlets, inlet return check valves, combination strainer-ball valve, built-in hot water shutoff in the event of hot or cold water supply failure, or electrical failure.
  - 4. Components: Factory assembled and tested system with mixing valve, pressure gages on inlets and outlet water piping, temperature gages on inlet and outlet water piping, inlet and outlet shut off ball valves, and unions for dismantling.
  - 5. Control Connections: LED digital readout, 110 volt electrical connection with 12 volt transformer. Sensors shall include hot water temperature, cold water temperature, tempered water sensor. 0-10 volt, 0-20 milliamp terminal strip with 2 way communication.
  - 6. Cabinet: 16 gage, 0.0598 inch stainless steel, for surface mounting.

**2.13 PILOT OPERATED PRESSURE REDUCING VALVE**

- A. Type: Consists of main valve and pilot control system. Main valve shall be single seated, hydraulically operated, pilot controlled diaphragm type globe valve. Main valve shall have a single removable seat and resilient disc. Stem shall be guided at other ends by a bearing in valve cover and integral bearing in valve seat.
  - B. Pilot Control: Shall be direct acting, adjustable, spring loaded, normally open diaphragm valve designed to permit flow when controlled pressure is less than the spring setting. Shall include a fixed orifice.
  - C. Material:
    - 1. Body: Ductile iron, ASTM A48.
    - 2. Main Valve Trim: Brass, borne, ASTM B61.
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- 3. Pilot Control System: Cast bronze, ASTM B62 with 3030 stainless steel.
- D. Maximum Working Pressure: 175 psi.
- E. Manufacturer:
  - 1. Watts ACV 115E, or Cla-Val, Baily, Bermad, Ross, Singer.

#### **2.14 CALIBRATED BALANCING VALVES, BV-1**

- A. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.
- C. Manufacturer:
  - 1. Bell & Gossett, Series CB.

#### **2.15 STRAINERS**

- A. Size 4 inch and Under:
  - 1. Lead free bronze body for 175 psi CWP, wye pattern with 1/32 inch stainless steel perforated screen.
  - 2. Class 150, threaded bronze body 300 psi CWP, wye pattern with 1/32 inch stainless steel perforated screen.
  - 3. Manufacturer:
    - a. Watts LF777S.
- B. Size 2 inch to 12 Inch:
  - 1. Class 125 Flanged connection, cast iron body with FDA epoxy coating, wye pattern with 1/16 inch stainless steel perforated screen.
  - 2. Manufacturer:
    - a. Watts 77DI-FDA.

### **PART 3 EXECUTION**

#### **3.1 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Confirm framing and support members.
- B. Confirm rough-in and framing of walls and partitions with supports for equipment and accessories.
- C. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 28 31 00 - Fire Detection and Alarm.
- D. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 26 05 83 - Wiring Connections.
- E. Confirm rough-in location and slope of floor assembly towards drain.
- F. Confirm rough-in locations and requirements before rough-in installation.

#### **3.2 EXAMINATION**

- A. Verify that piping and equipment are ready to receive work.
- B. Verify field measurements are as shown on shop drawings.
- C. Electrical:
  - 1. Verify electrical power, voltage, phase and current is available and of the correct characteristics.
  - 2. Verify rough-in for electrical connections to verify actual locations before installing.
  - 3. Verify motor type and VFD or disconnect type for compatibility prior to ordering equipment.

- D. Controls:
  - 1. Verify signal power, voltage, phase and current is available and of the correct characteristics.
  - 2. Verify rough-in for control connections to verify actual locations before installing.
  - 3. Verify motor type and VFD or disconnect type for compatibility with control sequence and control devices prior to ordering equipment.
- E. Maintain service clearances.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 INSTALLATION**

- A. Install in accordance with the following:
    - 1. Federal, State and Local Codes.
    - 2. Manufacturer's Instructions.
    - 3. 36 CFR 1191.
    - 4. NSF 61.
  - B. Roof Drains:
    - 1. Install roof drain within roofing system. Refer to Division 07 for roof systems.
  - C. Floor Drains:
    - 1. Install floor drains within flooring system.
    - 2. Coordinate floor drain direction with flooring pattern.
    - 3. Align drains with grout lines and tile sides.
    - 4. Align drains with walls and partitions.
    - 5. Position floor drains for easy access and maintenance.
    - 6. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
      - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
      - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
      - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
    - 7. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
    - 8. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
  - D. Trench Drains:
    - 1. Install trench drains within flooring system
    - 2. Align drains with walls and partitions.
  - E. Clean outs:
    - 1. Extend cleanouts to finished grade, finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
      - a. Encase exterior cleanouts in concrete flush with grade.
      - b. Install floor cleanouts at elevation to accommodate finished floor.
    - 2. Furnish and install cleanouts every 50 linear feet in drainage piping.
    - 3. Furnish and install cleanouts at every 90 degree change in drainage piping.
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4. Furnish and install cleanouts at the base of every stack in drainage piping.
  5. Furnish and install cleanouts 4'-0" from the edge of the building at the exterior of the building for each drainage piping.
- F. Miscellaneous Sanitary Drainage Specialties:
1. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
  2. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
  3. Assemble open drain fittings and install with top of hub 2 inches above floor.
  4. Install deep-seal traps on floor drains and other waste outlets, if indicated.
  5. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
  6. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
  7. Install vent caps on each vent pipe passing through roof.
  8. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
  9. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.
- G. Hose Bibb:
1. Mount hose bibb a minimum of 30 inches above finished floor. Unless mounted below a lavatory, then mount hose bibb 24 inches above finished floor.
  2. Secure hose bibb to wall using metal fasteners.
  3. Seal around wall penetration and hose bibb.
- H. Wall Hydrants:
1. Install hydrants within wall assembly.
  2. Coordinate with wall for masonry coursing and place wall hydrants within coursing.
- I. Wall Box:
1. Rough-in and connect within wall assembly.
  2. Coordinate with wall for masonry coursing and place within coursing.
  3. Provide quarter turn valve within box.
  4. Hot and cold water connection:
    - a. Provide water hammer arrestor on hot and / or cold water, size Water Hammer Arrestor - size A.
    - b. Install stainless steel braided flexible connection on water connection.
    - c. Install dual check backflow preventer on Ice makers, refrigerators, coffee makers and other food service connections.
  5. Install corrugated flexible connection on fuel gas connections.
- J. Water Hammer Arrestors:
1. Install water hammers on cold and hot water piping serving fixtures or equipment with solenoid actuated valves.
  2. Install per PDI-WH 201.
  3. Provide access panel to water hammer arrestors per Section 22 00 00 - Plumbing Common Work Results.
- K. Mixing Valves:
1. Set valve to temperature.
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2. Provide IT data drop next to valve location. Furnish and install conduit, box, wiring and termination devices from box to network server.
  3. Coordinate power and building control connection with other trades.
  4. Perform start-up in accordance with Section 22 00 00 - Plumbing Common Work Results.
- L. Pilot Operated Pressure Reducing Valve:
1. Install with pressure gauge upstream and downstream.
  2. Install with strainer upstream.
  3. Perform start-up in accordance with Section 22 00 00 - Plumbing Common Work Results.
- M. Calibrated Balancing Valves:
1. Install pressure gauge connection upstream and downstream of valve.
  2. Install shut-off valve down stream of valve.
  3. Perform start-up in accordance with Section 22 00 00 - Plumbing Common Work Results.
- N. Strainers:
1. Install hose end valve with cap and chain on blow down connection. Refer to Section 22 10 05 - Plumbing General Duty Valves.
  2. Flush strainers and check screens after system has been filled and operation for 5 days.

### **3.4 TRAINING**

- A. Perform training in accordance with Section 22 00 00 - Plumbing Common Work Results.

### **3.5 START-UP**

- A. Perform start-up in accordance with Section 22 00 00 - Plumbing Common Work Results.
- B. Verify system is ready for start-up with visual inspection and sign off from installing personnel.
- C. Start-up motor per equipment manufacturer's recommendations.
- D. Provide start-up reports documenting the following:
1. Mixing Valves:
    - a. Location / Associated Equipment.
    - b. Manufacturer.
    - c. Model/ Size.
    - d. Hot Water Temperature / Discharge Temperature.
  2. Pilot Operated Pressure Reducing Valve:
    - a. Location / Associated Equipment.
    - b. Manufacturer.
    - c. Model/ Size.
    - d. Inlet Pressure / Discharge Pressure.
  3. Calibrated Balancing Valves:
    - a. Location.
    - b. Manufacturer.
    - c. Model/ Size.
    - d. Flow Rate / Setting.

### **3.6 TESTING**

- A. Backflow Preventers: Backflow prevention assembly shall be tested using gauges specifically designed for the testing of backflow prevention assemblies. Gauges shall be tested annually for accuracy in accordance with the University of Southern California's Foundation of Cross Connection Control and
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Hydraulic Research or the American Water Works Association Manual of Cross Connection (Manual M-14). Report form for each assembly shall include, as a minimum, the following:

1. Data on Device.
2. Type of Assembly.
3. Manufacturer.
4. Model Number.
5. Serial Number.
6. Size.
7. Location.
8. Test Pressure Readings.
9. Data on Testing Firm.
10. Name.
11. Address.
12. Certified Tester.
13. Certified Tester No.
14. Date of Test.
15. Serial Number and Test Data of Gauges.

If the unit fails to meet specified requirements, the unit shall be repaired and retested.

**END OF SECTION 22 10 06**