

## PART 1 - GENERAL

## 1.01 SUMMARY

## A. Section Includes:

1. Unions and flanges.
2. Pressure gages.
3. Pressure gage taps.
4. Thermometers.
5. Relief valves.
6. Strainers.
7. Hose bibs.
8. Wall hydrants.
9. Backflow preventers.
10. Water hammer arrestors.
11. Thermostatic mixing valves.
12. Diaphragm-type compression tanks.
13. In-line circulator pumps.

## B. Related Sections:

1. Division 03 - Cast-In-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
2. Division 07 - Firestopping: Product requirements for firestopping for placement by this section.
3. Division 08 - Access Doors and Frames: Product requirements for access doors for placement by this section.
4. Division 09 - Painting and Coating: Product and execution requirements for painting specified by this section.
5. Section 22 05 03 - Pipes and Tubes for Plumbing Piping and Equipment: Product and installation requirements for piping materials applying to various system types.
6. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment: Product requirements for motors for placement by this section.

7. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping: Execution requirements for pipe expansion devices for placement by this section.
8. Section 22 05 23 - General-Duty Valves for Plumbing Piping: Product requirements for valves for placement by this section.
9. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports and firestopping for placement by this section.
10. Section 22 05 48 - Noise and Vibration Controls for Plumbing Piping and Equipment: Product requirements for vibration isolators for placement by this section.
11. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Product requirements for pipe identification and valve tags for placement by this section.
12. Section 22 07 00 - Plumbing Insulation: Product and execution requirements for pipe insulation.
13. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections to equipment specified by this section.

## 1.02 REFERENCES

### A. American National Standards Institute:

1. ANSI Z21.22 - Relief Valves for Hot Water Supply Systems.

### B. American Society of Mechanical Engineers:

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
3. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
4. ASME B31.9 - Building Services Piping.
5. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
6. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.
7. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

### C. American Society of Sanitary Engineering:

1. ASSE 1010 - Performance Requirements for Water Hammer Arresters.

2. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.
  3. ASSE 1012 - Performance Requirements for Backflow Preventer with Intermediate Atmospheric Vent.
  4. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
  5. ASSE 1019 - Performance Requirements for Vacuum Breaker Wall Hydrants, Freeze Resistant, Automatic Draining Type.
  6. ASSE 5015 - Performance Requirements for Testing Double Check Backflow Prevention Assemblies (DC) and Double Check Fire Protection Backflow Prevention Assemblies (RPDF).
- D. ASTM International:
1. ASTM E1 - Standard Specification for ASTM Thermometers.
  2. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.
- E. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
- F. American Water Works Association:
1. AWWA C651 - Disinfecting Water Mains.
  2. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
  3. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
  4. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.
- G. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- H. Plumbing and Drainage Institute:
1. PDI WH201 - Water Hammer Arrester Standard.

### 1.03 SUBMITTALS

- A. Division 01 - Submittal Procedures: Submittal procedures.

- B. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
  2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
  3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
  4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
  5. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.04 CLOSEOUT SUBMITTALS

- A. Division 01 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of valves and equipment.
- C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

#### 1.05 QUALITY ASSURANCE

- A. For drinking water service, provide valves complying with NSF 61.
- B. Perform Work in accordance with IBC-NJ.

#### 1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and with service facilities within 50 miles of Project.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 - Product Requirements: Product storage and handling requirements.

- B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

#### 1.08 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 - Product Requirements.
- B. Do not install underground piping when bedding is wet or frozen.

#### 1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.10 WARRANTY

- A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five-year manufacturer warranty for domestic water piping.

#### 1.11 EXTRA MATERIALS

- A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two (2) loose keys for each building for outside hose bibs, hose end vacuum breakers for hose bibs, service kits and two (2) pump seals for each pump model.

### PART 2 - PRODUCTS

#### 2.01 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
  - 1. Ferrous Piping: Class 150, malleable iron, threaded.
  - 2. Copper Piping: Class 150, bronze unions with soldered joints.

3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
  2. Copper Piping: Class 150, slip-on bronze flanges.
  3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

## 2.02 PRESSURE GAGES

- A. Gage: ASME B40.1, UL 393 and UL 404 with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
1. Case: Steel.
  2. Bourdon Tube: Brass.
  3. Dial Size: 3-1/2 inch diameter.
  4. Mid-Scale Accuracy: Two percent.
  5. Scale: Psi.

## 2.03 PRESSURE GAGE TAPS

- A. Needle Valve: Brass, 1/4 inch NPT for minimum 300 psi.
- B. Ball Valve: Brass 1/4 inch NPT for 250 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.

## 2.04 STEM TYPE THERMOMETERS

- A. Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
1. Size: 7 inch scale.
  2. Window: Clear.
  3. Stem: Brass, 3/4 inch NPT long.
  4. Accuracy: ASTM E77 2 percent.
  5. Calibration: Degrees F.

## 2.05 RELIEF VALVES

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
  - 1. Aquatrol, Inc.
  - 2. Kunkel Valves
  - 3. Watts Manufacturing
  - 4. Substitutions: Division 01 - Product Requirements.
- B. Pressure Relief:
  - 1. ANSI Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- C. Temperature and Pressure Relief:
  - 1. ANSI Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME certified and labeled.

## 2.06 STRAINERS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
  - 1. Spence Engineering Co.
  - 2. Mueller Steam Specialty.
  - 3. Watts Manufacturing.
  - 4. Substitutions: Division 01 - Product Requirements.
- B. 2 inch and Smaller: Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. 3 inches to 4 inches: Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen.

## 2.07 HOSE BIBS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
  - 1. Wilkins
  - 2. Woodford
  - 3. Stern-Williams

4. Substitutions: Division 01 - Product Requirements.
- B. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with hand wheel lock shield and removable key, integral vacuum breaker in conformance with ASSE 1011.

## 2.08 WALL HYDRANTS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. Jay R. Smith
  2. Woodford
  3. Mifab.
  4. Substitutions: Division 01 - Product Requirements.
- B. Wall Hydrant: ASSE 1019; non-freeze, self-draining type with polished bronze lockable recessed box hose thread spout, locks shield and removable key, and integral vacuum breaker.

## 2.09 BACKFLOW PREVENTERS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. FEBCO
  2. Watts
  3. Wilkins
  4. Substitutions: Division 01 - Product Requirements.
- B. Reduced Pressure Backflow Preventers:
1. Comply with ASSE 1013.
  2. Bronze body, with bronze internal parts and stainless steel springs.
  3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.
- C. Double Check Valve Assemblies: Comply with ASSE ASSE 1015 or AWWA C510; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.



## 2.10 WATER HAMMER ARRESTORS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
  - 1. Jay R. Smith
  - 2. Zurn
  - 3. Sious Chief
  - 4. Substitutions: Division 01 - Product Requirements.
- B. ASSE 1010; copper construction, piston type sized in accordance with PDI WH-201.

## 2.11 THERMOSTATIC MIXING VALVES

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
  - 1. Leonard Valve
  - 2. Bradley
  - 3. Lawler
  - 4. Substitutions: Division 01 - Product Requirements.
- B. Valve: Bronze or cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment. Conform to ASSE 1070 to temper water to maximum 110 degrees F.
- C. Capacity: Listed on Drawings.
- D. Accessories:
  - 1. Check valve on inlets.
  - 2. Volume control shut-off valve on outlet.
  - 3. Stem thermometer on outlet.
  - 4. Strainer stop checks on inlets.

## 2.12 IN-LINE CIRCULATOR PUMPS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
  - 1. Grundfos

- 2. ITT Bell & Gossett
  - 3. PACO
  - 4. Substitutions: Division 01 - Product Requirements.
- B. Casing: Bronze rated for 125 psig working pressure with stainless steel rotor assembly.
  - C. Impeller: Bronze.
  - D. Shaft: Alloy steel with integral thrust collar and two, oil lubricated bronze sleeve bearings.
  - E. Seal: Carbon rotating against stationary ceramic seat.
  - F. Drive: Flexible coupling.
  - G. Performance: As indicated on Drawings
  - H. Electrical Characteristics and Components: As indicated on Drawings

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Verify excavations are to required grade, dry, and not over-excavated.

#### 3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.

#### 3.03 INSTALLATION - THERMOMETERS AND GAGES

- A. Install one pressure gage for each pump, locate taps before strainers and on suction and discharge of pump; pipe to gage.
- B. Install gage taps in piping.
- C. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage.
- D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.

- E. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- F. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- G. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

#### 3.04 INSTALLATION - ABOVE GROUND PIPING

- A. Install non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- C. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange systems to drain at low points.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.
- H. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Division 08.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 01.
- K. Install domestic water piping in accordance with ASME B31.9.
- L. Sleeve pipes passing through partitions, walls and floors. Refer to Section 22 05 29.
- M. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section 22 05 29.
- N. Install unions downstream of valves and at equipment or apparatus connections.
- O. Install valves with stems upright or horizontal, not inverted.

- P. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- Q. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- R. Install ball valves for throttling, bypass, or manual flow control services.
- S. Provide check valves on discharge of water pumps.
- T. Provide flow controls in water circulating systems as indicated on Drawings.
- U. Install potable water protection devices on plumbing lines where contamination of domestic water may occur.
- V. Pipe relief from valves, back-flow preventers and drains to nearest floor drain.
- W. Test backflow preventers in accordance with ASSE 5013 and 5015.
- X. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping.

### 3.05 INSTALLATION - PUMPS

- A. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- B. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump so no weight is carried on pump casings. Install pumps on vibration isolators. Refer to Section 22 05 48.
- C. Install flexible connectors at or near pumps where piping configuration does not absorb vibration. Refer to Section 22 05 48.
- D. Provide line sized shut-off valve and strainer on pump suction, and line sized combination pump discharge valve on pump discharge. Refer to Section 23 21 16.
- E. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump so no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 2 inches and larger.
- F. Provide air cock and drain connection on horizontal pump casings.
- G. Provide drains for bases and seals.
- H. Lubricate pumps before start-up.

### 3.06 FIELD QUALITY CONTROL

- A. Division 01 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test domestic water piping system in accordance with IBC-NJ, NSPC and Authorities Having Jurisdiction.

### 3.07 CLEANING

- A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.
- D. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. When final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

END OF SECTION