

## SECTION 15411 - WATER DISTRIBUTION PIPING

## PART 1 - GENERAL

## 1.1 DESCRIPTION OF WORK:

- A. This Section specifies the water distribution piping system, including potable cold, hot, and recirculated hot water piping, fittings, and specialties within the building to a point 5 feet outside the building.
- B. Products installed but not furnished under this Section include water meters which will be provided by the utility company, to the site, ready for installation. The following is the name and address of the utility company:

Denver and Willow Water

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- C. Related Sections: The following Sections contain requirements that relate to this section.
  - 1. Refer to Division 15 for below grade water service piping from public utility water main to building.
  - 2. Refer to Division 15 for trenching and backfilling materials and methods for underground piping installations.
  - 3. Refer to other Division 15 sections for piping materials; methods for sealing pipe penetrations through basement walls and fire and smoke barriers; thermometers, flow meters and pressure gauges; mechanical identification; plumbing pumps; and dielectric unions, strainers and pressure regulating valves.

## 1.2 DEFINITIONS:

- A. Water Distribution Piping: A pipe within the building or on the premises which conveys water from the water service pipe or meter to the points of usage.
- B. Water Service Piping: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.
- C. Pipe Sizes used in this Specification are Nominal Pipe Size (NPS).

## 1.3 SUBMITTALS:

- A. Refer to Division 1 and Basic Mechanical Requirements for administrative and procedural requirements for submittals.
- B. Provide data for each piping specialty and valve specified.
- C. Certification of Compliance with ASME and UL fabrication requirements.
- D. Test reports specified in Part 3 of this Section.
- E. Manufacturer and product data for lead free solder with material breakdown.

- F. Maintenance data for each piping specialty and valve specified for inclusion in operation and maintenance manual specified in Division 15.
- 1.4 QUALITY ASSURANCE:
- A. Regulatory Requirements: Comply with the provisions of the following:
    - 1. ASME B 31.9 "Building Services Piping" for materials, products and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
    - 2. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for Qualifications for Welding Processes and Operators.
    - 3. State Plumbing Code and Utility Department requirements.
    - 4. State cross connection control manual.
- 1.5 DELIVERY, STORAGE AND HANDLING:
- A. Store pipe in a manner to prevent sagging and bending.
  - B. Cap ends of piping when being stored.
- 1.6 SEQUENCING AND SCHEDULING:
- A. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 3.
  - B. Coordinate the installation of pipe sleeves for foundation wall penetrations.
- 1.7 EXTRA STOCK:
- A. Maintenance Stock: Furnish one valve key for each key operated wall hydrant, hose bibb, or faucet installed.

## PART 2 - PRODUCTS

- 2.1 MANUFACTURERS:
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1. Hose Bibbs and Faucets:
      - a. Chicago Faucet Co.
      - b. Nibco Inc.
      - c. Watts Regulator Co.
      - d. Crane
      - e. Woodford Mfg Co.
    - 2. Wall and Yard Hydrants:
      - a. Josam Mfg. Co.
      - b. Smith, (Jay R.) Mfg. Co.
      - c. Zurn

- d. Woodford Mfg. Co.
  - e. Wade
3. Hose Stations:
- a. Leonard
  - b. T & S Brass
  - c. Duco
4. Backflow Preventers:
- a. Febco Sales, Inc.; Subs. of Charles M. Bailey Co., Inc.
  - b. Wilkins
  - c. Watts Regulator Co.
  - d. Ames Company, Inc.
  - e. Conbraco
5. Water Meters:
- a. Badger Meter, Inc.
  - b. Hersey Products Inc.
  - c. Neptune Water Meter Co.; Subs. Neptune Intl.
  - d. Rockwell Intl.; Measurement and Flow Control Div.
  - e. Hays Division; Romac Ind.
6. Relief Valves:
- a. A.W. Cash Valve Mfg. Corp.
  - b. Watts Regulator Co.
  - c. Conbraco Industries, Inc.
  - d. Wilkins
7. Shock Arresters - Bellows Type:
- a. Josam
  - b. J.R. Smith Mfg. Co.
  - c. Wade
  - d. Zurn
8. Shock Arresters - Piston Type:
- a. Precision Plumbing Products
  - b. Sioux Chief
  - c. Watts Regulator
9. Water Tempering Valves
- a. Powers
  - b. Leonard
  - c. Rada
10. Pressure Reducing Valves:
- a. Watts Regulator Co.
  - b. Mueller

- c. Conbraco Industries, Inc.
- d. Wilkins

11. Vacuum Breakers For Hose Connections:

- a. Cash (A.W.) Valve Mfg. Corp.
- b. Conbraco Industries, Inc.
- c. Watts Regulator Co.

12. Domestic Hot Water Expansion Tanks

- a. Amtrol
- b. State Industries
- c. Taco

2.2 PIPE AND TUBE MATERIALS:

- A. General: Provide pipe material and pipe fittings complying with Division 15, Section 15055.

2.3 BASIC SUPPORTS AND ANCHORS:

- A. General: Provide supports and anchors complying with Division 15, Section 15140.

2.4 GENERAL DUTY VALVES:

- A. General: Provide valves complying with Division 15, Section 15100.

2.5 SPECIAL DUTY VALVES:

- A. Calibrated Balance Valve: Refer to Section 15135.

OR

- B. Balance Cocks: Ball valve complying with Section 15100, with memory stop device

2.6 PIPING SPECIALTIES:

- A. Shock Arresters - Bellows Type: Stainless steel casing and bellows, rated for 250 psi, 200 degrees F, tested and certified in accordance with PDI Standard WH-201.
- B. Shock Arrester - Piston Type: 60 psi precharge, sealed from system water with free sliding piston and EPDM O-rings. Suitable for up to 150 psi and 180 degrees F thread connections.
- C. Hose Bibbs

- 1. HB – 1 Unfinished Areas and Equipment Rooms: Rough bronze body, renewable composition disc, wheel handle, vacuum breaker, 3/4 inch NPT inlet, 3/4 inch hose outlet with vacuum breaker.

Woodford No. 24 or Y24

- 2. HB – 2 Finish Areas, Polished chrome plated bronze body, with renewable composition disc, tee handle, 3/4 inch NPT inlet, 3/4 inch hose outlet.

Chicago Faucet No. 952-293-6

## D. Wall Hydrants

1. WH-1 Exposed type non-freeze wall hydrant; all brass with polished bronze or nickel bronze face plate, "T" handle loose key, integral vacuum breaker, self draining body and shank, exposed 3/4inch male hose thread outlet, 3/4inch male or female thread inlet, renewable seat; shank length to extend thru primary exterior wall sufficient distance to prevent freezing.

Woodford Model 65

2. WH- 2 Flush with wall, non-freeze, box type, wall hydrant; all brass with polished bronze or nickel bronze box cover and frame, "T" handle loose key, key lock cover, integral vacuum breaker, self draining body and shank, 3/4 inch male hose thread outlet, 3/4 inch male or female I.P.S. thread inlet, renewable seat; shank length to extend thru primary exterior wall surface sufficient distance to prevent freezing.

Woodford Model B65

3. WH- 3 Residential type, exposed handle and hose thread, frost proof sill faucet; all brass, wheel handle, with self draining body vacuum breaker and shank; shank length to extend thru primary wall sufficient distance to prevent freezing.

Woodford Model 25

## E. Yard Hydrants

1. YH- 1 Flush with grade, non-freeze, vertical box type yard hydrant; all brass with polished bronze box cover and frame, "T" handle loose key, key lock cover, vandal proof vacuum breaker, 3/4inch male hose thread outlet, 3/4inch male or female I.P.S. thread inlet, self draining body and shank; top of box to bottom of shank length [inches]; see detail on mechanical plans.

Woodford Model Y95

## F. Hose Stations:

1. HS-1: Provide hot and cold water mixing hose stations exposed, complete with hose, nozzle, hose rack, valves, vacuum breaker, and anchoring. Mixing unit and hose rack to be polished chrome.

Leonard Model #SW-75-EVBD  
Hose Leonard Model 25HDH  
Nozzle Leonard Model N-2

## G. Backflow Preventers:

1. BFP- 1 (Vacuum Breaker, Atmospheric): Atmospheric type, all brass, angle pattern with disc float that closes the atmospheric vent for temperatures up to 210 degrees F.; full size orifice for maximum flow; female thread inlet and outlet; rough brass exterior finish; unit to be approved by National Sanitary Foundation.
  - a. Watts No. 288
2. BFP- 2 (Vacuum Breaker Pressure Type): Spill resistant design, suitable for indoor or outdoor installation, with vent seal diaphragm designed to seal air vent prior to opening

the check valve. Suitable for use with downstream valves. Provided with ball valve shut-offs and test cocks.

a. Watts Series 008QT

3. BFP- 3 (Double Check Assembly): Sizes 3/4inch through 2inches include two spring-loaded, Y-pattern bronze check valves, two bronze ball valves and four testcocks for field testing. All valves are threaded type and the unit is shipped completely assembled.

Sizes 2-1/2inches through 10inches include two spring loaded Y-pattern check valves with epoxy coated ductile iron bodies and bronze trim, two cast iron non-rising stem/OS&Y gate valves and four testcocks for field testing. Compact style, inlet flow vertical up, outlet flow vertical down or up as shown on drawings. All valves are flanged type and the unit is shipped completely assembled; unit to be approved by National Sanitary Foundation, U.S.C. Foundation for Cross Connection Control, A.S.S.E. State and or Local authorities.

a. No. 850 2-1/2inches through 10inches

4. BFP- 4 (Reduced pressure type): All bronze (3/4inch-2inch)/ductile iron (2-1/2inch – 10inches) body with two independently operating, spring loaded check valves and one differential relief valve with automatic intermediate atmospheric vent. Pressure in intermediate zone to activate relief valve when there is a 2 psig. differential between the zone and the upstream side of the first check valve. The relief valve shall remain open until a positive pressure differential is re-established. Assembly to be furnished with fullport, positive shut off non-rising stem, OS&Y isolation valves, in-line strainer, union connections, funnel, and all test cocks. Compact style, inlet flow vertical up, outlet flow vertical down or up. Assembly to have approval of National Sanitary Foundation, U.S.C. Foundation for Cross Connection Control, A.S.S.E. State and or Local Authorities.

a. No. 825Y 10inches

b. Sizes 2-1/2 inch through 10 inch compact style - Febco Model 880/880V.

5. BFP- 5 (Carbonated Water for Beverage Dispensing Equipment): Stainless steel body and parts, positive double check valve rated for 150 psi at 140 degrees F. Heavy duty rubber seats shall comply with FDA food additive regulations.

3/8inch - Watts Model No. 9BD.

#### H. Pressure Reducing Valves (Direct Acting)

1. PRV- 1 Low and Medium Capacity (15 to 120 GPM): All bronze pressure reducing valves, sensitive spring and diaphragm for accurate pressure control; manual adjustment for outlet pressure integral strainer, female thread connections. See detail on mechanical plans for size, capacity and piping arrangement.

Watts No. 223

2. PRV- 2 High Capacity (50 to 1800 GPM): Epoxy coated cast iron body pressure reducing/sustaining valve, stainless steel seats, sensitive spring and large Buna-N diaphragm area for accurate pressure control; pilot valve with manual adjustment for outlet water pressure; female thread connections for sizes up to 2-1/2inches and flanged connections for sizes 3inches and larger. Provide in-line inlet water strainer;

inlet and outlet valves and threaded or flanged connections for easy valve removal. See detail on mechanical plans for size, capacity and piping arrangement.

Watts 115-2A

I. Water Tempering Valves

1. WTV- 1 Pressure Equalizing with Thermometer: Concealed type, 3-port, all bronze, pressure balancing mixing valve with integral angle check stops, maximum temperature limit stop, stainless steel balancing piston, chrome plated finished wall plate with hot and cold water marking; [1/2inch][3/4inch] inlet and outlet pipe sizes and volume control. Unit to hold temperature steady and constant with pressure fluctuations up to 85 percent. Unit shall have integral or separate flush with wall, 3-color dial thermometer with scale from 70 degrees F to 130 degrees F and chrome plated trim ring for separate thermometer. Valve to deliver [ ] gpm.

Powers P414.

J. Thermostatic Mixing Valves

1. TMV-1: Exposed type, all bronze thermostatically controlled mixing valve with stainless steel piston, fail safe automatic shut-down if either hot or cold water pressure fails; union connection, rough chrome finish. Valve to deliver [ ] gpm at a pressure differential of [ ] psi; [ ] in. hot and cold water inlet pipe sizes, [ ] in. tempered water outlet pipe size.

Powers Series 430

K. Pressure/Temperature Relief Valves (PTRV):

1. Fully automatic, all bronze pressure/temperature relief valve with test lever and extension thermostatic element; temperature relief setting at 210 degrees F and pressure setting at 150 psig; valve to meet ASME Standards and comply with the latest AGA ratings. Relief opening to be piped to an indirect connection at nearest floor drain.

L. Domestic Water Filter - In-Line

1. "Filtrine" Model 10-DUP-TM Duplex Water Filter with type 304 stainless steel housing, F-13 activated carbon replaceable filter sheet, 1 inch inlet and outlet. Provide connections with dielectric unions, inlet and outlet valves and full size by-pass with valve.

2.7 WATER METER:

- A. General: Provide water meters with registration in gallons.
- B. Water Meter - 2 Inches and Smaller: Disc type conforming to AWWA C700.
- C. Water Meter - 3 Inches and Larger: Compound type, conforming to AWWA C702.

1. Remote Registration System: Utility company standards.

2.8 DOMESTIC HOT WATER EXPANSION TANKS:

- A. Fabricated steel designed and constructed in accordance with ASME Section VIII, Division I.
- B. Heavy duty removable Butyl bladder.
- C. Working pressure of [100][125][150] psig.

- D. Maximum operating temperature of 240 degrees F.
- E. Tank liner of FDA approved materials.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify all dimensions by field measurements. Verify that all water distribution piping may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
- B. Examine rough-in requirements for plumbing fixtures and other equipment having water connections to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PIPING INSTALLATION:

- A. Refer to Section 15055, "Basic Piping Materials and Methods" for installation of piping.
- B. Install backflow preventers on plumbing lines where contamination of domestic water may occur and on boiler make-up lines, hose bibbs and flush valves.
- C. Install pressure reducing valves to limit maximum static pressure at plumbing fixtures to 65 [ ] psig.
- D. Install water hammer arresters in domestic water piping system on each set of flush valves and where hydrostatic shock pressures could occur.
- E. Yard hydrants to be installed as shown in detail on mechanical plans.

#### 3.3 HANGERS AND SUPPORTS:

- A. Refer to Section 15140, "Supports and Anchors" for supports and anchors.

#### 3.4 PIPE AND TUBE JOINT CONSTRUCTION:

- A. Refer to Section 15055, "Basic Piping Materials and Methods" for pipe joints.

#### 3.5 SERVICE ENTRANCE:

- A. Extend water distribution piping to connect to water service piping, of size and in location indicated for service entrance to building.
- B. Install sleeve and mechanical sleeve seal at penetrations through foundation wall for watertight installation as detailed on mechanical drawings.
- C. Install shutoff valve at service entrance inside building; complete with strainer, pressure gauge, and test tee with valve.
- D. Ductile-Iron Pipe: Install in accordance with AWWA C-60.
- E. Provide thrust blocks on underground water piping at each change in direction and where shown on the drawings.

- F. Coordinate foundation and all other structural penetrations with structural engineer.
- 3.6 INSTALLATION OF WATER METER:
- A. Install water meter in accordance with utility company's installation instructions and requirements.
  - B. Set meter on concrete pad as indicated. Refer to Division 3 for concrete, formwork, and reinforcing requirements.
  - C. Mount meter on wall brackets as indicated.
  - D. Size meter and arrange piping and specialties to comply with utility company's requirements.
- 3.7 ROUGH-IN FOR WATER METER:
- A. Install rough-in piping and specialties for water meter installation in accordance with utility company's instructions and requirements.
- 3.8 VALVE APPLICATIONS:
- A. General Duty Valve Applications: The drawings indicate valve types to be used. Where specific valve types are not indicated the following requirements apply:
    - 1. Shut-off duty: Use ball, and butterfly valves.
    - 2. Throttling duty: Use globe, ball, and butterfly valves.
- 3.9 INSTALLATION OF VALVES:
- A. Sectional Valves: Install sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more plumbing fixtures or equipment connections, and elsewhere as indicated. For sectional valves 2inch and smaller, use ball valves; for sectional valves 2-1/2inch and larger, use butterfly valves.
  - B. Shutoff Valves: Install shutoff valves on inlet of each plumbing equipment item and on inlet of each plumbing fixture, and elsewhere as indicated. For shutoff valves 2inch and smaller, use ball valves; for shutoff valves 2- 1/2inch and larger, use gate or butterfly valves.
  - C. Drain Valves: Install drain valves on each plumbing equipment item, located to completely drain equipment for service or repair. Install drain valves at the base of each riser, at low points of horizontal runs, and elsewhere as required to completely drain distribution piping system. For drain valves 2inch and smaller, use ball valves; for drain valves 2-1/2inch and larger, use butterfly valves.
  - D. Check Valves: Install non-slam spring loaded check valves on discharge side of each pump, and elsewhere as indicated. See 15100 for valve application.
  - E. Balance Cocks: Install in each hot water recirculating loop, discharge side of each pump, and elsewhere as indicated.
  - F. Hose Bibbs: Install on exposed piping where indicated, with vacuum breaker.
  - G. Wall Hydrants: Install where indicated with vacuum breaker.

3.10 INSTALLATION OF PIPING SPECIALTIES:

- A. Install backflow preventers at each connection to mechanical equipment and systems, and in compliance with the plumbing code and authority having jurisdiction. Locate in same room as equipment being connected. Pipe relief outlet thru air gap and without valves, to nearest floor drain.
- B. Install pressure regulating valves with inlet and outlet shutoff valves, and balance cock bypass. Install pressure gauge on valve outlet.
- C. Install shock arresters in locations shown on drawings and at all water connections to equipment with quick closing valves, including, but not limited to: dishwashers, disposals, clothes washers, ice makers, auto claves, pre-rinse spray hose, etc. Provide isolation valve. Install in accessible location. Provide access doors in accordance with architectural recommendations.
  - 1. Units shall be sized in accordance with the following schedule.

Drawing Designation	Fixture Unit Rating	P.D.I. Size
SA-1	1-11	A
SA-2	12-32	B
SA-3	33-60	C
SA-4	61-113	D
SA-5	114-154	E
SA-6	155-330	F

3.11 INSTALLATION OF DOMESTIC HOT WATER EXPANSION TANKS:

- A. Install expansion tanks in compliance with the plumbing code and the authority having jurisdiction.
- B. Locate tanks in the same room as the water heaters on storage tanks on the cold water supply line as close to the water heater or storage tank as possible. Installation is to be between the water heater or storage tank and backflow preventer, check valve, pressure reducing valve and/or meter.
- C. Provide independent support for in-line mounted tanks.
- D. Precharge tank to minimum static water pressure at the tank location.

## 3.12 EQUIPMENT CONNECTIONS:

- A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Plumbing Code.
- B. Mechanical Equipment Connections: Connect hot and cold water piping system to mechanical equipment as indicated. Provide shutoff valve and union for each connection, provide drain valve on drain connection. Provide back-flow preventor as shown as required. For connections 2-1/2inch and larger, use flanges instead of unions.

## 3.13 FIELD QUALITY CONTROL:

- A. Inspections: Inspect water distribution piping as follows:
  - 1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction.
  - 2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 48 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
    - a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
    - b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
  - 3. Reinspections: Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for reinspection by the plumbing official.
  - 4. Reports: Prepare inspection reports, signed by the plumbing official.
- B. Test water distribution piping as follows:
  - 1. Refer to Section 15055 "Basic Piping Materials and Methods" for pipe test.

## 3.14 ADJUSTING AND CLEANING:

- A. Clean and disinfect water distribution piping as follows:
  - 1. Purge all new water distribution piping systems and parts of existing systems, which have been altered, extended, or repaired prior to use.
  - 2. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction, or in case a method is not prescribed by that authority, the procedure described in either AWWA C651, or AWWA C652, or as described below:
    - a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
    - b. Fill the system or part thereof, with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system, or part thereof, and allow to stand for 24 hours.

- c. Drain the system, or part thereof, of the previous solution, and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.
  - d. Following the allowed standing time, flush the system with clean potable water until chlorine does not remain in the water coming from the system.
  - e. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.
- B. Prepare reports for all purging and disinfecting activities.
- 3.15 COMMISSIONING:
- A. Fill the system.
  - B. Check compression tanks to determine that they are not air bound and that the system is completely full of water.
  - C. Before operating the system perform these steps:
    - 1. Open valves to full open position. Close drain, valves, hydrants, and sill cocks.
    - 2. Remove and clean strainers.
    - 3. Check pump for proper direction of rotation. Correct improper wiring.
    - 4. Lubricate pump motors and bearings.
  - D. Provide certification reports for backflow prevention devices to appropriate jurisdiction and LPS upon completion certification.

END OF SECTION 15411