SECTION 22 11 00 - FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section Includes:

1. Domestic water piping, within 5 feet of building.
2. Domestic water piping, above grade.
3. Pressure gages.
4. Pressure gage taps.
5. Thermometers.
6. Flow control valves.
7. Water pressure reducing valves.
8. Relief valves.
9. Strainers.
10. Hose bibbs.
11. Hydrants.
12. Wall box outlet.
13. Backflow preventers.
14. Water hammer arrestors.
15. Thermostatic mixing valves.
16. Pressure balanced mixing valves.

1.2 REFERENCES

A. Comply with appropriate standards.

1. American Water Works Association: AWWA
2. Underwriters Laboratories Inc.: U.L.

1.3 SUBMITTALS

A. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
2. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

B. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 WARRANTY

A. Furnish one-year minimum warranty.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Tubing: ASTM B88, Type K, hard drawn.

1. Fittings: ASME B16.18, cast copper alloy ASME B16.22, wrought copper and bronze Annex G NSF/ANSI 61.

2. Joints:
   a. Soldered – ASTM B32 E & HB lead-free allow, with water soluble flux per ASTM B-13.
   b. Press-connect Fittings: Bronze or copper shall conform to the material requirements of ASME B16.18 or ASME B16.22, and the performance requirements of IAPMO PS117, and ICC/ANSI LC1002 and NSF/ANSI 61-pw (if used in a potable water system.) Press-connect fittings ½-inch thru 4-inch for use with ASTM B88 copper tube shall have an EPDM sealing element, and an un-pressed fitting, leak identification feature. 2-1/2-inch thru 4-inch shall have a 420 stainless steel grip ring, PBT separator ring, and EPDM sealing element. Sealing elements shall be verified for the intended use. Contractor shall be trained by a factory authorized representative and provide verification of training to the LAWA Inspector.

B. Copper Tubing: ASTM B88 Type L, annealed soft copper, to trap primers – fittings and joints not allowed.

C. Ductile-Iron Pipe And Fittings

1. Mechanical-Joint, Thickness Class 54, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
   a. Standard-Pattern, Mechanical-Joint Fittings: AWWA C110, ductile or gray iron.
   b. Compact-Pattern, Mechanical-Joint Fittings: AWWA C153, ductile iron.
      (1) Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L hard drawn.

1. Fittings: ASME B16.18, cast copper alloy ASME B16.22, wrought copper and bronze Annex G NSF/ANSI 61.

2. Joints:
   a. Soldered – ASTM B32 E & HB lead-free allow, with water soluble flux per ASTM B-13.
   b. Press-connect Fittings: Bronze or copper shall conform to the material requirements of ASME B16.18 or ASME B16.22, and the performance requirements of IAPMO PS117, and ICC/ANSI LC1002 and NSF/ANSI 61-pw (if used in a potable water system.) Press-connect fittings ½-inch thru 4-inch for use with ASTM B88 copper tube shall have an EPDM sealing element, and an un-pressed fitting, leak identification feature. 2-1/2-inch thru 4-inch shall have a 420 stainless steel grip ring, PBT separator ring, and EPDM sealing element. Sealing elements shall be verified for the intended use. Contractor shall be trained by a factory authorized representative and provide verification of training to the LAWA Inspector.

B. Copper Tubing: ASTM B88, Type L, rolled grooved ends.

1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22 wrought copper and bronze, grooved ends.

2. Joints: Grooved mechanical couplings meeting ASTM F1476.
   a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
   b. Gasket: Elastomer composition for operating temperature range to 200 degrees F.
   c. Accessories: Stainless steel bolts, nuts, and washers.

2.3 PIPE JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 CORROSION PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:

1. Standards: ASTM A 674 or AWWA C105.

2. Form: Sheet or tube.

3. Material: LLDPE film of 0.008-inch minimum thickness.

4. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, cross-laminated PE film of 0.004-inch minimum thickness.

5. Material: High-density, cross-laminated PE film of 0.004-inch minimum thickness.
6. Color: Black.

2.5 WATER METERS

A. Displacement-Type Water Meters:

1. Manufacturers:
   - **a. Badger Meter, Inc.**
   - **b. Neptune Technology Group, Inc.**
   - **c. Sensus.**
2. Description:
   - a. Standard: AWWA C700, and C710 Standards.
   - b. Pressure Rating: 150 psig working pressure.
   - c. Temperature Rating: -40° to + 150° F.
   - d. Registration: In gallons or cubic feet as required by LAWA.
   - e. Case: Bronze.
   - f. End Connections: Threaded.
   - g. Remote read per AWWA Standard C706.
3. Magnetic drive, type meter with 150 psig bronze body, lined cast iron frost proof body, threaded ends, internal strainer, wheel encoder register and receptacle.

B. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly capable of being connected to CUP FMCS.

C. 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 LAWA.

2.6 UNIONS AND FLANGES

A. Unions for Pipe 2-1/2 inches and Smaller:

1. Ferrous Piping: Class 150, malleable iron, threaded.
2. Copper Piping: Class 150, bronze unions with brazed joints.
3. Dissimilar Materials: Brass ball valve and 6 inch long Brass nipple.

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.
4. Dissimilar Materials: Brass ball valve and 6 inch long Brass nipple.

2.7 PRESSURE GAGES

A. Manufacturers:

1. AMETEK, Inc.
2. H.O. Trerice Co.
3. Weiss Instruments.

B. Gage: ASME B40.1, with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.

1. Case: Cast aluminum.
2. Bourdon Tube: Copper plated brass.
3. Dial Size: 6 inch diameter.

2.8 PRESSURE GAGE TAPS

A. Manufacturers:

1. AMETEK, Inc.
2. H.O. Trerice Co.
3. Weiss Instruments.

2.9 ESCUTCHEONS

A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.

B. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.

C. One Piece, Deep Pattern: Deep-drawn, box-shaped brass with chrome-plated finish.

D. One Piece, Stamped Steel: Chrome-plated finish with setscrew.

E. Split Casting, Cast Brass: Polished, chrome-plated finish with concealed hinge and setscrew.

F. Split Plate, Stamped Steel: Chrome-plated finish with concealed hinge.

G. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

H. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.10 WALL PENETRATION SYSTEMS

A. Manufacturer:

1. SIGMA Corporation.

2. Or approved equal.

B. Description: Wall-sleeve assembly, consisting of housing and gland, gaskets, and pipe sleeve.

1. Carrier-Pipe Deflection: Up to 5 percent without leakage.
2. Housing: Ductile-iron casting with hub, waterstop, anchor ring, and locking devices. Include gland, bolts, and nuts.
3. Housing-to-Sleeve Gasket: EPDM rubber.
4. Housing-to-Carrier-Pipe Gasket: AWWA C111, EPDM rubber.
5. Pipe Sleeve: AWWA C151, ductile-iron pipe or ASTM A53 / A53M, Schedule 40, zinc-coated steel pipe.

2.11 STEM TYPE THERMOMETERS

A. Manufacturers:

1. Ashcroft Inc.

2. H.O. Trerice Co.

3. Weiss Instruments.

B. Thermometer: ASTM E1, red appearing mercury, lens front tube, cast aluminum case with enamel finish.

1. Size: 6” scale.
2. Window: Clear glass.
3. Stem: Copper plated brass, 3/4 inch NPT, 3-1/2 inch long.
4. Accuracy: ASTM E77. Plus or minus 1 percent to 1.5 max of range.
5. Calibration: Degrees F.

2.12 FLOW CONTROL VALVES

A. Manufacturers:

1. Bell & Gossett / Xylem Inc.

2. Griswold Controls.

3. FLOCON / Precision Instruments Company.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, combination blow-down or back-flush drain.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 5 psi.

2.13 WATER PRESSURE REDUCING VALVES

A. Manufacturers:

1. **Zurn-Wilkins / Zurn Industries, LLC / Rexnord Corporation.**
2. **Conbraco Industries / Apollo Valves / Aalberts Industries N.V.**
3. **Watts Water Technologies Company.**

B. 2 inches and Smaller: MSS SP 80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded and single union double union ends.

C. 2 inches and Larger: MSS SP 85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.14 TEST PLUGS

A. Manufacturers:

1. **Petersen Products Company.**
2. **Sisco Manufacturing Company, Inc.**
3. **Watts Water Technologies Company.**

B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.

C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

D. Core Inserts: One or two self-sealing rubber valves.

1. Insert material for water service at 20 to 200 deg F shall be CR.
2. Insert material for water service at minus 30 to plus 275 deg F shall be EPDM.

E. Test Kit: Furnish two test kit(s) containing one pressure gage and adaptor, two thermometer(s), and carrying case. Pressure gage, adapter probes, and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping.

1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be 0 to 200 psig.
2. High-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F.
3. Carrying case shall have formed instrument padding.

2.15 VACUUM BREAKERS

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

1. Manufacturers:

a. **Watts Water Technologies Company.**

b. **Zurn Indistries, LLC / Rexnord Corporation.**

c. Conbraco / Apollo Valves / Aalberts Industries, N.V.

2. Standard: ASSE 1001.
3. Equal to Watts No. 288A.

B. Hose-Connection Vacuum Breakers:

1. Manufacturers:
   a. Watts Water Technologies Company.
   b. Zurn Indistries, LLC / Rexnord Corporation.
   c. Conbraco / Apollo Valves / Aalberts Industries, N.V.
2. Standard: ASSE 1011.
3. Equal to Watts No. NF8 or No. 8A.

C. Pressure Vacuum Breakers:

1. Manufacturers:
   a. Watts Water Technologies Company.
   b. Zurn Indistries, LLC / Rexnord Corporation.
   c. Conbraco / Apollo Valves / Aalberts Industries, N.V.
2. Standard: ASSE 1020.
3. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.

D. Spill-Resistant Vacuum Breakers:

1. Manufacturers:
   a. Watts Water Technologies Company.
   b. Zurn Indistries, LLC / Rexnord Corporation.
   c. Conbraco / Apollo Valves / Aalberts Industries, N.V.
2. Standard: ASSE 1056.
3. Operation: Continuous-pressure applications.
4. Accessories:
   a. Valves: Ball type, on inlet and outlet.

2.16 RELIEF VALVES

A. Manufacturers:

1. Conbraco / Apollo Valves / Aalberts Industries, N.V.
2. Watts Water Technologies Company.
3. Zurn-Wilkins / Zurn Industries, LLC / Rexnord Corporation.

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.

2.17 STRAINERS

A. Manufacturers:

1. Conbraco / Apollo Valves / Aalberts Industries, N.V.

2. Watts Water Technologies Company.

3. Zurn-Wilkins / Zurn Industries, LLC / Rexnord Corporation.

B. 2 inch and Smaller: Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

C. 3 inch and Larger: Class 125, flanged iron body, basket pattern with type 304 1/8 inch stainless steel perforated screen.

2.18 HOSE BIBBS

A. Manufacturers:

1. Acorn Engineering Company, Inc. / Morris Group International.

2. MIFAB, Inc.

3. Jay R. Smith Mfg. Co. / Morris Group International.

B. Rough-Bronze body with integral wall flange, threaded or soldered end, replaceable disc, hose thread spout, with lock shield and removable key integral and non-removable vacuum breaker in conformance with ASSE 1011.

C. Provide rough-chrome or polished chrome finish as required.

2.19 HYDRANTS

A. Manufacturers:

1. Acorn Engineering Company, Inc. / Morris Group International.

2. MIFAB, Inc.

3. Zurn Industries, LLC / Rexnord Corporation.

B. Wall Hydrant: ASSE 1019; non-freeze, self-draining type with chrome plated, or polished bronze; wall plate lockable recessed box hose thread spout, hand wheel lock shield and removable key, and integral non-removable vacuum breaker.

C. Floor Hydrant: ASSE 1019; chrome plated polished bronze; lockable recessed box, hose thread spout, lock shield and removable key, or non-removable vacuum breaker.

2.20 RECESSED VALVE BOX

A. Manufacturers:

1. IPS Corporation.

2. Sioux Chief Manufacturing Company.

3. Or approved equal.

B. Washing Machine: Water tight recessed plastic, preformed rough-in box, ½" copper connections with chrome ¼ turn ball valves; integral water hammer arrestors; 2" center drain outlet.

C. Refrigerator: Plastic water-tight recessed plastic, preformed rough-in box, ½" copper connection with chrome ¼ turn ball valve preformed rough-in box with brass valves with wheel handle slip finishing cover.

2.21 BACKFLOW PREVENTERS

A. Manufacturers:

1. Conbraco / Apollo Valves / Aalberts Industries, N.V.

2. Watts Water Technologies Company.

3. Zurn-Wilkins / Zurn Industries, LLC / Rexnord Corporation.

B. Reduced Pressure Principle Backflow Preventers:

1. Comply with ASSE 1013 for continuous pressure operations.
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; integral 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.

2.22 WATER HAMMER ARRESTORS

A. Manufacturers:

1. **MIFAB, Inc.**
2. **Watts Water Technologies Company.**
3. **Zurn-Wilkins / Zurn Industries, LLC / Rexnord Corporation**.

B. ASSE 1010; copper construction, bellows or piston type sized in accordance with PDI WH-201.

C. Pre-charged suitable for 35 to 100 degrees temperature range, working pressure.

D. Provide distribution box as required.

2.23 THERMOSTATIC MIXING VALVES

A. Manufacturers:

1. **Watts Water Technologies Company.**
2. **Zurn Industries, LLC / Rexnord Corporation**
3. **Symmons Industries, Inc.**

B. Master Mixing Valves

1. Bronze body and cap with replaceable corrosion-resistant stainless steel piston and liner.
2. Factory assembly shall include: Check stops, thermometer removable strainers, inlet and outlet ball-type shut-off valves.
3. Provide recessed or surface mounted cabinet, stainless steel or white enamel.
4. Hi-low or standard type valve assembly shall comply with ASSE 1017, U.P.C. and C.S.A. for 125 PSI maximum operating pressure, 200 degrees maximum inlet temperature, for 5 G.P.M. minimum flow.

C. Point-of-Use Mixing Valves

1. For lavatory or sink faucets – 0.5 G.P.M. minimum flow capacity.
2. Integral adjustable set-point and in-line check stops.
3. 105 degree maximum outlet temperature.

2.24 PRESSURE BALANCED MIXING VALVES

A. Manufacturers:

1. **Symmons Industries, Inc.**
2. **Watts Water Technologies Company.**
3. **Zurn Industries, LLC / Rexnord Corporation.**

B. Valve: Chrome plated cast brass body, stainless steel cylinder and integral temperature adjustment.

C. Accessories:

1. Volume control shut-off valve on outlet.
2. Stem thermometer on outlet.
3. Strainer stop checks on inlets.

D. Provide recessed or surface mounted cabinet, stainless steel or white enamel, as required.

2.25 WATER FILTERS

A. In-line cold water filter for up to 1.3 GPM capable of removing dirt/rust, odor and scale.

1. Manufacturer:
   - **a. Everpure / Pentair Inc.**
   - **b. Or approved equal.**

B. On cold water lines for the following:

1. Coffee makers.
2. Electric water coolers.
3. Refrigerators.
4. Ice makers.

2.26 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Inlet: Threaded or solder joint.
5. Outlet: Threaded, short nipple with garden-hose threads complying with ASME B1.20.7.

2.27 TRAP SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Manufacturers:
   - a. **Precision Plumbing Products (PPP) Inc.** Solo Prime for single traps.
   - b. **Precision Plumbing Products (PPP) Inc.** Mini Prime for up to four traps.
   - **c. Or approved equal.**
2. Standard: ASSE 1044,
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.

4. Cabinet: Recessed-mounting steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
6. Vacuum Breaker: ASSE 1001.
7. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 INSTALLATION - ABOVE GROUND PIPING

A. Install Brass Ball Valve and 6" brass nipple connections wherever joining dissimilar metals.

3.2 INSTALLATION - SERVICE CONNECTIONS

A. Provide new water service complete with approved reduced pressure double check back-flow preventer and water meter with by-pass valves pressure reducing valve, and strainer as required.

B. Provide sleeve in wall for service main and support at wall with reinforced-concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

C. Provide 18 gauge galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

3.3 INSTALLATION – PRESS-CONNECT FITTINGS

A. Press-connect Fittings: Pipe ends shall be cut on a right angle (square) to the pipe. Pipe ends shall be reamed and chamfered, all grease, oil or dirt shall be removed from the pipe end with a clean rag. Visually examine the fitting sealing element to insure there is no damage and it is properly seated into the fitting. Insert pipe fully into the fitting. Make a mark with a felt tip pen on the pipe at the face of the fitting. Always examine the tube to insure it is fully inserted into the fitting prior to pressing the joint. Fittings shall be installed according to the most current edition of the manufacturer's installation guidelines using manufacturer recommended tools. Sealing elements shall be verified for the intended use.

END OF SECTION 22 11 00