

SECTION 22 11 00

FACILITY WATER DISTRIBUTION

PART 1 - DESIGN DIRECTIVES

1.1 DESIGN CRITERIA

- A. The designer is responsible for contacting the Hanover Water Works Co. (603/643-3439) to obtain the latest regulations regarding connection to the Town services. Typically, in buildings with automatic fire sprinklers, the domestic water tap shall be taken from within the building after it enters the building prior to the fire alarm check valve.
- B. The designer shall confirm with the Water Company the appropriate backflow to specify. The RPZ preventer shall be used in high hazard applications, the double check valve in ordinary and low hazard applications. The standards include the current preferred backflow preventers.
 - 1. Science buildings shall be equipped with two full size backflow preventers piped in parallel.
 - 2. In buildings requiring a backflow preventer larger than 2", provide two (or more) smaller backflow preventers. This provides limited operation of the building while a backflow is being serviced.
- C. Bypass piping around water meters is not allowed except in extenuating circumstances where water flow to the building cannot be interrupted. The designer will confer with the Water Company & FO&M to determine such needs and, if allowed, will confirm in writing and include a detail of the water Company's requirement.
- D. The designer will confer with the Water Company to determine the water meter size and indicate on the drawings. The meter shall be supplied by the Water Company and installed by the plumbing contractor.
- E. The order of the water entrance components shall be, in the direction of flow, as follows:
 - 1. Water meter
 - 2. Backflow preventer
- F. The designer is responsible for sizing the static balancing valves located on the recirculating hot water loop. Refer to DC Standards 15010, BASIC MECHANICAL REQUIREMENTS, for further design criteria. Static balancing valves used in recirculating hot water systems may be the ball type valve, see DC Standards 15010, VALVES.
- G. Provide an interior wall hydrant (cold water) over all service sinks (48" AFF) for use with the chemical cleaning dispenser.
- H. Provide a mixing interior wall hydrant in all areas with multiple showers. The wall hydrant shall be located under a sink and accessible for connecting a hose.
- I. The designer shall include riser diagrams or isometric drawings for all distribution systems.
- J. Provide mixing valves at all emergency eyewashes and emergency showers per ANSI standard Z358.1.

- K. Provide at least one exterior wall hydrant on the four major sides of the building, maximum 100' o/c.
- L. Provide water filters on the cold-water supply to all ice machines and independent RO or DI water systems.
- M. Refer to DC Standards 15010 Basic Mechanical Requirements, for design criteria regarding domestic water mixing valves and recirculation pumps.
- N. All domestic hot water systems shall be equipped with expansion tanks to compensate for thermal expansion.
- O. Refer to DC Standards 23 05 10 Basic Mechanical Requirements for requirements regarding domestic water recirculation pumps.

1.2 SUBMITTALS

- A. Provide calculations, per PDI standard practices, of all water hammer arresters, clearly indicating locations of all fixtures served & arrester locations.
- B. Maintenance data for each piping specialty and valve specified for inclusion in Maintenance Manual specified in Division 1 and Division 23 Section - "Basic Mechanical Requirements."

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store pipe in a manner to prevent sagging and bending. Pipe is to be kept dry and out of the elements, with pipe ends protected from damage and covered to prohibit foreign particles from entering.

PART 2 - PRODUCTS

2.1 PIPE, FITTINGS, AND JOINT MATERIALS

- A. Pipe and Tube: Refer to Part 3, Article, "PIPE APPLICATIONS," for identification of systems where the below materials are used.
- B. Annealed Temper Copper Tubing:

ITEM	SIZE	ASTM SPEC NO.	MATERIAL WEIGHT & TYPE
Pipe	≤4"	B88 copper	Type L or K, drawn
Fittings	≤4"	Wrought copper or cast bronze	ANSI B16.22 & B16.18
Bolts	Per flange standard	A193, grade B7 carbon steel	Hex head (ANSI B18.2.1), B1.1, class 2A course thread
Nuts	Per flange standard	A194, Grade 2H, Carbon steel	Heavy hex (ANSI B18.2.2), B1.1, class 2B course thread
Gaskets	Per flange standard	1/16" Compound fiber	

2.2 GATE VALVES

- A. Acceptable Manufacturers

1. Apollo
 2. Watts
 3. Crane
 4. Stockham
- B. Over 2-Inches: Lead free bronze body and trim, non-rising stem, handwheel, single wedge 200psi W.O.G. rating, flanged ends.
- C. Valves shall have stem extensions suitable to allow for insulation of the valve body to the thickness of adjoining pipe without interfering with valve wheel operations.

2.3 BALL VALVES

- A. Acceptable Manufacturers
1. Apollo
 2. Nibco
 3. Stockham
 4. Watts
 5. Viega
- B. Up to and including 3-Inches: Lead-free, bronze two-piece body, 600 psi WOG/125 psi WSP, stainless steel plated ball and stem. PTFE seats and stuffing box ring, lever handle, and soldered or threaded ends to suit piping which valve will be installed in.
- C. Valves shall have stem extensions suitable to allow for insulation of the valve body to the thickness of adjoining pipe without interfering with valve wheel operations.

2.4 BALANCING VALVES

- A. Acceptable Manufacturers
1. Bell & Gossett
 2. Armstrong
 3. Taco
 4. Watts
 5. Tour & Anderson
- B. Valves 3-inches and smaller shall be of lead-free bronze construction. All valves shall have differential pressure read-out ports across valve seat area. Read-out ports shall have internal EPT inserts and check valves. Balancing valves shall have memory stop feature to allow valve to be closed for service and reopened to set point without disturbing balance position. Balancing shall provide bubble-tight shutoff at 125 psig and shall have a maximum temperature rating of 250 deg. F. Valves shall have calibrated dial with graduated markings to allow for flow adjustment to design conditions. All balancing valves shall be similar and equal to Bell & Gossett Model CB and shall be lead-free and approved for domestic water.

2.5 SWING CHECK VALVES

- A. Acceptable Manufacturers
1. Stockham
 2. Grinnell
 3. Crane

4. Watts

- B. Up to and including 2-Inches: Bronze swing disc, 200 psi W.O.G. solder or screwed ends.
- C. Over 2-Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.

2.6 STRAINERS

A. Acceptable Manufacturers

- 1. Watts
- 2. Sarco
- 3. Mueller

- B. Size 2-inch and Under: Screwed brass or iron body for 125 psi WSP/200 W.O.G., "Y" pattern with 1/32-inch stainless steel perforated screen.

- C. Sizes 2½-inch and Larger: Flanged iron body rated for 175 psig working pressure, "Y" pattern with 1/16-inch stainless steel perforated screen.

- D. Lead-free and approved for potable water.

2.7 SPECIAL DUTY VALVES

- A. Interior wall hydrants shall be bronze or brass construction, chrome plated, with integral vacuum breaker, 3/4" threaded inlet connection, 3/4" hose connection.

- 1. Chicago #952
- 2. T&S #B720

- B. Mixing wall hydrants shall be bronze or brass construction, chrome plated, with integral vacuum breaker, check & stop, and 3/4" hose connection.

- 1. Chicago #305-VB-RC

- C. Exterior wall hydrants shall be key operated, exposed, non-freeze, anti-siphon, automatic draining, with integral backflow preventer, 3/4" hose connection.

- 1. Josam Co. - #71050 series
- 2. Woodford Mfg. Co. - #65 series
- 3. Zurn Industries Inc., Hydromechanics Div. - #Z-1310

2.8 PIPING SPECIALTIES

- A. Water Hammer Arresters: Bellows type, with stainless steel casing and bellows, pressure rated for 125 psi, tested and certified in accordance with PDI Standard WH-201.

- 1. Josam Co. - #75000 series
- 2. J. R. Smith Mfg. Co. – Hydrotrol, #5000 series
- 3. Watts Regulator Co. - #15 series
- 4. Zurn Industries, Inc.; Hydromechanics Div. - #Z-1700 Shoktrol series

- B. Vacuum Breakers: Atmospheric type shall conform to ASSE Standard 1001, silicone disc, rough brass finish, for use in low hazard connections.

1. Conbraco - #38-100 series
 2. Watts Regulator Co. - #288A series
 3. Zurn Industries, Inc., Wilkins Regulator Div. - #30
- C. Backflow Preventers (service line):
1. Reduced pressure zone (RPZ) principle assembly consisting of shutoff valves on inlet and outlet and strainer on inlet. Assemblies shall include test cocks and pressure differential relief valve located between 2 positive seating check valves and comply with requirements of ASSE Standard 1013. Provide an air gap drain funnel at the pressure differential relief valve. Manufacturer shall be Watts Regulator Co. – #909 series.
 2. Double check valve assembly consisting of shutoff valves on the inlet and outlet and a strainer on the inlet. The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. Seats and discs shall be replaceable. Include four top mounted resilient seated test cocks and comply with the requirements of ASSE standard 1015. Manufacturer shall be Watts 007 series.
- D. Backflow Preventers (equipment isolation): Continuous pressure double check valve style with intermediate atmospheric vent protecting against both back siphonage and back pressure in low hazard applications. Comply with requirements of ASSE Standard 1024. Manufacturer shall be
1. Watts Regulator Co. – #9DM series
- E. Pressure Reducing Valves: Diaphragm operated, cast iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut down, and non-corrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory- set at operating pressure and have the capability for field adjustment.
1. Armstrong Pumps, Inc. - RD-40
 2. Bell and Gossett - FB-38
 3. Taco, Inc. - #335
- F. Pressure-Regulating Valves: Single-seated, direct-operated type, having bronze body with integral strainer and complying with requirements of ASSE Standard 1003.
1. Watts Regulator Co. - #N35B series
 2. Zurn Industries Inc., Wilkins Regulator Div. - #70 series
- G. Relief Valves: Sizes for relief valves shall be in accordance with ASME Boiler and Pressure Vessel Codes for indicated capacity of the appliance for which installed.
1. Conbraco
 2. Watts Regulator Co.
 3. Zurn Industries, Inc. Wilkins Regulator Div.
- H. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Temperature relief valves shall be factory set at 210°F, and pressure relief at 150 psi.
1. Watts Regulator Co. - #40XL
 2. Zurn Industries, Inc., Wilkins Regulator Div., #TP series

- I. Special hot or cold-water faucet, shall be polished chrome plated with integral vacuum breaker and $\frac{3}{4}$ " hose thread outlet.
 - 1. Chicago #952
 - 2. T & S B720.
- J. Water filters shall be Cuno Aqua-Pure model AP101S, filter media shall be 5 micron, model #AP110.
- K. Expansion tanks shall be pre-charged and constructed of steel with a butyl diaphragm. Unit shall be suitable for service in potable water systems conforming with ANSI/NSF 61.
 - 1. Amtrol Therm-X_Trol, ST series
 - 2. Watts DET series.

2.9 WATER TEMPERING DEVICES

- A. Water tempering devices for emergency laboratory life safety devices shall be units specifically designed for the listed purpose. Devices shall conform to ANSI Standards Z358.1-1998. Devices shall maintain discharge water temperature within $\pm 5^{\circ}\text{F}$ when the water flow is at least 1 gpm, water temperature (hot or cold) changes no greater than 30°F , and water flow does not decrease greater than 50%. Upon failure of hot water supply the device shall provide cold water. Upon failure of cold-water supply, the device shall not provide any water. The discharge (tempered) water line shall be equipped with a pressure gauge.
 - 1. Lawler Manufacturing Co., models 911 or 911E.
 - 2. Honeywell, MX series.
- B. Water tempering devices for domestic hot water systems shall be units specifically designed for the listed purpose.
 - 1. Holby Valve Company
 - 2. Lawlor manufacturing Company
 - 3. Leonard Valve Company

2.10 TRAP PRIMER

- A. Pressure Differential Style – inline brass body with integral air gap. Provide distribution unit as required for multiple traps.
 - 1. Precision Plumbing Products #PR-500
- B. Electrically Operated Style – 115-volt unit with integral solenoid valve and adjustable timer clock. Unit shall be factory mounted in an enclosure with vacuum breaker.
 - 1. Precision Plumbing Products PTS series.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

- A. Above grade, ≤ 4 " : Type L, drawn copper tube with wrought copper fittings and solder joints.

- B. Below grade, $\leq 2"$: Install Type K, annealed temper copper tube with minimum number of joints. Minimum contiguous pipe section is 45'. Joint connections shall be brazed.

3.2 PIPING INSTALLATION

- A. Install piping with 1/32"/foot (1/4%) downward slope towards drain point.
- B. Minimum size of hot water recirculation piping is 3/4"

3.3 SERVICE ENTRANCE

- A. Install sleeve and mechanical sleeve seal at penetrations through foundation wall for watertight installation.
- B. Ductile-Iron Pipe: Install in accordance with AWWA C-600. Pipe below ground inside building and to a point 5 feet outside of building shall have restrained joints.

3.4 INSTALLATION OF WATER METER

- A. Install water meter in accordance with utility company's requirements and manufacturer's installation instructions.

3.5 VALVE APPLICATIONS

- A. Use ball valves or resilient seated butterfly valves.

3.6 INSTALLATION OF PIPING SPECIALTIES

- A. Install backflow preventers at each connection to mechanical equipment and systems, in compliance with the plumbing code. Group together equipment requiring protection wherever possible and locate in same room as equipment being connected. Install air gap fitting and pipe relief outlet drain without valves to nearest floor drain.
- B. Install pressure-regulating and pressure regulating valves with inlet and outlet shutoff valves and valve bypass. Install pressure gage on both the inlet and outlet of the pressure reducing valve. Install a test tee (with a drain valve) after the second pressure gage and add a third isolation valve downstream of the test tee.
- C. Install a flow control valve in each hot water recirculating loop located in an accessible location just beyond the last fixture served. The flow control valve shall be located between a check valve / strainer and an isolation valve.
- D. Install trap primers where indicated on the drawings serving traps indicated. Trap primers shall be installed a minimum of 12" above the inlet of the trap and shall be located in accessible locations.
- E. Install water hammer arresters for each bathroom group with multiple flush valves and at each location with equipment furnished with fast acting solenoid valves (ie ice machine, washing machine, etc.). Bathroom groups with a single flush valve on a branch line need not have a water hammer arrester. Arresters shall be located in accessible locations.
- F. Provide a special cold water faucet for connection to the cleaning dispenser in all janitor rooms.

- G. Install water-tempering devices for all emergency showers and eyewashes. Isolation valves shall be installed on all three pipes serving the device. Devices may only be installed on hot water pipes served by recirculation pumps. Install in strict accordance with the manufacturer's written instructions, particularly the requirements regarding the hot water pipe arrangement. Use model #911 for emergency showers and 911E for emergency eyewashes. All devices, including valves, shall have suitable service access.
- H. Install water filters with unions on both sides of the filter housing and ball valves outboard of the unions.
- I. Install thermal expansion tanks on the cold-water inlet side of storage hot water heaters.
- J. Install pressure differential style trap primers on lines that are served by quick acting vales such as flushometers and washing machines. Install electrically operated vales in all other applications. Water feed to all units shall be of the top of the main to minimize dirt. All primers to have an isolation valve upstream of the primer.

3.7 EQUIPMENT CONNECTIONS

- A. Provide hot and cold-water piping runouts to fixtures and equipment of sizes indicated, but in no case smaller than required by plumbing code. Connections to equipment shall have isolation valves with drains. Connections to fixtures shall be threaded type only, solder type are not allowed.

3.8 FIELD QUALITY CONTROL

- A. Inspect and test water distribution piping as follows:
 - 1. Cap and subject the piping system to a static water pressure of 1.5 times the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired. Repair all leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
 - 2. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the building inspector, DC-FO&M, and the clerk of the works.
 - 3. Arrange for inspections of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.
 - 4. Prepare inspection reports signed by the building inspector and include in the O&M Manual.

3.9 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 that have been altered, extended, or repaired prior to use.
 - 2. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
 - 3. 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.

4. 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.
 5. Flush the system with clean, potable water until chlorine does not remain in the water.
- B. Prepare reports for all purging and disinfecting activities. Furnish the owner with two copies of the final report for record and the Authority Having Jurisdiction.

END OF SECTION 22 11 00