

SECTION 23 51 50 - WATER SYSTEMS SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Submit shop drawings on water system specialties.

1.3 GENERAL REQUIREMENTS

- A. Equipment and accessories shall be rated for a minimum of 125 psi wwp, and 250°F temperatures. Manufacturer's written installation procedures shall become a part of these specifications.

PART 2 - PRODUCTS

2.1 HEAT EXCHANGERS

- A. Shell and Tube Type:
 - 1. Constructed and stamped ASME Code, 125 psi wwp design, 250 psi test.
 - 2. Removable head and tube bundle, steel shell and baffles with mounting saddles.
 - 3. 3/4 in. o.d., #20 BWG copper tubes, U-bend construction, 5 ft./second maximum tube velocity, fouling factor 0.0005.
 - 4. Design Equipment: Taco.
 - 5. Make: Armstrong, Adamson, Bell & Gossett, Patterson-Kelley, Taco.
- B. Plate and Frame Type:
 - 1. Individually removable .4mm 304 stainless steel channel plates.
 - 2. Gasket Suitable for Propylene Glycol (No EPDM)
 - 3. Epoxy coated steel frame and pressure plates at each end of the unit,
 - 4. Stainless steel clad carrying bars, cadmium plated steel tightening bolts and nuts.
 - 5. OSHA aluminum splash guard.
 - 6. Design Equipment: Alfa Laval.
 - 7. Make: Alfa Laval, Taco, Bell & Gossett.

2.2 COMPRESSION TANKS AND ACCESSORIES

- A. Steel tanks, 125 psi wwp, ASME construction, with reinforced openings of size and location as required.
- B. Red oxide coating outside and final exterior coat of paint; factory applied.

- C. Provided with 3/8 in. brass petcocks and gauge glass to check water level, airtrol tank fitting, and Drain-O-Tank air charger.
- D. Design Equipment: Taco.
- E. Make: Armstrong, Bell & Gossett, Taco.

2.3 EXPANSION TANKS AND ACCESSORIES

- A. Steel tanks, 125 psi wwp, ASME construction per ASME Section VIII, Div. 1, with reinforced openings of size and location as required.
- B. Red oxide coating outside and final exterior coat of paint; factory applied.
- C. Tank shall contain a heavy-duty rubber bladder which is replaceable and removable for inspection.
- D. The tank shall be capable of full acceptance of the tank volume when tank is void of air.
- E. Design Equipment: Taco CA.
- F. Make: Armstrong, Bell & Gossett, Taco.

2.4 AIR REMOVAL ASSEMBLY – COALESCING TYPE

- A. Air removal device with automatic air vent.
 - 1. Shell: Carbon Steel
 - 2. Connections: Same size or greater than attached piping
 - 3. Max Working Temperature: 250F
 - 4. Max Working Pressure: 150 psi
 - 5. Air Vent: 2" to 5" Brass, 6" and greater Cast Iron
- B. Maximum Pressure Drop 3.0 Ft. or less.
- C. Design Equipment: Taco.
- D. Make: Armstrong, Spiro-Therm, Bell & Gossett, Taco.

2.5 AIR ELIMINATING SUPPLY FITTING

- A. Designed to eliminate air from supply water; located in supply header from heat generating devices; flanged or screwed.
- B. Design Equipment: Taco.
- C. Make: Armstrong, Bell & Gossett, Taco.

2.6 LOW PRESSURE MAKE-UP WATER VALVES – Radiant Floor

- A. Brass with built-in strainer and anti-siphon check valve.

- B. Set at 12 psi.
- C. Design Equipment: Taco.

2.7 HIGH PRESSURE MAKE-UP WATER VALVES [HIGH PRESSURE]

- A. Bronze body, stainless steel trim, gauge tapping on outlet side.
- B. Adjustable range: to 150 psi. Set at 100 psi fill
- C. Make: Watts

2.8 RELIEF VALVES

- A. Heating System:
 - 1. To Relieve Full Heating Capacity, As Required By ASME Code:
 - a) Design Equipment: McDonnell Miller Series 240.
 - b) Make: Bell & Gossett, McDonnell Miller, Kunkle.

2.9 FLOW BALANCERS

- A. Constructed for 125 psi and 250°F.
- B. Maximum Pressure Drop 5.0 Ft. or less.
- C. Provide one 0-35 FT HD range meter complete with hoses, shut-off valves, and vent valves, and deliver to Owner and obtain receipt.] [Use temporary meter furnished by manufacturer.
- D. 3 in. and Smaller: Calibrated balance valve with provisions for connecting a portable differential pressure meter suitable as a service valve. Meter connections to have built-in check valves. An integral pointer shall register degree of valve openings. Valve shall have internal seals.
 - 1. Balance valve sizes shall be based upon gpm range rather than pipe size.

<u>Balance Valve Size</u>	<u>GPM Range</u>
1/2"	up to 1.6
3/4"	1.7 – 3.0
1"	3.1 – 7.0
1 1/4"	7.1 - 12
1 1/2"	12 - 22
2"	23 - 45
2 1/2"	46 - 70
3"	71 – 140
4"	141 - 280

- 2. Design equipment: Flow Design.
- 3. Make: Bell & Gossett, Armstrong, Taco, Tour & Anderson, Flow Design.

E. 4 In. and Larger: Nickel-plated flow meter with provisions for connecting a portable differential pressure meter. Shall be individually calibrated. Provide with a butterfly valve with memory stop. at each location.

1. Flow meter sizes shall be based upon gpm range rather than pipe size.

<u>Flow Meter Size</u>	<u>GPM Range</u>
4"	180 - 300
5"	300 - 500
6"	500 - 850
8"	850 - 1500
10"	1500 - 2500
12"	2500 - 3500

- a) Design equipment: Taco.
- b) Makes: Bell & Gossett, Illinois, Taco.

F. Y-Pattern, Globe Type Balancing Valves:

1. 2 in. and Smaller:

- a) Ametal® brass copper alloy body providing dielectric protection, with soldered or threaded ends.
- b) EPDM o-ring seals, 4-turn digital readout hand wheel for balancing and concealed memory feature with locking, tamper-proof setting.
- c) Built-in check valve provided for connecting a Series 73M portable differential pressure meter to be left with the owner.
- d) Design Make: Victaulic/Tour & Andersson Series 786, 787, or 78K.

2. Coil Components: Install Series 78U union port fitting, Series 78Y strainer/ball valve or Series 78T union/ball valve combination, and two coil hoses to complete terminal hookup at coil outlet.

a) 2-1/2" and Larger:

- 3. Ductile iron body with Ametal® internal components, flanged or grooved ends, EPDM o-ring seals, multiple-turn digital readout hand wheel for balancing and concealed memory feature with locking, tamper-proof setting.
- 4. Built-in check valve provided for connecting a Series 73M portable differential pressure meter to be left with the owner.
- 5. Design Make: Victaulic/Tour & Andersson Series 788 or 789.

2.10 SUCTION DIFFUSER

- A. Cast iron body, 125 lb. working pressure, 250°F operating temperature.
- B. Type X (for closed systems) cylinder orifice in steel with start-up strainer with bronze mesh and inlet vanes in steel construction.
- C. Type Y (for open systems) cylinder orifice in stainless steel without strainer and inlet vanes in steel construction.
- D. Angle type body with inlet vanes and combination diffuser-strainer orifice cylinder with 3/16 in. diameter openings.
- E. Disposable fine mesh start-up strainer to be removed after 30 days of operation.
- F. Permanent strainer free area not less than five times section area of pump connection with blow-down connection and magnetic trap.
- G. Adjustable support foot.
- H. Maximum Pressure Drop 3.0 Ft. or less.
- I. Pump suction diffuser with grooved inlet and straight, single, or double reduction flanged outlet, ASTM A395 ductile iron body, Type 304 stainless steel frame and perforated sheet diffuser with 5/32" diameter holes, Type 304 stainless steel 20 mesh startup pre-filter, pipe plug for system drainage, and bosses for support. Victaulic Series 731-D rated to the working pressure of the mating flange.
- J. Pump suction diffuser 14 in. through 24 in. shall have an AGS grooved inlet and Class 150 flanged outlet connection. ASTM A536 ductile iron body, Type 304 stainless steel frame and perforated sheet with 5/32" diameter holes. Type 304 stainless steel 20-mesh startup pre-filter, pip plug for system drainage, and bosses for support. Victaulic Series W731-D rated up to 300 psig.
- K. Design Equipment: Taco.
- L. Make: Armstrong, Bell & Gossett, Taco, Victaulic.

2.11 STRAINERS

- A. Cast semi-steel body or cast iron construction for steel piping and bronze body construction for copper piping; equipped with removable, monel or stainless steel water screen; maximum pressure drop 2 psi with free area at least four times area of pipe. Provided with blow-off outlet.
- B. Sizes 5 in. And Smaller: "Y" Type.
- C. Sizes 6 in. And Larger: Top removable basket type.
- D. Grooved End Strainers:
 - 1. Y-Pattern, 2 in. through 18 in.: Ductile iron body, off-centered blow-down port fitted with pipe plug, Type 304/304L stainless steel metal removable

basket with [0.062"] [0.125"] [0.156"] diameter perforations, 300 psig CWP. Victaulic Style 732 or W732.

2. T-Pattern, 2 in. through 24 in.: Ductile iron or carbon steel body, Type 304/304L stainless steel mesh removable basket with No. [12] [6] [4] mesh sizes, removable coupling and end cap or T-bolt hinged closure/cap for strainer maintenance, up to 750 psig CWP. Victaulic Series 730 and W730.

E. Design Equipment: Mueller.

F. Make: Elliot, Illinois, Keckley, Mueller, Webster, Victaulic.

2.12 MULTI-PURPOSE VALVE

A. To serve as system balancing device, shutoff valve and check valve constructed with linear contoured disc and calibrated adjustment feature. Installed in vertical position, stem up. Cast iron body, 125 psi wwp, 300oF.

B. Maximum Pressure Drop 5.0 Ft. or less.

C. Design Equipment: Taco.

D. Make: Armstrong, Bell & Gossett, Taco, Victaulic.

2.13 FLOW CONTROL VALVES

A. To prevent overheating by gravity flow.

B. Screwed or soldered ends. Angle or straight pattern, same size as main. Constructed so that entire valve mechanism may be removed for cleaning. Equipped with rising stem opening mechanism to open valve for gravity circulation or draining system.

C. Design Equipment: Taco.

D. Make: Armstrong, Bell & Gossett, Taco, Victaulic/Tour & Andersson.

2.14 AUTOMATIC AIR VENTS

A. Inverted ball type automatic vent trap, 150 psi rating, Sarco 13W. OR Float type, 35 psig rating, equal to Hoffman No. 77.

B. Make: Armstrong, Hoffman, Sarco.

2.15 CENTRIFUGAL SEPARATOR

A. Centrifugal separator unit shall consist of, in-line separator, and support legs or wall brackets as applicable.

1. Welded steel shell, minimum pressure rating of 150 psi, 12 psi maximum pressure drop, sized for indicated gpm.

2. Provide a sight glass and motorized ball valve with a 100 volt purge timer controller with plug cord.
- B. Make: Lakos, or equal.

2.16 PUMP AND COIL FLEXIBLE CONNECTORS

- A. Carbon steel flanges welded to carbon steel stub ends with annular close pitch stainless steel hose with stainless steel braid for coils. Keflex type KFCS, or equal.
- B. Construction same as above for pump applications. Keflex type KSSPC, or equal.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Obtain detailed instructions from each manufacturer for proper method of installation.

3.2 HEAT EXCHANGERS

- A. Install so that tube bundle can be readily removed for maintenance. Support on angle steel frame floor mounted or wall mounted.

3.3 COMPRESSION/EXPANSION TANKS – FOLLOW MFG REQUIREMENTS FOR HIGH PRESSURE FILL

- A. For compression tanks pitch connection to heating system 1 in. in 5 ft. minimum up toward tank. Provide shutoff valve in piping connection to system and 3/4 in. hose end drain valve on tank. Provide supporting steelwork, hangers, and suspension racks. Provide water make-up connection, petcocks and tank fitting.
- B. For expansion tanks, provide 4" housekeeping pad with length and width greater than 1.2 times the maximum diameter of the tank. Provide pitch connection to heating system 1 in. in 5 ft. minimum up toward system. If connection must rise towards tank, provide automatic air vent at high point. Provide shutoff valve in piping connection to system and 3/4 in. hose end drain valve on tank. Provide water make-up connection to air separator. Air separator shall have automatic air vent.

3.4 SYSTEM FILLING

- A. After Cleaning, Fill Each System From Low Point:
 1. With pumps off, vent mains, risers, runouts, and units, working consecutively from low to high point in building. Obtain approximately 2 psi at highest point. Obtain proper air cushion in compression tanks.

3.5 AIR VENTING

- A. Provide one of the following vents at points in piping system where air may collect.
 1. Manual Vent Assembly Consisting Of: 1-1/4 in. x 6 in. air collection

chamber, 1/4 in. brass globe valve in accessible location, install hose connection on valve outlet.

2. Automatic vent with air chamber.

B. Equipment Vents:

1. When equipment is above mains: Connect runouts or risers to upper quadrant or top of mains. Install vent assembly concealed within enclosure, consisting of 1 in. diameter by 4 in. to 6 in. long air collection chamber with 1/4 in. soft copper tube to manual valve. Mount securely near bottom of enclosure, but not fastened to enclosure. For individual units, radiators, fan convectors and units with return grilles: Provide screwdriver operated manual valve, operated from discharge grille or access door. Drill enclosure and position valve for operating without removing enclosure.
2. When equipment is below mains: Connect piping runouts or risers to bottom or lower quadrant of mains. Vent assembly not required in unit. Provide means of purging and draining each unit if required. Use tees instead of ells at low point of runouts.

3.6 AIR REMOVAL ASSEMBLY

- A. Provide supports and provide blow-down with hose end drain valve full size of opening.

3.7 MAKE-UP WATER VALVES

- A. Provide for each system, with 3/4 in. globe valve, bypass connection, and check valve downstream of bypass connection. Set valves to provide 2 psi at high point of system. Provide pressure gauge assembly.

3.8 RELIEF VALVES

- A. Hot Water System: Pipe discharge to floor drain and place hanger at elbow. Install piping so as not to introduce stress on PRV body.
- B. Chilled Water System: Provide as protection for each cooling coil, piped so as to relieve back into system should shutoff valves be closed. Provide check valve in relief valve discharge.

3.9 STRAINERS

- A. Provide where called for. Provide valved dirt blow-down connection for strainers, size 6 in and larger. Equip with quick opening hose end valve, and brass plug.

3.10 MANUAL RADIATOR VALVES

- A. Provide in supply line to each heating unit as called for and where automatic control is not furnished.

3.11 FLOW BALANCERS

- A. Provide on zone or riser returns, on each hydronic unit and where called for. Meter connection points shall not point downward.
- B. On details where a shut-off valve is shown in conjunction with the flow balancer (3" and smaller), if the Armstrong "CBV", Flow Design "AP" or Tour & Anderson "ST" type is used, the additional shut-off valve may be deleted.

3.12 SUCTION DIFFUSERS

- A. Provide at inlet to base mounted pump.
- B. Pipe suction diffuser blow-off connection (full line size with ball valve) to nearest floor drain.

3.13 CENTRIFUGAL SEPARATOR

- A. Provide where called for.

3.14 PUMP AND COIL FLEXIBLE CONNECTIONS

- A. Provide support for piping and equipment directly from floor or building structure.
- B. Piping or equipment being supported or compressing flexible connectors will be rejected.

END OF SECTION

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