
SECTION 23 21 14
HYDRONIC SPECIALTIES**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Suction diffusers.
- F. Pump connectors.
- G. Pressure-temperature test plugs.
- H. Balancing valves.
- I. Coil hook-up kits.
- J. Combination flow controls.
- K. Relief valves.
- L. Pressure reducing valves.
- M. Glycol system.

1.2 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements
- B. Section 01 60 00 - Product Requirements
- C. Section 01 70 00 - Execution and Closeout Requirements
- D. Section 01 78 00 - Closeout Submittals
- E. Section 20 10 05 - Piping
- F. Section 23 09 23 - Direct-Digital Control System for HVAC
- G. Section 23 21 13 - Hydronic Piping.
- H. Section 26 27 17 - Equipment Wiring

1.3 REFERENCE STANDARDS

- A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
- B. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
- C. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.
- D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2021.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference, and should not be used as an ordering model number. Accessories and

options may be custom components purchased separately.

- C. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories. Manufacturer's data sheets on each item of equipment and device, marked up to identify the items to be used on the project.
 - 1. Expansion tanks. (23 21 14 - 001 - A)
 - 2. Air vents. (23 21 14 - 002 - A)
 - 3. Air separators. (23 21 14 - 002 - A)
 - 4. Strainers. (23 21 14 - 002 - A)
 - 5. Suction diffusers. (23 21 14 - 003 - A)
 - 6. Pressure-temperature test plugs. (23 21 14 - 004 - A)
 - 7. Balancing valves. (23 21 14 - 004 - A)
 - 8. Coli hook-up kits. (23 21 14 - 004 - A)
 - 9. Combination flow controls. (23 21 14 - 004 - A)
 - 10. Relief valves. (23 21 14 - 004 - A)
 - 11. Pressure reducing valves. (23 21 14 - 004 - A)
 - 12. Glycol system. (23 21 17 - 006 - A)
- D. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
- E. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
- F. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
 - 1. Submit under Operation and Maintenance Data books
 - 2. Expansion Tanks.
 - 3. Strainers.
 - 4. Balancing valves.
 - 5. Coil hook-up kits.
 - 6. Combinations flow controls.
 - 7. Pressure reducing valves.
 - 8. Glycol system.
- H. Project Record Documents: Record actual locations of components and locations of access doors required for access or valving.
 - 1. Refer to Section 01 78 00 - Closeout Submittals.
 - 2. Record Documents.
- I. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
 - 1. Refer to Section 01 78 00 - Closeout Submittals.
 - 2. Operation and Maintenance Data Books.
 - 3. Operation and Maintenance DVD.
- J. Project Record Documents:
- K. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.6 **WARRANTY**

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- A. Provide 3 year warranty, including parts, materials and labor for defective parts, for the following:
 - 1. Include in Closeout Submittals Book.
 - 2. Expansion Tanks.
 - 3. Strainers.
 - 4. Balancing valves.
 - 5. Coil hook-up kits.
 - 6. Combinations flow controls.
 - 7. Pressure reducing valves.
 - 8. Glycol system.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 EXPANSION TANKS

- A. Manufacturers:
 - 1. Amtrol, Inc.
 - 2. ITT Bell & Gossett.
 - 3. Taco, Inc.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Construction: Welded steel, tested and stamped in accordance with ASME (BPV VIII, 1); supplied with National Board Form U-1, rated for working pressure of 150 psi, with flexible butyl diaphragm or bladder sealed into tank, and steel support stand.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psi.
- D. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure zone back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.2 AIR VENTS

- A. Manufacturers:
 - 1. Armstrong International, Inc.
 - 2. ITT Bell & Gossett.
 - 3. Taco, Inc.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Manual Type: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- C. Float Type:

1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.3 AIR SEPARATORS

- A. Centrifugal Air Separators/Strainers:
 1. Manufacturers:
 - a. Armstrong International, Inc.
 - b. ITT Bell & Gossett.
 - c. Taco, Inc.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.
 3. Maximum Service Flow and Pressure: 16 gpm at 125 psi.

2.4 STRAINERS

- A. Manufacturers:
 1. Armstrong International, Inc.
 2. Flexicraft Industries.
 3. Grinnell Products, a Tyco Business.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Size 2 inch and Under:
 1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 1. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with 1/16 inch or 3/64 inch stainless steel perforated screen.

2.5 SUCTION DIFFUSERS

- A. Manufacturers:
 1. ITT Bell & Gossett.
 2. Victaulic Company of America.
 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh startup screen, and permanent magnet located in flow stream and removable for cleaning.
- C. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.

2.6 PUMP CONNECTORS

- A. Manufacturers:
 1. The Metraflex Company; Vane Flex.
 2. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.
 - 1. Maximum Allowable Working Pressure: 150 psig at 120 degrees F.
 - 2. End Connections: Flanged ductile iron; complying with ASME B16.1 Class 125.
 - 3. Provide necessary accessories including, but not limited to, swivel joints.

2.7 PRESSURE-TEMPERATURE TEST PLUGS

- A. Manufacturers:
 - 1. Peterson Equipment Company Inc.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.
- C. Application: Use extended length plugs to clear insulated piping.

2.8 BALANCING VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc.
 - 2. ITT Bell & Gossett.
 - 3. Taco, Inc.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Size 2 inch and Smaller:
- C. Provide ball style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
- D. Metal construction materials consist of bronze or brass.
- E. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- F. Size 2.5 inch and Larger:
 - 1. Provide ball, globe, or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged, grooved, or weld end connections.
 - 2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
 - 3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, or EPDM.

2.9 COIL HOOK-UP KITS

- A. Manufacturers:
 - 1. Nexus Valve: Coil Pak 03Y.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Under Contractor's option, coil hook-up kits may be used in lieu of individual specified components with the detail for connecting a 2-way or 3-way hydronic valve. The coil connection kit must provide all of the same functions as the individual components. The fittings shall remain line size similar to how individual components would be sized and the final reduction in size for the coil is at the coil connection.
- C. Combination valve with manual flow control valve, with setting indicator, PT test plugs, memory stop and union ends. Valve shall also operate as isolation valve.
 - 1. 600 PSI WOG, 325 Degree F rated.

- 2. Valve: Stainless Steel ball, full port.
- 3. Manufacture: Nexus Valve: Series Ultra XB Orturi.
- D. Combination casting with Union, Manual Air vent and PT Test Plug:
 - 1. Manufacture: Nexus Valve UltraU.
- E. In the bypass leg for 3-way valves, combination valve with Ball valve, memory stop and union end.
 - 1. Manufacturer: Nexus Valve Ultra NXU.
- F. In supply piping, Combination valve with Ball valve, strainer, union end, PT test plug blowdown valve with cap.
 - 1. 304 stainless steel 40 mesh screen.
 - 2. Valve: Stainless Steel ball, full port.
 - 3. Manufacturer: Nexus Valve Ultra Y.
- G. Flexible EPDM core, Stainless braided hose for connection to coil.
 - 1. Rated for 300 psi or greater at 180 degrees F.

2.10 RELIEF VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc.
 - 2. ITT Bell & Gossett.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.11 PRESSURE REDUCING VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc.
 - 2. ITT Bell & Gossett.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve.
- C. Materials of Construction:
 - 1. Valve Body: Constructed of bronze or brass.
 - 2. Internal Components: Construct of brass and engineered plastics or composition material.
- D. Connections:
 - 1. NPT threaded: 0.75 inch.
 - 2. Soldered: 0.75 inch.
- E. Provide integral check valve and strainer.
- F. Maximum Inlet Pressure: 100 psi.
- G. Maximum Fluid Temperature: 180 degrees F.
- H. Operating Pressure Range: Between 10 psi and 25 psi.

2.12 GLYCOL SYSTEM

- A. Mixing Tank: 55 gallon steel drum with fittings suitable for filling and hand pump for charging, rubber hose for connection of hand pump to system.
- B. Storage Tank: Closed type, welded-steel construction, tested and stamped in accordance with ASME BPVC-VIII-1; 100 psi rating; cleaned, prime coated, and supplied with steel support saddles. Construct

with tappings for installation of accessories.

- C. Expansion Tank: Diaphragm type with vent fitting with air separator, and automatic air vent.
- D. Air Pressure Reducing Station: Pressure reducing valve with shut-off valves, strainer, check valve, and needle valve bypass.
- E. Glycol Solution:
 - 1. Inhibited propylene glycol and water solution mixed 50 percent glycol - 50 percent water, suitable for operating temperatures from minus 40 degrees F to 250 degrees F.

PART 3 EXECUTION

3.1 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Confirm framing and support members.
- B. Confirm rough-in and framing of walls and partitions with supports for equipment and accessories.
- C. Confirm rough-in locations and control system requirements before rough-in installation. Refer to Section 23 09 23 - Direct-Digital Control System for HVAC.
- D. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 26 27 17 - Equipment Wiring.

3.2 EXAMINATION

- A. Verify that surfaces are suitable for installation.
- B. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- C. Verify that piping and equipment are ready to receive work.
- D. Verify field measurements are as shown on shop drawings.
- E. Electrical:
 - 1. Verify electrical power, voltage, phase and current is available and of the correct characteristics.
 - 2. Verify rough-in for electrical connections to verify actual locations before installing.
 - 3. Verify motor type and VFD or disconnect type for compatibility prior to ordering equipment.
- F. Controls:
 - 1. Verify signal power, voltage, phase and current is available and of the correct characteristics.
 - 2. Verify rough-in for control connections to verify actual locations before installing.
 - 3. Verify motor type and VFD or disconnect type for compatibility with control sequence and control devices prior to ordering equipment.
- G. Maintain service clearances.
- H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Install specialties in accordance with the following:
 - 1. Federal, State and Local codes.
 - 2. Manufacturer's instructions.
 - 3. Contract documents.
- C. Expansion Tanks:
 - 1. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.
 - 2. Provide valved drain and hose connection on expansion tank.

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- D. Air Vents:
 - 1. Where large air quantities can accumulate, provide enlarged air collection standpipes.
 - 2. Provide manual air vents at system high points and as indicated.
 - 3. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
 - 4. Install automatic air vents within mechanical room and service areas only.
 - E. Air Separators:
 - 1. Provide air separator on suction side of system circulation pump and connection to expansion tank.
 - 2. Provide full port valved drain and extend to floor drain.
 - F. Strainers:
 - 1. Provide valved drain and hose connection on strainer blowdown connection.
 - G. Suction Diffusers:
 - 1. Provide pump suction fitting on suction side of base-mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.
 - H. Support pump fittings with floor-mounted pipe and flange supports.
 - I. Pipe relief valve outlet to nearest floor drain.
 - J. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.
 - K. Pressure Temperature Test Plugs:
 - 1. Provide test plugs on water inlet and outlet from units and each coil.
 - L. Balancing Valves:
 - 1. Install on the outlet of each unit and coil.
 - 2. Install shut off valve upstream and downstream of balancing valve.
 - 3. Install pressure gauge ports upstream and downstream of balancing valve.
 - M. Coil Hook-up Kits:
 - 1. Install kits within accessible areas. Maintain clearances for maintenance of valves.
 - 2. Install in locations as indicated for individual assemblies.
 - N. Relief Valves:
 - 1. Where one line vents several relief valves, make cross-sectional area equal to sum of individual vent areas.
 - 2. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
 - 3. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
 - 4. Pipe relief valve outlet to nearest floor drain.
 - 5. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.
 - O. Pressure Reducing Valves:
 - 1. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.
 - 2. Install isolation valves and pressure gauges upstream and downstream of valve.
 - P. Glycol System:
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1. Feed glycol solution to system through make-up line with pressure regulator, venting system high points.
2. Feed glycol solution to system through make-up line with pressure regulator, venting system high points. Set to fill at 12 psi.
3. Feed glycol solution to system through make-up line with pressure regulator, venting system high points. Pressure system cold at 5 psi.
4. Perform tests determining strength of glycol and water solution and submit written test results.

3.4 MAINTENANCE

- A. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.
- C. Perform monthly visit for the first four months and then bi-monthly visits for the first year to make water analysis on site with measurement instruments. Report findings in detail in writing, including analysis and amounts of chemicals or water added. Submit report to owner.
- D. Explain corrective actions to Owner's maintenance personnel in person.
- E. Contractor shall provide chemicals required for correcting system.

3.5 START-UP

- A. Perform start-up for all equipment.
 1. Expansion tanks.
 2. Air vents.
 3. Air separators.
 4. Strainers.
 5. Suction diffusers.
 6. Pressure-temperature test plugs.
 7. Balancing valves.
 8. Coil hook-up kits.
 9. Combination flow controls.
 10. Relief valves.
 11. Pressure reducing valves.
 12. Glycol system.

END OF SECTION 23 21 14