

## SECTION 23 21 16 - PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SYSTEM DESIGN REQUIREMENTS

- A. Strainers:
1. Place strainers upstream of all regulators, pumps, chillers, boilers, control equipment or any other equipment, which could be damaged or rendered inoperative due to foreign matter in the piping. Provide adequate access for removal.
  2. Provide parallel strainers with isolation valves on primary piping systems where operation is critical and is intended to continue during servicing. Strainers shall then be cleaned through removable caps.
  3. For critical systems, provide pressure gauges to indicate loading. Consider clear see-through duplex strainers or filters for critical applications.
  4. Provide single strainers with isolation valves on secondary piping systems where operation can be interrupted. Provide blowdown valves with caps on single strainers.
- B. Hydronic Piping Specialties:
1. General: Provide factory fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, of if not indicated, provide proper selection as determined by installer to comply with connections, within properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
- C. General Information - Gauges
1. Provide gauge cocks at all gauges for removal under operation.
  2. Employ independent gauges with range twice the operating pressure across pumps, strainers, pressure reducing stations, etc.
  3. Monitor all systems by the building automation system for On/Off, temperatures, and pressures.
- D. Shall be made in accordance with Section 23 00 00.

#### 1.2 QUALITY ASSURANCE

- A. Codes and Standards:
1. FCI Compliance: Test and rate "Y" type strainers in accordance with FCI 73-1 "Pressure Rating Standard for "Y" Type Strainers". Test and rate other type strainers in accordance with FCI 78-1 "Pressure Rating Standard for Pipeline Strainers other than "Y Type".
  2. ASME B31.9 "Building Services Piping" for materials, products, and installation.
  3. Safety valves and pressure vessels shall bear the appropriate ASME label.
  4. Fabricate and stamp air separators and compression tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
  5. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Air Vents (manual)
    - a. Armstrong Machine Works
    - b. Bell & Gossett, ITT; Fluid Handling Div.

- c. Hoffman Specialty ITT, Fluid Handling Div.
  - d. Spirax Sarco
2. Pipe Escutcheons:
  - a. Chicago Specialty Mfg. Co.
  - b. Sanitary-Dash Mfg. Co.
  - c. Producers Specialty & Mfg. Corp.
3. Mechanical Sleeve Seal:
  - a. Thunderline Corp.
4. Fire and Smoke Barrier Penetration Seal:
  - a. Dow Corning
  - b. Electrical Products Div./3M
  - c. Flame Stop, Inc.
5. Expansion Tanks:
  - a. Diaphragm Type Expansion Tanks
    - 1) Amtrol, Inc.
    - 2) Watts.
    - 3) Bell and Gossett ITT; Fluid Handling Div.
6. Air Separators:
  - a. Bell and Gossett ITT; Fluid Handling Div.
  - b. Amtrol Inc.
  - c. Armstrong Pumps, Inc.
  - d. Spriax Sarco
7. Combination Pressure and Temperature Relief Valves:
  - a. Amtrol, Inc.
  - b. Bell and Gossett ITT; Fluid Handling Div.
  - c. Watts Regulator Co
  - d. Spirax Sarco
8. Low Pressure Strainers:
  - a. Metraflex Co.
  - b. Hoffman Specialty ITT; Fluid Handling Div.
  - c. Watts Regulator Co.
  - d. Spirax Sarco
9. Basket Strainers:
  - a. R-P&C Valve
  - b. Keckley.
  - c. Metraflex
10. Pressure Reducing Valves (Water Application):
  - a. Amtrol, Inc. Taco, Inc.
  - b. Keckley
  - c. Armstrong
11. Pump Suction Diffusers:
  - a. Amtrol, Inc.
  - b. Armstrong Pumps, Inc.
  - c. Bell & Gossett ITT; Fluid Handling Div.
12. Diverting Fittings:
  - a. Armstrong Pumps, Inc.
  - b. Bell & Gossett ITT; Fluid Handling Div.
  - c. Victaulic Company of America
13. Dielectric Waterway Fittings:
  - a. America
  - b. EpcO Sales, Inc.
14. Hydronic System Safety Relief Valve:
  - a. Kunkle Valve Co., Inc.
  - b. Watts Regulator Co.
  - c. Bell & Gossett ITT; Fluid Handling Div.
15. Pressure Regulating Valves (Steam Application):

- a. Spence (preferred)
- b. Hoffman Specialty ITT; Fluid Div.
- c. Armstrong.

## 2.2 MATERIALS, GENERAL

### A. Air Vents (Manual):

1. Bronze body and nonferrous internal parts; 150 psig working pressure, 212 degree F operating temperature; screwdriver or coin operated type.
2. Float Type: Brass or semi-steel body, copper float, stainless steel valve and valve seat; suitable for system operation temperature and pressure. With isolating valve.
3. Washer Type: Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.
4. Provide valve or gauge cock for isolation and repair.
5. Pipe high point manual air vents to drain. Notify Project Manager in areas where the manual vents can not be piped to drain.

### B. Pipe Escutcheons:

1. General: Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
2. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
3. Pipe Escutcheons for Oversized Holes: Provide sheet steel escutcheons, solid or split hinged.

### C. Dielectric Protection:

1. General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.
2. Use dielectric waterway fittings rather than dielectric unions
3. Installing full-port brass valves, with half-unions at the inlet and outlet, to connect steel to copper pipe is acceptable.
4. Dielectric protection fittings shall be installed in equipment rooms only.

### D. Sleeves: Provide pipe sleeves of one of the following:

1. Galvanized sheet steel with lock seam joints for sleeves passing through non-load bearing or non-fire rated walls and partitions. Minimum gauges as follows:
  - a. Pipes 2-1/2 inch and smaller: 24 gauge.
  - b. Pipes 3 inch to 6 inch: 22 gauge.
  - c. Pipes over 6 inch: 20 gauge.
2. Schedule 40 galvanized steel pipe or cast iron pipe for sleeves passing through load bearing walls, concrete beams, fire-rated partitions, foundations, footings, and waterproof floors.
3. Insulated Pipe: Sleeves of sufficient internal diameter to install pipe and insulation and allow for free movement of pipe.
4. In finished areas where pipes are exposed, terminate sleeves flush with wall, partitions, and ceiling and extend 1 inches above finished floors.
5. Fire Protection Lines: Extend sleeves a minimum of 3 inches above finished floor.

### E. Mechanical Sleeve Seals:

1. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation. Foundation walls only.
- 2.

- F. Fabricated Piping Specialties:
  - 1. Drip Pans: Fabricated from corrosion resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inch. Reinforce top, either by structural angles or by rolling top over 1/4-inch steel rod. Provide hole, gasket and flange at low point for watertight joint and 1-inch drain line connection.
  
- G. Expansion Tanks:
  - 1. Compression Tanks: Welded carbon steel rated for 125 psig working pressure, 375 degree F maximum operating temperatures. Provide with taps in bottom of tank for tank fittings and taps in end of tank for gauge glass. Tested and labeled in accordance with ASME Pressure Vessel Code.
    - a. Air Control Tank Fittings: Cast iron body, copper-plated tube, brass vent tube plug, and stainless steel ball check.
    - b. Tank Drain Fitting: Brass Body, nonferrous internal parts. Fitting to admit air into compression tank drain water, and close off the system.
  - 2. Diaphragm Type Tanks: Welded steel, rated for 125 psig working pressure, 375 degree maximum operating temperature, flexible diaphragm sealed into tank. Provide taps for pressure gauge, air charging fitting, and drain fitting. Provide with steel legs or saddles. Tested and labeled in accordance with ASME Pressure Vessel Code.
  
- H. Air Separators:
  - 1. In-line air separators: Cast iron for sizes 1-1/2 inch and smaller, welded steel for sizes 2 inch and larger; tested and labeled for minimum 125 psig working pressure and 350 degree F operating temperature. ASME constructed and labeled
  - 2. Air Elimination Valve: Bronze, float operated, for 125 psig operating pressure.
  
- I. Pressure Reducing Valves:
  - 1. 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. Factory set at operating pressure and field adjustable.
  
- J. Hydronic System Safety Relief Valves:
  - 1. Diaphragm operated, cast iron or brass body, Teflon seat, stainless steel stem and springs, with low inlet pressure check valve, inlet strainer removable without system shut-down, ASME certified and labeled. Select valve to suit actual system pressure and BTU capacity. Set valve to relieve at 10 psi above operating pressure.
  
- K. Unions: ANSI B16.39 malleable-iron, Class 150, hexagonal stock, with ball-and- socket joints, metal-to-metal bronze seating surfaces; female threaded ends. Threads shall conform to ANSI B1.20.1.
  
- L. Dielectric waterway fittings: Threaded end connections installed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.
  
- M. Automatic Air Vent:
  - 1. Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure, 240 degree F operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection. B & G Model #87.
  
- N. Pump Suction Diffusers:
  - 1. Cast iron body, with threaded connections for 2 inch and smaller, flanged connections for 2-1/2 inch and larger; 175 psig working pressure, 300 degree F maximum operating temperature; and complete with the following features:
    - a. Inlet vanes with length 2-1/2 times pump suction diameter or greater.
    - b. Cylinder strainer with 3/16 inch diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head.
    - c. Disposable fine mesh strainer to fit over cylinder strainer.

- d. Permanent magnet located in flow stream, removable for cleaning.
  - e. Adjustable foot support designed to carry weight of suction piping.
  - f. Blowdown tapping in bottom; gauge tapping in side.
- O. Diverting Fittings: Cast iron body with threaded ends or wrought copper with solder ends; 125 psig working pressure, 250 degree F maximum operating temperature. Indicate flow direction on fitting.
- P. Low Pressure Y-Pattern Strainers:
- 1. Line size strainer with ends matching piping system materials, 125 psig working pressure with Type 304 stainless steel screens with 3/64-inch perforations at 233 per square inch.
    - a. Threaded Ends, 2-Inch and Smaller: Cast iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
    - b. Threaded or Flanged Ends, 2-1/2-inch and Larger: Cast iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
    - c. Butt Welded Ends, 2-1/2-inch and Larger: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
    - d. Grooved Ends, 2-1/2-inch and Larger: Tee pattern, ductile-iron or malleable-iron body, and access end cap, access coupling with EDPM gasket.
- Q. High Pressure Pipeline Strainers:
- 1. Line size with ends matching piping system materials, 250 psig working pressure with Type 304 stainless steel screens with 3/64-inch perforations at 233 per square inch.
    - a. Threaded Ends, 2-Inch and Smaller: Cast iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
    - b. Threaded or Flanged Ends, 2-1/2-inch and Larger: Cast iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
    - c. Butt Welded Ends, 2-1/2-inch and Larger: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
    - d. 1/2-inch and Larger: Tee pattern, ductile-iron or malleable-iron body, and access end cap, access coupling with EDPM gasket.
- R. Basket Strainers:
- 1. For 125 psig Systems or less and pipe sizes 16-inches or less: High-tensile ASTM A126B Class B cast iron, angle design, ductile iron clamped cover, flanged ends, stainless steel screen assembly, suitable gasket material, bottom threaded drain outlet.
  - 2. For systems operating greater than 125 psig and pipe sizes greater than 16-inches: High-tensile ASTM A126 Class B cast iron, angle design, bolted cover, flanged ends, stainless steel screen assembly, suitable gasket material, bottom threaded drain outlet.
- S. Gas Meter:
- 1. As per local utility supplier.
  - 2. Coordinate any monitoring of meter with 23 09 00.
- T. Domestic Water Meter:
- 1. General: Install per local utility.
- U. Vacuum Breakers
- 1. Armstrong
  - 2. Watts
  - 3. Hoffman+
  - 4. Spirax Sarco

## PART 3 - .EXECUTION

### 3.1 INSTALLATION, GENERAL

A. General:

1. Install specialties in accordance with manufacturer's instructions to provide intended performance.
2. Support tanks inside building from building structure in accordance with manufacturer's instructions.
3. Where large air quantities can accumulate, provide enlarged air collection standpipes.
4. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
5. Provide manual air vents at system high points and as indicated with 1/4" X 2" minimum copper tube to direct flow of air and fluid.
6. Provide valved drain and hose connection on strainer blow down connection.
7. Support pump fittings with floor mounted pipe and flange supports.
8. Provide relief valves on pressure tanks, low pressure side or reducing valves, heat exchangers, and expansion tanks.
9. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity.
10. Pipe relief valve outlet to nearest floor drain.
11. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.
12. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or sleeve but not to insulation with set screws. Install escutcheon to cover penetration hole and flush with adjoining surface. Provide high cap type escutcheon to clear sleeve extension where sleeve extends above finished surface.
13. Dielectric waterway fittings: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
14. Mechanical Sleeve Seals: at exterior foundation walls only
  - a. Installed between sleeve and pipe.
  - b. Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.

B. Hydronic Specialties Installation:

1. Install automatic air vents where noted.
2. Install in-line air separators in pump suction lines. Run piping to compression tank with 1/4 inch per foot (2%) upward slope towards tank. Install drain valve on units 2 inch and larger.
3. Install ball valve to isolate expansion tank for cleaning and blowdown. Install drain valve on tank for cleaning/blowdown.
4. Install separator in pump suction lines. Run piping to compression tank with 1/4 inch per foot (2%) upward slope towards tank. Install blowdown piping with ball valve, extend to nearest drain.
5. Provide sufficient number of pipe diameters to inlet of each pump as noted in detail or install pump suction diffusers on pump suction inlet, adjust foot support to carry weight of suction piping. Install nipple and ball valve in blowdown connection.
6. Install gauge glass and cocks on end of compression tanks. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.
7. Provide adequate support from structure to carry twice the weight of the tank, piping connections, fittings, and weight of water assuming a full tank of water. Do not overload building components and structural members. Coordinate concrete inserts with general contractor.

**END OF SECTION 23 21 16**