

SECTION 23 22 13

STEAM AND CONDENSATE PIPING

PART 1 GENERAL

1.1 HOTWORK

- A. General Conditions of the Contract: special note should be taken of Permitting requirements and HOTWORK regulations as identified in Article 4.

1.2 SUBMITTALS

- A. Product Data: For each type of special-duty valve and steam trap indicated, including rated capacities and accessories.
- B. Welding Certificates: Copies of certificates for welding procedures and personnel.
- C. Maintenance Data: For steam traps, vacuum breakers, and meters to include in maintenance manuals specified in Division 1.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

1.4 COORDINATION

- A. Coordinate layout and installation of steam and condensate piping and suspension system components with other construction, including light fixtures, hydronic piping, fire-suppression-system components, and partition assemblies.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Steam:
 - 1. Schedule 40 black steel pipe and cast iron fittings for sizes 2" and smaller, and butt-welded fittings 2-1/2" and larger.
 - 2. Direct bury pipe shall not be used for steam applications without the approval of DPS and mechanical engineer.
- B. Condensate:
 - 1. Schedule 80 black steel pipe and extra-heavy cast iron fittings.
 - 2. Direct bury pipe shall not be used for steam applications without the approval of DPS and mechanical engineer.
- C. Grooved Joint Piping System for Saturated Steam with operating temperatures to +388 deg F (197 deg C) and 200 psi (1379-kPa) in pipe sizes NPS 2 through NPS 8 (DN50 through DN200).:
 - 1. Fittings for grooved joint steam piping systems shall be carbon steel, conforming to ASTM A216, grade WCB, with zinc coating. Fittings shall be grooved in accordance with Victaulic Specification OGS-200.
 - 2. Grooved Joint Couplings for Saturated Steam: Rigid type, suitable for saturated steam piping systems on Schedule 40 or 80 carbon steel pipe. Couplings shall consist of two ductile iron housing segments conforming to ASTM A536, Grade 65-45-12 with zinc coating per DIN EN 13858, PTFE composite seals, cobalt-chromium-nickel alloy spring energizer conforming to AMS 5833, and ASTM A193 hex bolts, A194 heavy hex nuts, and ASTM F436 steel washers. Victaulic Style 870 Rigid Coupling.
 - 3. Expansion Loops for Steam: OGS-200 grooved ends, expansion loop consisting of two schedule 40 carbon steel 90-degree bends and 180-degree return, and two 321 stainless steel corrugated hose sections with 304 stainless steel braid. The loops are suitable for working pressure to 150-psi (1034-kPa) at working

temperatures to 366°F (186°C) in sizes NPS 2 through NPS 8 (DN50 through DN200). Victaulic Series 159.

4. Pipe shall be grooved using a Victaulic grooving tool equipped with R9S roll sets, in accordance with Victaulic Specification OGS-200.

2.1 STEAM TRAPS

A. Acceptable Manufacturers:

1. Armstrong.
2. Sarco.
3. Watson McDaniel.
4. ITT McDonnell Hoffman

2.2 PRESSURE-REDUCING VALVES

A. Not Used.

2.3 RELIEF VALVES

A. Acceptable Manufacturer:

1. Kunkle.

2.4 STRAINERS

A. Acceptable Manufacturers:

1. Armstrong
2. Boylston
3. AW Cash
4. Fisher
5. ITT
6. Hoffman
7. Keckley
8. Leslie
9. Mueller/Fabrotech

B. Y-Pattern Strainers: 250-psig working steam pressure; ASTM A 126, Class B cast-iron body; stainless-steel screen, No. 20 mesh for 2" and smaller and manufacturer's recommended perforations for 2-1/2" and larger; tapped blow off plug. Threaded connections for strainers 2" and smaller and flanged connections for strainers 2-1/2" and larger.

C. Basket Strainers: 250-psig working steam pressure; ASTM A 126, Class B cast-iron body; stainless-steel screen; bolted cover; threaded connections for strainers 2" and smaller and flanged connections for strainers 2-1/2" and larger.

2.5 FLANGE GASKETS

A. Acceptable Manufacturers (Non-asbestos only)

1. Flexitallic or DPS approved equivalent.

2.6 RISING-STEM GATE VALVES

A. Acceptable Manufacturers:

1. Stockham
2. Lunkenheimer
3. Powell
4. Jenkins

B. Up to two (2) inches: bronze, rising stem.

C. Over two (2) inches: iron, rising stem.

2.7 HIGH-PERFORMANCE BUTTERFLY VALVES

- A. Acceptable Manufacturers:
 - 1. Jamesburg
 - 2. Tyco

2.8 VACUUM CONDENSATE UNIT

- A. Unit shall be designed for high temperature use.
- B. Receiver shall be close grained cast iron for corrosion protection.
- C. Duplex bronze fitted pumps.
- D. NEMA 2/UL listed control panel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Prior to any steam system installation work, the installer shall review the installation and the equipment to be installed with DPS and Mechanical Engineer.
- B. Install anti-seize joint compound appropriate for steam applications. No sealants with adhesive, such as Rector-Seal, will be acceptable.
- C. Install drains, consisting of a tee fitting, ¾" ball valve, and short ¾" threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- D. Install steam supply piping at a uniform grade of 0.2 percent downward in direction of steam flow.
- E. Install condensate return piping at a uniform grade of 0.4 percent downward in direction of condensate flow.
- F. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
- G. Unless otherwise indicated, install branch connections to steam mains using 45-degree fittings in main pipe, with the takeoff coming out the top of the main pipe. Use of 90-degree tee fittings is permissible if 45-degree fittings are impractical. If length of branch takeoff is less than 10 feet, pitch branch line down toward mains at a 0.4 percent grade.
- H. Provide unions in piping 2" and smaller adjacent to each valve, at final connections of each piece of equipment, and elsewhere as indicated.
- I. Provide flanges in piping 2-1/2" and larger at final connections of each piece of equipment and elsewhere as indicated.
- J. Grooved Piping System: See the latest copy of Victaulic Specification OGS-200 and the Field Assembly and Installation Instruction Manuals and Handbooks specific to the product being installed.
- K. Provide strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, traps, and elsewhere as indicated. Install ¾" nipple and ball valve in blowdown connection of strainers 2" and larger. Match size of strainer blow off connection for strainers smaller than 2".
- L. Install anchors on the piping for proper direction of expansion and contraction.
- M. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.
 - 1. On straight runs with no natural drainage points, install drip legs at intervals not exceeding 300 feet where pipe is pitched down in direction of steam flow and a maximum of 150 feet where pipe is pitched up in direction of steam flow.
 - 2. Reduce distances above by about half in systems warmed up automatically.
 - 3. Specify gate valve at drip legs, dirt pockets, and strainer blowdowns to allow removal of dirt and scale.
 - 4. Specify that steam traps close to drip legs and equipment. Show steam traps in accessible locations.
- N. Hanger, support, and anchor devices are specified in Division 23.
- O. Terminal Equipment Connections:
 - 1. Size for supply and return piping connections shall be same as for equipment connections.

2. Specify traps and control valves in accessible locations close to connected equipment.
 3. For heat exchangers, specify bypass piping with globe valve around control valve. If multiple, parallel control valves are installed, only one bypass is required.
 4. For heat exchangers, specify vacuum breaker downstream from control valve and bypass and close to coil inlet connection.
 5. Specify ports for pressure and temperature gauges at coil inlet connections.
 6. Specify a drip leg at coil outlet.
- P. Vacuum breakers:
1. Required at all heat exchanger equipment and absorption chillers with automatic temperature control valves. Use ball-type, similar to Spirax-Sarco VB14 and VB21.
- Q. Steam traps:
1. End of main drips: bucket type.
 2. Terminal equipment (except for radiators and convectors): float and thermostatic.
 3. Radiators and convectors with cooling legs: thermostatic.
 4. Contract Documents shall indicate sizing parameters for traps.
 5. Drawing detail shall indicate, in the direction of condensate flow: ball valve, strainer with drain valve, union, trap, union, test-tee with ball valve, spring-loaded check valve and ball valve.
- R. Valves:
1. High-performance butterfly valves are preferred over rising-stem gate valves where possible. High-temperature ball valves are preferred for condensate lines.
 2. Gate valves shall be rising-stem, installed with stems upright if possible, and no lower than horizontal.

END OF SECTION 23 22 13

