

SECTION 23 22 00 – STEAM AND CONDENSATE PIPING AND PUMPS

PART 1: GENERAL

1.1 PURPOSE:

- A. This standard is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. The responsibility of the engineer is to apply the principles of this section such that the University of Texas at Dallas may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be justified through LCC analysis and submitted to UT Dallas for approval.

1.2 REFERENCES:

- A. ANSI/ASTM B31.1 – Power Piping
- B. ANSI/ASTM B31.9 – Building Services Piping

1.3 REQUIREMENTS:

- A. For the purposes of this standard steam systems shall be defined as follows:
 - 1. Low Pressure Systems: 0-15 psig and below
 - 2. Medium Pressure Systems: 15-125 psig
 - 3. High Pressure Systems: 125 psig and above
- B. Provide low pressure steam via a two-parallel full capacity pressure reducing stations with 33/67% pressure reducing valves (PRV's).
- C. Provide a tee in the condensate receiver vent line with plugged branch, just above the receiver, for University installation of a high-level float switch.
- D. Provide a capped tee in the condensate return line immediately upstream of the receiver for later use by the University.
- E. Provide a plugged opening on the low side of any condensate receiver, for installation of a thermo well for future temperature sensor by the University.
- F. Arrange the inlet piping to the condensate receiver so the University can dump condensate to floor drain before it enters the receiver.
- G. Avoid the use of plug valves in condensate systems.
- H. Provide spring-assisted, silent check valves on condensate pump discharge.
- I. Avoid 3½" and 5" diameter pipe.
- J. Use 316 stainless steel tubing with Swagelok fittings between the discharge of all condensate pumps and the connection at the utility tunnel.
- K. Provide shutoff valve between the receiver and each pump.
- L. Provide shutoff valves to isolate equipment, parts of systems, or vertical risers.
- M. Provide high pressure steam valve 12" and larger with an equalizing bypass valve assembly.
- N. Provide Flexitallic Model CG spiral-wound gaskets for steam and condensate flanged piping service.

PART 2: PRODUCTS

2.1 STEAM PIPING:

A. High pressure steam:

1. Piping shall be Schedule 80 black steel piping
2. Fittings shall be extra heavy butt-welded type. Flanges shall be 300 lb. class welding neck type.

B. Low and Medium pressure steam:

1. All piping shall be Schedule 80 black steel piping.
2. Fittings on piping 2½" and larger shall be extra heavy butt-welded type. Flanges shall be 300 lb. class welding neck type. Unions shall be 300 lb. class.
3. Fittings on piping 2" and smaller shall be screwed type, class 300 malleable black iron. Unions shall be 300 lb. class.

2.2 STEAM SPECIALTIES:

A. Pressure Reducing Valves:

1. Steam pressure reducing valves shall be Spirax Sarco25P. Owner to be provided with manufacturer's recommended repair kit. Pressure reducing valves 2½" or larger shall be flanged and less than 2" shall be threaded. PRV pipe and fittings shall be Schedule 80, 300 lb. class, up to and including the first downstream block valve.

B. Steam Traps:

1. Inverted bucket traps are to be used only when the condensate outlet is subject to back-pressure. When condensate flows by gravity from the trap, a float and thermostatic trap shall be selected. Bucket traps on high-pressure steam to be Spirax Sarco B Series steam trap. Provide a separate gate valve installed between the trap valve station and the steam line
2. Float and Thermostatic Traps shall be ASTM A126, cast iron body and bolted cover for 200 psig WSP; provide access to internal parts without disturbing piping; with bottom drain plug, stainless steel bellows type air vent, stainless steel float, stainless steel lever and valve assembly. F&T traps used in low pressure (15 psig or less) drip applications shall be rated at 30 psig to avoid lockup in event inlet pressure exceeds 15 psig. F&T traps used in process applications (coils and vessels) shall be mounted at least 10" below the process. The installation shall also include vacuum breaker sized for the application, air vent and compound pressure gauge.
3. Thermodynamic traps are preferred over inverted bucket traps for drip applications above 30 psig when condensate flows by gravity to a receiver (the typical arrangement), prevented backpressure on the trap.
4. All trap station components (traps, valves, strainers) for clean steam system shall be of 316L stainless steel construction, body and trim.

C. Steam Relief Valves:

1. Relief valves 2" and smaller shall have brass bodies and arranged for screwed connections. Such relief valves shall be Spirax Sarco SV5708 Brass Safety Valves for steam. Add Spirax Sarco DPE drip pan elbow on outlet of all safety relief valves. Pipe weep holes for safety relief valve and drip pan elbow to drain.
2. Relief valves 2½" and larger shall in the case of all medium and low pressure steam piping systems be arranged for flanged inlet and screwed outlet connections. Such relief valves shall be Spirax Sarco SV73 Cast Iron Safety Valves for steam. Add Spirax Sarco DPE drip pan elbow on outlet of all safety relief valves. Pipe weep holes for safety relief valve and drip pan elbow to drain.

3. The pressure at which each relief valve shall open is designated on the Drawings. When such valves are ordered by the Contractor, he shall definitely specify the pressure at which each relief valve is to be set. Each valve shall have a metal tag attached stamped with the valve identification plus the pressure setting.

D. Manual Valves:

1. Low and medium pressure isolation valves shall be ball valves, Zinc plated A-105 carbon steel body and stainless steel trim, R-PTFE seats, threaded 3-piece design for pipe sizes of 2" and under (flanged for sizes above 2").
2. High pressure Isolation valves shall be gate valves.

E. Strainers:

1. Strainers shall be A-105 or ductile iron threaded body for pipe sizes of 2" and under (flanged for sizes above 2"), rated for system temperature and pressure, 20-mesh stainless steel screen, with full-sized blow-off valve piped to drain; strainers to be Spirax Sarco IT strainers.
2. Exception – Strainers upstream of control valves and PRV's shall have 100-mesh stainless steel screens.

F. Air Vents and Vacuum Breakers:

1. Provide automatic air vents with a pressure rating equal to system classification, but not less than 125 psig. Air vents to be Spirax Sarco VS204 air vents.
2. Provide shut off valve for maintenance of the air vent.
3. Locate all air vents and their discharge lines in accessible locations, preferably clustered and pipe all air vents to drain.
4. Mount vacuum breakers between control valve and equipment, in vertical position with cap on top, and at the highest point of the circuit; vacuum breaker to be Spirax Sarco VB14 with low cracking pressure.
5. Large coils or equipment may require more than one vacuum breaker.

2.3 CONDENSATE RETURN PUMP:

A. Low Profile Pressure Powered Pump

1. Pump shall be Spirax Sarco PPEC low profile pressure powered pump or equal.
2. Pump shall be operated by steam, compressed air, or other pressurized gas to 125 psig, which does not require any electrical energy.
3. Body constructed of cast iron to pump liquids of 0.65 specific gravity or higher.
4. Pump shall contain a float operated snap-acting mechanism with no external seals or packing, stainless steel trim, and hardened stainless steel mechanism bearing components with single piece motive inlet valve.
5. Pump to be provided complete with inlet and outlet stainless steel check valves attached at the factory for ease of field installation.
6. Pump to be provided with sight glass.
7. Pump shall be installed on a factory pre-piped packaged assembly including minimum 12 gallon vented receiver, stainless steel check valves, inlet strainer, exhaust and motive piping and fabricated steel skid.

B. Pressure Powered Pump

1. Pump shall be Spirax Sarco PTC Pivotrol Pump pressure powered pump or equal.
2. Pump shall be operated by steam, compressed air, or other pressurized gas to 200 psig, which does not require any electrical energy.
3. Body constructed of ductile iron.
4. Pump shall have stainless steel, split disc check valves on the inlet and outlet connections.
5. Pump shall contain Spirax Sarco Power Pivot inside to ensure longevity and reliability of pump.
6. Pump shall include an Inconel Spring with a lifetime warranty and be supplied with an integral cycle counter to monitor a 3-million cycle x 3-year warranty.
7. Pump to be provided with sight glass.
8. Pump shall be installed on a factory pre-piped packaged assembly including minimum 31 gallon vented receiver, stainless steel check valves, inlet strainer, exhaust and motive piping, isolation valves, and fabricated steel skid.

C. Automatic Pump Trap

1. Pump trap shall be Spirax Sarco automatic pump trap (Model APT) or equal.
2. Pump trap shall be operated by steam to 200 psig, which does not require any electrical energy.
3. Body construction of SG iron (EN JS 1025 dual certified with ASTM A395) with integral swing type inlet check valve and integral ball type outlet check valve (APT14 only).
4. The internal trap mechanism shall contain dual stainless steel floats connected with two-stage trap.
5. The internal pump mechanism shall be made of stainless steel incorporating a single spring snap-action device with no external seals or glands.
6. Pump trap shall be installed on a complete pre-piped factory package requiring only service connections for a fully functional system. Individual pump and traps systems will not be accepted.
7. Packaged pump trap assembly shall have a condensate receiver constructed for 200 psig WP, structural steel platform skid, motive piping, exhaust sensing line, isolation valves and air vent.

D. Fittings on piping 2½" and larger shall be extra heavy butt-welded type. Flanges shall be class 300 welding neck type.

E. Fittings on piping 2" and smaller shall be screwed type, class 300 black cast iron. Unions shall be 300 lb. class.

PART 3: EXECUTION

3.01 PIPE TESTING PROCEDURES:

- A. Refer to Appendix for plumbing pipe testing procedures.

END OF SECTION 23 22 00