

**GENERAL:**

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The scope of this document is to provide instruction for the installation of all piping specialties for exterior underground steam & condensate systems.

**DESIGN GUIDELINES:**

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**A. Materials**

1. Traps
  - 1.1. Inverted bucket traps shall be cast iron ASTM A278, Class 30, with 250 psig pressure rating at 450 F, side inlet/outlet, with 3/4" pipe connections and a minimum 1/8" orifice. Lever arms and bucket shall be stainless steel. Minimum trap capacity shall be 400 lb/hr at 10 psi differential with capability to operate with 80 psi differential. Traps shall be model 800 as manufactured by Armstrong International, or approved equal.
2. Strainers
  - 2.1 Strainer shall be Y-pattern with stainless steel screen having .045" openings.
  - 2.2 Strainers shall be ST-2: Screwed, 600 lb., cast steel ASTM A216 Grade WCB, model B1SC as manufactured by Armstrong International, or approved equal.
  - 2.3 Strainer shall have blowdown gate valve and associated piping of size matching blow down connection.
3. Check Valves
  - 3.1 Check valves installed downstream of steam bucket traps shall be 3/4" threaded Class 200 (ASME/ANSI B16.34) bolted flanged cap, stainless steel body swing check valves. Valves shall be #2341 as manufactured by Powell Valves, Cincinnati, OH, or approved equal.
4. Expansion Joints
  - 4.1. Externally pressurized bellows expansion joints shall be model "PM" as manufactured by Adsco Manufacturing, Hyspan 3502 or Senior Flexonics Pathway.
  - 4.2. Joint shall be internally/externally guided and have integral heavy cover and sleeve, and drain and vent connections. The external housing shall be designed for full line pressure.
  - 4.3. Joint shall be as follows:

Type	Single without base Ends Weld. Wall schedule to match pipe.
Bellows Type	Externally pressurized, 150 psig design
Bellows Material	304 stainless steel or Inconel
Covers	Integral
Sleeve	Integral

## 336315 Steam Energy Distribution Piping Specialties

Cycles	1000
Maximum Thrust Area	148 sq. in. for 10" joint 84 sq. in. for 8" joint 50 sq. in. for 6" joint 22 sq. in. for 3" joint
Maximum Axial Spring Rate	410 lb/in for 10" joint 1385 lb/in for 8" joint 525 lb/in for 6" joint 674 lb/in for 3" joint

4.4 Joints shall be precompressed at the factory for the design travel and shipped with suitable restraining devices to permit proper installation of joint in cold line. Provide for possible joint extension of at least 10% of rated travel. Joints shall include integral flow restrictor.

4.5 Joints and guides shall be properly cleaned and painted with manufacturer's standard finish.

## 5. Sump Pumps

5.1. Sump Pump shall be high-temperature, automatic, submersible, non-clog, centrifugal sewage pump designed for continuous 200F liquid applications with suction strainer, and two vane open impeller. Pump shall have cast iron housing, 416 stainless steel shaft, 304/316 SS hardware, and cast iron impeller, with pump out vanes on backside.

5.2. Pump shall be 115V with 2" NPT discharge, integral float switch and 3-wire cord and plug.

5.3. Pump shall be [Zoeller](#) BN2137 high temperature sump pump, or approved equal.

## 6. Pressure Gauges

6.1. Pressure gauges shall be installed as before every main line steam valve. Coordinate gauge locations with owner.

6.2. Pressure gauges shall be 1% accuracy with stainless steel movement, black phenolic or aluminum alloy case, 4-1/2" diameter dial and 1/2" NPT connection. Gauges shall be by Ashcroft, Palmer, Trerice, Weiss or Weksler.

6.3. Bourdon tube shall be stainless steel.

6.4. All gauges shall have 1/2" carbon steel bar stock needle valve suitable for steam service.

6.5. Gauges used on steam service shall be protected with pigtail siphons.

6.6. Gauge scale range shall be as follows:

6.6.1. Steam: 0 - 100 psig

6.6.2. Condensate 0 – 100 psig

## 7. Pipe Penetration Sealing Assembly

7.1. Pipe penetration sealing assembly shall be model "T" Link-Seal Modular Seal as manufactured by PSI-ThunderLine Corporation.

7.2. Sealing assembly shall be modular, mechanical type, consisting of inter-locking synthetic rubber links shaped to continuously fill the annular space between the

pipe and the wall opening. The elastomeric element shall be sized and selected per manufacturer's recommendations and have the following properties as designated by ASTM:

For High Temperature or Fire Seal Applications (-67°F to 400°F)  
SILICONE = ASTM D2000 M1GE505.

8. Vent Cap

8.1. Furnish and install vent caps in steam chases entering buildings, next to the building.

8.2. Caps for pipe vents shall be mushroom type with cast aluminum body, brass mesh screen, and 4" NPT connection, catalog number 11740 as manufactured by Preferred Utilities, Danbury CT, or approved equal.

9. Flexible Connector

9.1. Flexible connectors for compressed air piping shall be bellows type installed in strict accordance with manufacturer's instructions and pressure temperature ratings.

9.2. Metal bellows type connector shall consist of 300 series stainless steel bellows surrounded and supported by 300 series stainless steel braid, complying with ISO Standard 10380, with seamless or butt welded annular Type X and high flexibility Type I construction. Connector shall be 3" diameter, rated for 3" offset motion at no less than 50,000 cycles at working pressures to 290 psig at 70°F. Burst pressure shall be no less than 1500 psig. Connector shall have live length no less than 24" with female union ends. Connector shall be American BOA PARRAP or approved equal.

**B. Installation**

1. Traps shall be located in an easily accessible area.
2. Do not install pumps until manholes are cleaned of all dirt and debris.
3. Pressure gages should be installed so as to be visible and accessible.
4. Steam drip legs and traps shall be installed at all low points in the system. Drip legs shall be full pipe size for 4" pipe and smaller and a minimum of 4", but not less than half the pipe diameter for lines larger than 4". Length of drip legs shall be 1-1/2 times the main diameter but not less than 10". Steam line drip leg pipe shall be Schedule 80. All traps and related valves shall be easily accessible from floors.
5. To insure proper expansion joint alignment the piping shall be made up "solid" and anchored and then a section of pipe shall be cut out and joint welded into the pipe line.
6. Pressure, temperature, maximum overall length, and travel of expansion joints shall be as needed.

7. Steam and condensate pipe penetrations entering through a concrete building foundation shall be installed with a Link-Seal Modular seal assembly.

### **C. COMMISSIONING**

1. MU Only: Steam and condensate will be turned on by Energy Management Utility Distribution personnel. Owner's Representative will coordinate.

### **REFERENCES**