

SECTION 336315 – PIPING SPECIALTIES FOR STEAM UTILITY DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

1.2 SUMMARY

- A. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the Drawings and as specified herein.
- B. This section includes the furnishing and installation of gages, steam traps, and miscellaneous piping specialties.
- C. Related sections include the following:
 - 1. Division 33 Section "Utility Distribution General Requirements."
 - 2. Division 33 Section "Piping for Utility Distribution."
 - 3. Division 33 Section "Valves for Utility Distribution."
 - 4. Division 33 Section "Steam and Condensate Utility Distribution."
- D. This section includes, but is not limited to, the following instrumentation work:
 - 1. Provide necessary valved pressure and temperature taps, steam, and drain connections and piping.
 - 2. [Furnish and install flow metering and pressure and temperature data collectors.]
 - 3. [Provide signal converters and other devices as necessary to communicate with the campus building automation system (BAS).]

1.3 REFERENCES

- A. Except as herein specified or as indicated on the Drawings, the work of this section shall comply with the following:
 - 1. ASTM Specifications:
 - a. A126 - Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - b. A216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service.
 - c. A193 - Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service.

- d. A278 - Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650 Degrees F.
- 2. ANSI Standards:
 - a. B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
 - b. B16.5 - Pipe Flanges and Flanged Fittings.
- 3. ASME American Society of Mechanical Engineers:
 - a. Boiler and Pressure Vessel Code - Section II.
 - b. B31.1 - Power Piping.
 - c. B31.9 - Building Services Piping.

1.4 SUBMITTALS

- A. Manufacturer's literature for all items specified herein to include:
 - 1. Dimensions.
 - 2. Details of construction and installation.
 - 3. Name of manufacturer.
 - 4. Model.
 - 5. Performance characteristics.
 - 6. Options and accessories.
 - 7. Details of construction and data for expansion joint insulating blankets.
- B. Factory test certification.
- C. Drip and Trap Circuit Layout Drawings: Submit for Engineer's and Owner's review, a dimensioned layout drawing for all trap circuits. Drawings shall be to scale and may be 3-dimensional or include sufficient section cuts to indicate spatial relationships of steam and condensate piping, drip legs, bleeders and valve orientation.

1.5 QUALITY ASSURANCE

- A. Qualifications: For fabrication and installation personnel:
 - 1. Trained and experienced in the fabrication and installation of the materials and equipment.
 - 2. Knowledgeable of the design and the reviewed Shop Drawings.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

- A. Manufacturer:
 - 1. Advanced Thermal Systems, Inc., Thermal Pak Type TP2.
 - 2. Yarway Corporation "Gun-Pakt."
 - 3. Hyspan Series 6500 Perma-Pax.

- B. Location: As indicated on Drawings.
- C. Sizes: Appropriate for pipe size.
- D. Type:
 - 1. Provide single slip type, packed expansion joints of fabricated steel with bronze integral internal and external guides, fully packed, welded ends, bases as indicated on the Drawings, designed for 150 psi (90 psi working pressure) with traverse distances as indicated on Drawings.
 - 2. Fabricate the body and slip of ASTM A53, Grade B, seamless steel pipe, Schedule 40 for steam service and Schedule 80 for condensate service. Provide the joint with stainless steel limit stops designed for full line pressure thrust at 3.0 times or greater design pressure.
 - 3. Equip expansion joints with carbon steel packing cylinders with internal acme thread and a carbon steel cylinder body with external acme thread welded in place on the circumference of the joint and fitted with a 1/4-turn shut off valve or check fitting to prevent blowback, allowing the addition of semi-plastic self-lubricating packing under full line pressure.
 - 4. Each expansion joint shall have the following number of packing cylinders located on the circumference of the joint:

PIPE SIZE (NPS)	NO. OF CYLINDERS
1-1/4" - 3"	2
4"	2
5" - 6"	3
8" - 10"	4
12" - 14"	5
16" - 18"	6
20" - 24"	8

- 5. Provide manufacturer's guarantee that all joints are free from defects in materials and workmanship for a period of 5 years from the date they are put into service.
- 6. Factory Testing:
 - a. Cycle test each expansion joint and record test data for each joint.
 - b. Hydraulically cycle each expansion joint 3 times after packing inspection to ensure free movement for the total rated traverse.
 - c. Provide Cycle Test Results with Joint Friction Loading for Full Stroke at 150 psi Steam Loading, for each expansion joint.
 - d. Testing shall be conducted by the manufacturer or by an approved independent testing agency (Owner approved).

7. Each expansion joint shall be complete with weatherproof reusable insulation blanket furnished and manufactured by joint manufacturer or by pre-approved custom fabricator. Blanket shall be 2 piece design, custom made to fit expansion joint body and slip side of joint. Inside diameter of insulation on slip end shall be equal to the outside diameter of adjoining pipe and insulation. Packing glands must be accessible for service without removing blanket. Material shall be suitable for damp installations, exposure to salt, and for temperature to 550 degrees F. Insulation blanket shall be 2 inches thick; equal to ATS, MT550 NN.

2.2 WALL PENETRATIONS

- A. Provide Schedule 40 coated steel or cast iron sleeves wherever piping passes through walls.
- B. Provide modular, mechanical type seals, consisting of inter-locking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall opening.
- C. The elastomeric element shall be sized and selected in accordance with manufacturer's recommendations and have the following properties as designated by ASTM:
 1. For High Temperature Applications:
 - a. -67 to +400 degrees F (-55 to +204 degrees C).
 - b. Silicone = ASTM D2000 M1GE505.
- D. "Link-Seal" by Thunderline Corporation; or as approved.

2.3 GASKETS

- A. Flanged joints shall be fitted with one 900 pound ring gasket. Gaskets shall cover full space on inside of bolt holes, not extending beyond inside diameter of pipe. Gaskets shall be Flexitallic Style CG with 304 stainless steel winding, graphite filler and carbon steel guide ring.

2.4 STEAM TRAP CIRCUITS

- A. General:
 1. Traps shall be noiseless, steam tight, and properly sized for condensing capacity and operating pressure of the line they serve with adequate safety factor allowed.
 2. Acceptable Manufacturer: Armstrong. No substitutions.
- B. Inverted Bucket Steam Traps:
 1. Traps shall have cast iron body and cover, 1-inch threaded connections, stainless steel bucket and internal strainer screen and check valve, renewable hardened stainless steel head and seat side, and inlet and side outlet. Working steam pressure is 90 psi.
 2. Armstrong Series 880. Unless otherwise indicated, traps used on this Project shall be one of the following:
 - a. Size 881, 1/8-inch orifice.
 - b. Size 882, 5/32-inch orifice.

c. Size 883, 1/4-inch orifice.

C. Strainers: Class 250, extra heavy cast iron body Type “Y” strainer with threaded ends. 1/16-inch diameter perforated stainless steel screen. Mueller No. 11M; or approved equal.

D. Eductor:

1. Eductor shall have stainless steel body, stem, and delivery as manufactured by Penberthy, Model GH.

2. Fabricate and install special tailpiece as indicated on the Drawings.

2.5 GAGES

A. General: Gages shall have 4-1/2-inch dial size, stainless steel polished case and ring, 316 stainless steel tube and socket, 1/4-inch NPT lower connection, and be installed on 1/2-inch nipples with reducing fittings (no bushings).

B. Steam Pressure Gages:

1. Steam pressure gages shall have a 1/4-inch coil syphon between the pipe and gage, and be graduated 0 to 200 psi, with figures every 20 psi, and intermediate graduations every 2 psi.

2. Gages shall be Ashcroft Type 1009; or equal by Trerice.

C. Condensate Pressure Gages (Pressurized Return Only):

1. Condensate pressure gages shall be graduated 0 to 100 psi, with figures every 10 psi and intermediate graduations every 1 psi.

2. Gages shall have brass pulsation dampener attached.

3. Ashcroft No. 1106B; or equal by Trerice.

2.6 [FLOW METERING AND PRESSURE/TEMPERATURE DATA COLLECTORS

A. Manufacturer:

1. Rosemount Division of Emerson Process Management.

2. As approved by Owner.

B. Signal Converter:

1. Rosemount Model 333 U Tri-Loop HART-to-analog signal converter with high alarm option.

2. Required for both flow and temperature/pressure applications.

C. Mass Flow Meter Applications – Pipe Sizes Greater Than 10-inch Diameter:

1. Rosemount Model 3051SFA MFA Mass ProBar Flowmeter for steam service.
 2. Multi-variable (differential and static pressure and temperature) transmitter.
 3. Rosemount Model 485 and 316 stainless steel sensor.
 4. Integral RTD.
 5. Aluminum PlantWeb housing with 1/2-inch – 14 NPT conduit connection.
 6. 4-20 mA analog signal with superimposed digital signal using HART protocol.
- D. Mass Flow Meter Applications – Pipe Sizes 10-inch Diameter and Less:
1. Rosemount Model 3051SFC Compact Orifice Flowmeter for steam service.
 2. Multi-variable (differential and static pressure and temperature) transmitter.
 3. Conditioning orifice plate.
 4. Integral RTD.
 5. Aluminum PlantWeb housing with 1/2-inch – 14 NPT conduit connection.
 6. 4-20 mA analog signal with superimposed digital signal using HART protocol.
- E. Temperature/Pressure Data Collection Applications:
1. Rosemount Model 3095 MA transmitter.
 2. External single element RTD.
 3. Aluminum PlantWeb housing with 1/2-inch – 14 NPT conduit connection.
 4. 4-20 mA analog signal with superimposed digital signal using HART protocol.]

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install piping specialties in conformance with:
1. The Shop Drawings reviewed by Engineer.
 2. The manufacturer's recommendation.
- B. Strainers:
1. Drip legs, on steam mains, shall have strainers installed ahead of traps.
 2. Strainer screens shall be monel metal or stainless steel and the free area through the screen shall be at least 2-1/2 times the pipe area in which it is installed.
 3. Perforations shall be 0.033 inches for steam strainers, 0.045 inches for condensate lines.
- C. Steam Traps:
1. Low points in steam lines, the bottom of down feed risers, shall have traps of proper size and type.
 2. Traps for draining low points in steam mains shall be high or low pressure bucket type.

3. Traps shall be provided with a gate valve and unions on both side. Ahead of each trap install a dirt pocket in accordance with detail.
4. Use Armstrong inverted bucket traps for campus distribution.
5. [Steam traps used for North Campus shall be selected for vacuum return system of 4 inches Hg.]

D. New Expansion Joints:

1. Contractor shall support and align the steam and/or condensate return line to guarantee proper operation of the expansion joint prior to installing the new expansion joint. Alignment of the steam and condensate lines is considered essential to the Work of this Contract.
2. Align the steam and/or condensate line with use of a laser device, measurements shall be taken in 2 planes (horizontal and vertical) 90 degrees from each other. Adjust the pipe support guides, and/or anchor connections as necessary to provide proper axial movement into the expansion joint according to the manufacturer's specifications, and current standards.
3. Strictly adhere to the following installation procedures and the manufacturer's instructions for installing the slip type expansion joints in the high pressure steam and condensate return system.
 - a. Align the pipe (see Items 1 and 2, above) and install the pipe supports, hangers and guides between the 2 main anchors making sure the pipe is aligned.
 - b. Perform required testing.
 - c. Cut the piping out where the expansion joint is to be installed and check for pipe movement or springing. This step is to be scheduled with the Project Representative 1 week in advance.
 - d. Carefully protect the slip surface from damage during handling and installation.
 - e. Expansion joint will be shipped at a preset ambient temperature, normally 70 degrees F (21 degrees C). If the ambient temperature at the time of installation is colder or hotter, then adjust the travel of the expansion joint as required.
 - f. Cut or extend the pipe opening to match the expansion joint's length.
 - g. Align and weld expansion joint to the piping according to manufacturer's recommendations and Contract Documents.
 - h. Contractor shall provide a pipe support for the expansion joint when required by manufacturer or code, or both. Provide a concrete pad under the support to protect from moisture and corrosion.

- i. Lubricate expansion joints in accordance with manufacturer's recommendations prior to activation. Relubricate as necessary during activation and prior to final acceptance.
- j. Contractor shall have a manufacturer's representative inspect each expansion joint after installation.

E. Existing Expansion Joints:

1. The Contractor shall support and align the steam and/or condensate return line to guarantee proper operation of the expansion joint prior to connection to the expansion joint. Alignment of the steam and condensate lines is considered essential to the Work of this Contract.
2. Align the steam and/or condensate line with use of a laser device, measurements shall be taken in 2 planes (horizontal and vertical) 90 degrees from each other. Adjust the pipe support guides, and/or anchor connections as necessary to provide proper axial movement into the expansion joint in accordance with the manufacturer's specifications and current standards.
3. Strictly adhere to the following installation procedures and the manufacturer's instruction for installing the slip type expansion joints in the high pressure steam and condensate return system.
 - a. First align the existing pipe (see Items 1 and 2, above) and replace the pipe supports, hangers, and guides between the 2 main anchors making sure the pipe is aligned.
 - b. Cut the existing expansion joint out and check for any pipe movement or springing. This step is to be scheduled with the Project Representative 1 week in advance.
 - c. Carefully protect the slip surface from damage during handling and installation.
 - d. Expansion joint was shipped at a preset ambient temperature, normally 70 degrees F (21 degrees C). If the ambient temperature at the time of installation is colder or hotter, then adjust the travel of the expansion joint as required.
 - e. Cut or extend the existing pipe opening to match the new expansion joints length.
 - f. Align and weld expansion joint to the piping according to manufacturer recommendations and Contract Documents.
 - g. Contractor shall provide a pipe support for the expansion joint when required by manufacturer and/or code. Provide a concrete pad under the support to protect from moisture and corrosion.
 - h. Lubricate expansion joints in accordance with manufacturer's recommendations prior to activation. Relubricate as necessary during activation and prior to final acceptance.

- i. Contractor shall have a manufacturer's representative inspect each expansion joint after installation.

F. Steam Trap Circuits:

1. A steam trap circuit shall be installed at each low point of the steam line.
2. Trap circuits in tunnels shall be installed to provide full access to components and connections for service and system maintenance. Layout shall also minimize risk from contact with hot piping, valves and blow-offs. Refer to submittal requirements.

G. Gages:

1. Pressure gages shall be installed before and after each steam or condensate main line valve.
2. Use concentric reducer for reduced gage line size.

H. Flow Meters and Pressure/Temperature Data Collectors: Install in accordance with Drawing details and manufacturer's instructions.

END OF SECTION 336315