SECTION 02695
STEAM DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
   1. Material, fabrication, testing and installation of buried steam and condensate piping and appurtenances

B. Related Sections:
   1. Section 02200 - Earthwork
   2. Section 02221 - Trenching, Backfilling, Compacting
   3. Section 02300 - Utility Tunnels
   4. Steam piping within the building: Division 15 sections or direct buried steam and condensate systems.

C. Order of preferred Installation:
   1. Utility tunnel
   2. Shallow trench
   3. Direct burial

1.2 INTENT: To conform the steam distribution system to the steam master plan.

1.3 CODES & STANDARDS:

1.4 QUALITY ASSURANCE:

A. Welding materials and labor: Refer to section 15521 of these standards.

B. All piping materials shall comply with local codes.

C. General: Comply with requirements of Sections 15010, 15050, and 15521.

D. Permits: Obtain tap permits from the University of Colorado at Boulder Utility Engineer.

1.5 SUBMITTALS:

A. Design Loads:
   1. Submit design loads for pipe sizing.

C. Record Drawings:
   1. At project close-out, submit record drawings of installed steam system piping and
PART 2 - PRODUCTS

2.1 PRE-INSULATED STEAM PIPING:

A. All underground pre-insulated steam piping shall be constructed of Perma-Pipe Pre-Insulated Piping System or approved equal. The conduit system shall be a Class A design being airtight, pressure testable, drainable and dryable. The conduit system shall be prefabricated and include conduit casing, pipe, insulation, pipe supports and guides, and where required, fittings, gland seals, end seals, and anchors. Straight sections of conduit system shall be furnished in random twenty (20) and forty (40) foot lengths. The piping manufacturer shall provide a representative on site to provide inspection and certification to the Owner of proper installation. Specific pre-insulated system pipe type (i.e. steel jacketed, fiberglass jacketed, etc.) is to be determined by the University engineer. Groundwater conditions are to be assessed in the design of all direct buried piping systems.

B. If steel casing is selected, appropriate cathodic protection is to be utilized.

C. Pipe Supports – All underground steam piping shall be supported within the conduit casing at not less than 10 foot intervals. Supports shall be insulated continuously and shall provide for drainage and venting of the system.

D. The steam piping and fittings shall meet the requirements as specified in Section 15060, Pipe and Pipe Fittings.

E. Comply with requirements of Sections 15050 and 15521.

2.2 GASKETS AND REDUCERS:

A. Refer to section 15521 of these standards.

2.3 APPLICATION OF PIPING SYSTEMS

A. Refer to section 15521 of these standards.

2.4 IDENTIFICATION:

A. Underground Type Plastic Line Markers (Applies to direct-bury only):

1. Manufacturer's standard permanent, continuous-printed plastic tape with metallic core, intended for direct-burial service; not less than 6’’ wide x 4 mils thick. Provide green tape with black printing reading “CAUTION STEAM LINE BURIED BELOW”.

2. Provide identification markers of one of the following:

   a. Allen Systems, Inc.
   b. Emed Co., Inc.
   c. Seton Name Plate Corp.
B. Tunnel: Identification shall meet the requirements of Section 02300.

PART 3 – EXECUTION:

3.1 PRE-INSULATED PIPING

A. Field joints – Conduit casing joints shall be made after all interior piping has been hydrostatically tested to 1-½ times the working pressure. Field joints shall then be completely insulated. After casing field joints have been made, the entire conduit system shall be air tested to 15 psi. Holiday test 100 percent of factory and field joint coating before backfilling.

B. Pre-insulated condensate piping shall meet requirements of pre-insulated steam piping.

C. Pre-insulated piping expansion shall be determined by the piping manufacturer and shall be accomplished with oversize casing elbows.

3.2 SYSTEM SUPPLIER REPRESENTATIVE:

A. The system supplier representative shall be a person who regularly performs the duties specified herein. Certified by the system supplier, technically qualified and experienced in the installation of the system. Provide verification of certification by the system supplier prior to the beginning of the work. The system supplier’s representative shall be present at the job site when the following work is performed. The system supplier’s representative shall certify in writing that all requirements have been performed. The system supplier representative will perform the following:

1. Inspection of trench prior to installation.
2. Inspection of thrust blocking.
3. Inspection of cold springing.
4. Hydrostatic testing of all piping.
5. Inspection of all field joint work.
6. Air test of conduit.
7. Inspection of any coating patchwork.
8. Inspection of all backfill up to 24 inches above the top of the casing.

B. The Contractor shall not perform any of this work in the absence of the system supplier’s representative.

C. The installation contractor shall be trained in the installation of the pre-insulation piping system by the system supplier prior to the beginning of any installation.

3.3 GENERAL:

A. Maintain minimum steam pipe slope of ½” down per 10’-0” in direction of flow unless otherwise noted on the drawings.

B. Provide drip trap assembly at low points and where condensate may back up in front of control valves. Where condensate lines form a trap, provide vent loop over trapped section.
C. Make reductions in horizontal steam pipe with flat bottom eccentric reducing fittings.

D. Install piping to allow for expansion and contraction without stressing pipe or connected equipment.

3.4 PREPARATION:

A. Ream pipe and tube ends. Remove burrs. Bevel plain and ferrous pipe.

B. Remove scale and dirt, inside and outside, before assembly.

C. Remove welding slag or foreign material from pipe and fitting materials.

D. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.

E. Flush each piping system and prove clean.

3.5 STEEL PIPE CONNECTIONS:

A. Use butt weld fittings for welded steel pipes. Use electric arc process.


3.6 PIPE TESTING:

A. General

1. Test all piping systems. Correct leaks by remaking joints. Remove equipment not able to withstand test pressure from system during test. Consult governing codes for special system requirements.

2. Give 48 hour notice of dates when acceptance test will be conducted. Conduct pressure, performance, operating tests in presence of representative of agencies having jurisdiction. Submit three copies of successful test reports to Owner.

3. Test pipe before being permanently enclosed.

4. Obtain certificates of approval, acceptance, compliance with regulations of agencies having jurisdiction. Submit to Owner.

B. System Tests

1. Hydrostatic test – steam and water piping: Hand pump system to greater of 150 psig or 150% of operating pressure. Maintain pressure until system has been inspected for leaks but not less than four hours.
3.7 UNDERGROUND PIPE INSTALLATION:

A. If steel casing is utilized, protect steel pipe installed below grade and to minimum 6” above grade with factory applied covering, Pro-Co felt and pipe line enamel No. 4 Double Wrap or X-Tru-Coat plastic coating.

B. Protect field joints on steel pipe as follows:

1. Clean fittings, nipples, other field joints thoroughly.

3.8 INSTALLATION OF IDENTIFICATION:

A. During backfilling and topsoiling of underground steam piping, install continuous underground plastic line markers, located at two (2) depths 1’ below grade and 1’ above pipe.

3.9 STEAM DISTRIBUTION INSTALLATION REQUIREMENTS:

A. Install drip legs and drain traps. These must be installed at intervals of no more than 300’ (direct bury piping must have drip legs and drain traps installed at intervals of no more than 300’ and must be assessable for maintenance).

B. Reference UCB standard for steam mains, main drip, 15521 appendix A, drawing C for recommended steam main and branch line drip leg sizing.

C. Refer to section 15521: Steam and condensate piping specialties for material and installation requirements.

END OF SECTION 02695