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STANDARD SPECIFICATION
SECTION 15G
STEAM PIPING, UNDERGROUND
(INCLUDING MANHOLES)

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STANDARD SPECIFICATION

SECTION 15G

STEAM PIPING, UNDERGROUND

(INCLUDING MANHOLES)

15G-01. SCOPE

- a. Included: Materials and operations required for the installation of medium to low pressure (125 psig and under) steam and condensate piping underground and in manholes, including: All piping, fittings, valves, strainers, traps, expansion joints, anchors, guides, hangers, supports, insulation, testing and cleaning.

15G-02. MATERIALS

- a. Piping: Shall conform with ANSI B31.1-73 and shall also be as follows:
 - (1) 2 Inches and Larger: Shall be Schedule 40, black steel, seamless, beveled end, per ASTM A53-Grade A or better.
 - (2) 1-1/2 Inches and Smaller: Shall be Schedule 40, black steel, seamless, plain end, per ASTM A53-Grade A or better.
- b. Fittings: Shall conform with ANSI B31.1-73, and shall also be as follows:
 - (1) Flanges:
 - (a) 2 Inches and Larger: Shall conform to ANSI B16.5-71 for 150 pound rated, steel, Grade I flanges.
 - (b) 1-1/2 Inches and Smaller: Shall conform to ANSI B16.5-71 for 150 pound rated, steel, Grade I flanges with threads conforming to ANSI B2.1-68.
 - (2) Fittings:
 - (a) 2 Inches and Larger: Shall conform to ANSI B16.9-71 for Schedule 40 wrought steel butt-weld fittings.
 - (b) 1-1/2 Inches and Smaller: Shall conform to ANSI B16.3-71 for 300 pound malleable-iron screwed fittings or 2000 pound forged steel socket weld, ANSI B16.11-66.
 - (c) Gaskets: Shall be made of 1/16 inch thick compressed asbestos, and shall be Flexitallic, Style CG.

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(d) Bolts and Nuts: Bolts shall conform to ASTM A193-71, Grade B7, and nuts shall conform to ASTM A194-72 Class 2H.

(e) Valves:

- (1) Gate Valves, 2 Inches and Larger: Shall be of semi-cast steel, 150 pound rating, with outside screw and yoke, rising stem, and with flanged ends and shall conform to ANSI B16.10. The trim and stem of valves shall be of bronze per ASTM B61 or of stainless steel per ASTM A182.

Gate valves 4 inches and larger for steam shall have factory-installed globe valve bypass. The bypass valve shall be a cast steel Y-type globe valve with the yoke cast integral with the body. The bypass shall be 1/2 inch for 4 inch gate valves, 3/4 inch for 5 through 8 inch gate valves, and 1 inch for 10 inch or over gate valves. Gate valves shall be:

Walworth 5202F

- (2) Gate Valves, 1-1/2 Inches and Smaller: Shall be of 300 pound rating, of cast-bronze construction per ASTM B61, with inside screw rising stems, with screwed ends, with solid wedge and seats of renewable nickel-bronze or stainless steel, and shall be:

Crane 634E, or Powell 1377S

- (3) Globe Valves, 1-1/2 Inches and Smaller: Shall be of 200 pounds rating, of bronze body construction per ASTM B61, with bronze rising stems, nickel-bronze or stainless steel renewable discs and seats, and shall be:

Crane 212P, or Powell 2608

- (4) Check Valves, 1-1/2 Inches and Smaller: Shall be swing check valves, of 200 pounds rating, of bronze body construction per ASTM B61, with bronze discs and screwed caps, and shall be:

Walworth 420, or Crane 36

- f. Strainers: Shall be 250 pounds rating, with bronze or iron bodies, with 20-mesh monel screen strainers, installed with strainer blowoff valves, and shall be:

Crane 990-1/2, or Walworth 3699-1/2

- g. Steam Traps: Shall be combined float and thermostatic type, of 250 pounds rated iron or steel body, capacity rated at 125 pounds differential, in accordance with recommended standards of the Steam Heating Equipment Manufacturers' Association provided with substantial supporting brackets, and shall be:

Illinois Traps as manufactured by American Air Filter Co., Inc.

- h. Expansion Joints: Shall be of 150 pounds rating, with stainless steel bellows, internally guided, with "T" neck and control rings, and integral limit stop to prevent

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bellows expansion beyond design limit. Furnished with provision for compressing bellows in the field to allow for pipe temperature variations, and furnished with removable covers. Expansion joints shall be:

AdSCO Corruflex Internally Guided Expansion Joint, or Flexonics Controlled Flexing Expansion Joint.

- i. Anchor and Guides: Anchor and guides shall be constructed of materials in accordance with ANSI B31.1-73, Section 121.2.1. Prefabricated pipe alignment guides with steel spider and segmented steel cylinder shall be:

Flexonics Piping Alignment Guide, or Tube-Turn Series A Guides.

- j. Pipe Hangars, Supports, and Bracing: Hangars, supports, or bracing required for piping and/or equipment in manholes shall be fabricated with materials in accordance with ANSI B31.1-73, Section 121.

Supports for piping in the trenches shall be precast insulating blocks of proper thickness and strength to support the pipe without crumbling or breaking during construction procedures.

- k. Insulation, Underground: Underground steam and condensate pipe shall be insulated with a solid monolithic, and lightweight concrete of a thickness indicated on the applicable contract drawings. The "U" factor and compressive strength of the insulation shall be equal to the following approved material.

Zcrete b-t-u manufactured by Concrete Thermal Casting, Inc.

- l. Insulation Inside Manholes: Insulation for all pipes, valves, and fittings shall be moulded type fiberglass (mineral wool) pipe insulation having a factory applied 0.016 inch thick embossed aluminum jacketing. The insulation shall have a minimum density rating of 7 pounds per cubic foot, a thermal conductivity (k) of 0.30 at 200 F mean temperature rating of 400 F, and shall conform with the other requirements of ASTM C547, and shall be:

Owens-Corning Fiberglass

- (1) Insulation Thickness: The thickness of insulation shall be as follows:

| <u>Pipe Size</u> | <u>Insulation Thickness</u> |
|----------------------|-----------------------------|
| 3 Inches and Smaller | 1-1/2 Inches |
| 4 Inches and Larger | 2 Inches |

- (2) Moulding Cement: When it is necessary to use a moulding cement, the moulding cement shall be:

All Purpose OC 110 procurable from Owens-Corning Fiberglass Corporation.

The installed moulding cement shall be finished with two (2) coats of aluminum colored weather resistant mastic such as Foster 60-65, or approved equal, reinforced with open weave glass fabric.

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15G-03. CONSTRUCTION

- a. Pipe: Pipe shall be aligned in the trenches and manholes as accurately as possible on the trench concrete pad (see 15G-03, e). Connections of pipe-to-pipe and pipe-to-fittings shall be made without forcing or springing and shall be adequately supported and aligned before the welds or threaded joints are made.
- b. Anchors and Guides: Anchors and guides shall be fabricated and installed as indicated on the applicable contract drawings. Pipe shall be welded to the anchors without forcing or springing to maintain the required alignment. Guides shall permit the pipe to move freely in longitudinal direction and not bind the pipe nor exert or cause lateral or transverse movements to expansion joints. Anchors and guides shall be installed in accordance with ANSI B31.1-73, Section 121.2.1.
- c. Pipe Hangers, Supports, and Bracing: All piping and/or equipment in the manholes requiring hangers, supports, or braces shall be installed as outlined on the applicable contract drawings and in accordance with ANSI B31.1-73, Section 121. Supports for piping in the trenches shall support the pipe during installation and testing procedures and permit free movement of the piping as caused by thermal expansion and contraction or by other causes.
- d. Expansion Joints: Expansion joints shall be installed in strict accordance with instructions from the manufacturer of the joint. In order to maintain proper alignment of the expansion joint in the manhole, the manhole piping shall first be completely installed with guides and anchors in place. A section of pipe shall then be cut and flanges welded on the pipe ends to match the expansion joint's flanges. If the pipe should spring or become misaligned when cut, it shall be realigned by modifying the guides before installing the joint. The proper installation length of the expansion joint shall first be determined by obtaining the temperature of the underground pipe and then modifying the pre-compression of the joint as required. Expansion joints are specified for a ground installation temperature of 70°F. Others will be available to instruct the contractor on the precompression adjustment of the expansion joints.
- e. Insulation, Underground: The trench base shall have a 2-inch thick structural concrete pad poured to maintain accurate line and grade previous to the installation of the piping. After the pipe has been tested, the pipe shall then be provided with a parting medium to allow for free longitudinal movement of the pipe. This parting medium shall be of single faced waterproof corrugated paper and shall be fastened around the pipe with edge laps of 1 inch. Since it is difficult to maintain a monolithic structure if the insulating concrete pour is not continuous, every effort shall be made to make the pour continuous. In the event that pans are being used to allow for pipe expansion and movement, a pour shall first be made to provide a base to attach or mount the pans. After the pans are secured in place, the insulating concrete pour shall be completed. The insulating concrete pour shall be poured "in place" with a minimum of running the material or shoveling to get it into place. A period of 24 hours shall be allowed for the insulating concrete to cure. A 54 inch wide 15 mil P.V.C. film shall be draped over the insulating concrete to provide a waterproof cover.
- f. Insulation Inside Manholes: Excluding unions and expansion joints, all pipe, valves, fittings and flanges in the steam and condensate lines shall be insulated. All threaded valves, unions, traps, strainers, flash tanks and finned tubes in the manhole condensate drainage system shall not be insulated. Insulation shall be applied with

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the longitudinal lock seam of the metal jacket in the four o'clock position on the pipe to shed water. Butt joints shall be sealed with factory furnished joint scaling strips with integral mastic and secured in place with 1/2 inch aluminum bands tightened to insure weather seal. Flanges, fittings, etc., shall be insulated with fabricated or mitered segments of the moulded pipe insulation and finished with two (2) coats of aluminum colored weather resistant mastic, such as Foster 60-65, reinforced with open weave glass fabric. Moulding cement may be used in lieu of moulded insulation when the use of moulded insulation is impractical and shall be finished in the same manner. When pipe hangers or supports occur on exterior of aluminum jacket, a 22-gauge galvanized iron sleeve shall be installed between the aluminum jackets and pipe hangers.

- g. Welding: All pipe and fitting joints in 2 inch and larger pipe lines shall be electric arc welded and all pipe fitting joints, not threaded in 1-1/2 inch and smaller pipe lines shall be gas or electric welded. The welding shall conform to ANSI B31.1-73, Section III. All welds shall be subject to radiographic examination by others and if found defective shall be removed and replaced at the Contractor's expense. Welding shall conform with the requirements of the "General Material and Work Requirements" section of the Specifications.
- h. Testing: Before any pipe covering is applied or insulating concrete placed, all pipes shall be hydraulically tested and proven tight by subjecting the lines to an internal water pressure of 250 min. psig. While under this pressure each joint shall be rapped with a hammer. This test shall be made in the presence of the Inspector. Defective welds shall be replaced at the Contractor's expense and the test shall be repeated until the system under test is acceptable.
- i. Cleaning, Inside of Pipes: Before the steam and condensate lines are put in service to supply the existing system, steam shall be introduced into the new steam and condensate lines to preheat the lines. After the lines have reached normal operating temperatures, the steam shall be allowed to free blow for a period of time as directed. Before the free blow is started, the entire premises involved shall be guarded and posted in accordance with the requirements of the safety organization involved. The free blow shall be installed where directed and shall consist of piping, a valve, and safety barricade as required so that the rate of steam blow can be controlled through a valve located at a convenient operating position and that the steam and products dislodged from the piping will be discharged vertically into the air starting at a height of at least 10 feet above the ground. All necessary precautions shall be taken so as not to cause damage to surrounding property. Any damage incurred by any free blowing shall be borne by the Contractor. The size of the free blow valve shall not exceed 3 inches. Particular care shall be taken to coordinate fully with the steam plant. An estimate of the rate of steam per hour, the date, and the times each blow will begin and end, shall be submitted to the steam plant 24 hours in advance.
- j. Existing Shutoff Valves: Where work will depend upon tight shutoff of existing valves, the contractor shall make provisions to provide complete shutoff at no additional cost.

END OF SECTION