GENERAL:

The scope of this document is to provide instruction for the installation of thermal insulation for underground steam and condensate distribution piping.

DESIGN GUIDELINES:

1. Materials

1.1 Insulation for steam and condensate piping in trenches, tunnels and manholes shall be cellular glass insulation as manufactured in accordance with ASTM C552, Foamglas Super K as manufactured by Pittsburgh Corning, Pittsburgh, PA, or "Eslin" E-Glass pipe insulation as manufactured by Visionary Industrial Insulation, Kapolei, HI, or approved equal.

1.2 Foamglas,fabrication adhesive shall be Hydrocal B-11 as manufactured by USG Corporation, Chicago IL, or approved equal.

1.3 Foamglas insulation shall have bore coat of Hydrocal B-11 as manufactured by USG Corporation, Chicago IL, or approved equal.

1.4 All piping insulation in manholes, trench and tunnel shall be covered with 0.024" thick, stucco embossed, perforated aluminum jacket, aluminum alloy. ASTM B209 with H-14 temper, 1/8" diameter holes on 21/64" staggered centers. Covering shall be Insul-Mate as manufactured by RPR Products, Inc., Houston TX, or approved equal. Fittings shall be covered with 0.016" perforated aluminum jackets.

1.5 Flanged valves, expansion joints and steam meters shall be insulated with tight fitting, reusable insulation blankets consisting of high density insulation (fiberglass, mineral wool, ceramic fiber) covered on outside with coated glass fabric having heavy adjustable straps with buckles. Inside of blanket shall be covered with fabric suitable to specified temperature or stainless steel square mesh woven wire cloth. Insulation shall be minimum 1-1/2" thick. Blankets shall be suitable for temperatures up to 500°F. Install Velcro sealed "inspection window" for expansion covers to allow maintenance personnel the ability to inspect for proper movement of the expansion joint slip.

1.6 Insulation and insulating materials containing asbestos shall not be used.

1.7 Insulation thickness shall be in accordance with the schedule below:

PIPE INSULATION SCHEDULE

Service	Insulation Symbol	Design Temp,°F	Pipe Size	Thickness
Steam	MPS	450	2" and under	1.5"
			2-1/2" to 3"	2.0"
			4"	2.5
			6" to 12"	3.0"
			14" and above	3.5"

Condensate	MPC	200	1-1/2" and under	1.0"
	PC		2" and above	1.5"

1.8. In walk tunnels and steam manholes, piping insulation may need to be thicker than listed above. Surface temperatures of the aluminum jacket shall be no more than 132 degrees F. assuming steam temperatures of 400 degrees F., an airflow of 1 mph, and an ambient temperature of 80 degrees F.

2. Installation

2.1. All required tests on piping must be completed and satisfactory test reports must be completed prior to application of insulation covering joints.
2.2. All surfaces to be insulated shall be cleaned of all scale, rust, oil, and foreign matter and shall be dry and free of frost prior to and during application of insulation.
2.3. All insulation and accessory materials shall be stored in an area that is dry and protected from the weather before and during insulation application.
2.4. Insulation shall be installed to accept cyclic thermal growth and contraction of piping without damage and loss of insulating value.
2.5. Insulation systems shall be installed in strict accordance with manufacturer's recommendations and as detailed on drawings “Construction Standard - Expansion Joint Insulation Detail” and “Construction Standard - Pipe Guide Insulation”.
2.6. Reinsulate any existing steam and condensate piping that are to remain that had insulation removed as part of asbestos abatement work or to make tie-ins.
2.7. Insulation shall be applied to pipe, fittings, flanges and valves. Unions shall not be insulated. Trap installations to include traps, stop valves, check valve, and hand-blow valve, shall not be insulated. Piping on trap installations shall be insulated. Drip leg and piping up to first stop valve shall be insulated.
2.8. Insulation shall be installed in a smooth, clean, workmanlike manner. Joints shall be tight and finished smooth. Stagger longitudinal joints and tightly butt sections.
2.9. Insulation shall fit tightly against surface to which it is applied.
2.10. Apply insulation so as to permit expansion or contraction of pipe lines without causing damage to insulation.
2.11. Preformed pipe covering shall be terminated at a sufficient distance from flanges to permit removal of bolts.
2.12. Insulation on flanges and flanged fittings shall overlap adjacent pipe covering at least 2".
2.13. Pipe insulation at expansion joints shall be held back a sufficient distance to permit the specified travel into the joint.
2.14. Valves shall be insulated up to the gland only so as to permit replacement of packing without disturbing insulation.
2.15. Insulation shall be continuous through pipe covering protection saddles, guides and sleeves or openings in walls and floors. Aluminum jacket shall not be run through pipe saddles and guides.
2.16. Lap jacket 2" and fasten with 1/2" stainless steel bands on 12" centers.
2.17. Provide band 1-1/2" back from all discontinuous ends of jacket.
2.18. All insulation shall be marked non asbestos.

3. Commissioning

3.1. Steam and condensate lines will not be placed in service until all insulation has been installed.

REFERENCES