MULTI-THERM 500®

Guide Specification

GENERAL

All underground heat distribution lines as shown on the contract drawings shall be fiberglass jacketed steel conduit MULTI-THERM 500 as manufactured by PERMA-PIPE®. The system supplier shall have fabricated systems of the composition defined herein for at least three years. All straight sections, fittings, anchors and other accessories shall be factory prefabricated to job dimensions. Each system layout shall be computer analyzed by the piping system manufacturer to determine stresses and movements of the service pipe. The system design shall be in strict conformance with ANSI B31.1 latest edition, and stamped by a registered professional engineer. Factory-trained field technical assistance shall be provided for the critical periods of the installation; i.e., unloading, field joint instruction and testing. The system shall be designed based on the following conditions _____ temperature _____ pressure.

SERVICE PIPE

Internal piping shall be standard weight carbon steel except for condensate piping, which shall be Schedule 80 carbon steel. All joints shall be butt welded for sizes 2½ inches and larger, and socket welded for 2 inches and below. Where possible, straight sections shall be supplied in 40-foot random length with 6 inches of piping exposed at each end for field joint fabrication.

SUBASSEMBLIES

End seals, gland seals and anchors shall be designed and factory prefabricated to prevent the ingress of moisture into the system. All subassemblies shall be designed to allow for complete draining and drying of the conduit system.

SERVICE PIPE INSULATION

Internal shall be Mineral Wool insulation (optional cellular glass). The insulation shall be secured to the pipe by stainless steel bands. Insulation thickness shall be a minimum as follows_____. The piping system manufacture must design the service pipe insulation thickness to insure the interface temperature between the foam and the steel conduit does not exceed 208°F. The piping system manufacture shall submit heat calculations that indicate the interface temperature. No system will be approved that has a temperature above 206°F.

OUTER CONDUIT

The steel conduit casing shall be smooth wall, welded steel conduit of the thicknesses specified below:

Conduit Size (In.)	Conduit Thickness
6-26	10 Gauge
28-36	6 Gauge
38-42	4 Gauge

Changes in casing size, as required at oversized casing to allow for service pipe expansion, shall be accomplished by eccentric and/or concentric fittings and shall provide for continuous drainage.

PIPE SUPPORTS

All pipes within the outer casing shall be supported at not more than 10-foot intervals. These supports shall be designed to allow for continuous airflow and drainage of the conduit in place. The straight supports shall be designed to occupy not more than 10 percent of the annular air space. Supports shall be of the type where insulation thermally isolates the service pipe from the outer conduit. The surface of the insulation shall be protected at the support by a sleeve not less than 12 inches long, fitted with traverse and, where required, rotational arresters.

OUTER CONDUIT INSULATION AND JACKET

Conduit insulation shall be spray-applied polyurethane foam 0.18 k-factors with R141B blowing agent and having a nominal 2 lb/ft^3 density for all straight lengths and fittings. The insulation thickness shall not exceed 1 inch. Quality assurance procedures for the insulation shall include either a visual check prior to jacketing or infrared inspection twenty-four hours after the foaming is complete, to insure there are no insulation voids. The urethane foam shall meet ASTM C591. The outer jacket shall be fiberglass (FRP) and shall be filament wound, directly on to the urethane foam insulation or at the piping manufactures option foam injection is allowed into a fiberglass pipe manufactured by A.O. Smith Red Thread or Ameron Bondstrand 3000. No PVC or HDPE jackets shall be allowed. All straights and fittings shall be factory jacketed.

LEAK DETECTION SYSTEM

The secondary containment system manufacturer shall furnish a PAL-AT cable type leak detection system. The piping shall be designed to allow pulling of the leak detection cable into the conduit pipe, both during and after piping installation. Containment pull ports shall be located a maximum of 500 feet apart for straight runs and reduced by 150 feet for every 90°change in direction. The leak detection/location system shall consist of a microprocessor based panel capable of continuous monitoring of a sensor string for leaks/faults. The unit shall have a sensing range of [2000] [5000] [7500] feet per cable [with up to eight cables per panel]. The alarm unit(s) shall operate on the principle of pulsed energy reflection and be capable of mapping the entire length of the sensor cable and storing the digitized system map in nonvolatile memory. The alarm units shall provide continuous indication that the sensor cable is being monitored.

After proper acknowledgment of a minor leak, the leak detection system shall be capable of monitoring the entire sensing string for additional leaks, even if they are smaller than the leak previously acknowledged. The system shall be capable of accounting for minor installation irregularities, static moisture and puddles (such as condensation) with no loss in accuracy or sensitivity. The system shall locate the point of origin of the first leak or fault within ±0.1% of the distance from the last calibration point to the leak or + 5 feet, whichever is greater. The monitoring unit shall report and record, to nonvolatile memory, the type of fault, distance, date and time of an alarm.

The system manufacturer shall have at least ten years of experience with leak detection sensor cable technology and provide a factory trained representative at two on-site meetings for pre-construction and sensor/electronics installation.

The systems shall have multi-level security passwords for access to operating functions, with recording of all password entries to nonvolatile memory.

The alarm unit(s) shall be enclosed in a modified NEMA 12 enclosure and have a two line by forty character display providing status and alarm data. The monitoring unit(s) [shall be field connected to an] [shall have a factory mounted] alarm horn. The monitoring unit shall be U.L. Listed and FM approved to provide connections for intrinsically safe sensor circuits for use in a Class I, Division I, Groups C and D hazardous locations.

The system shall be tested and found to comply with the limits for a Class A Digital device, pursuant to part 15 of the FCC rules and so labeled.

Ability to locate a leak shall not depend on battery backed-up functions. In the event of power failure, system conditions and parameters shall be stored in nonvolatile memory allowing the units to automatically resume monitoring without resetting, upon restoration of power.

The monitoring unit(s) power requirements shall be 120/240 VAC, 100 VA, 50/60 Hz, single phase. Monitoring units shall be equipped with an RS-232 communication port and a common alarm relay for the panel and one relay per cable. SPDT relays are rated for 250 VAC, 10A.

The sensor cable, connectors (probes) and jumpers shall be supplied by the manufacturer of the monitoring unit(s). The cable sensing principal shall provide for continuous monitoring while short lengths of the cable are in contact with liquids, without altering the systems sensitivity and/or accuracy. The sensor cable shall be of fluoropolymer and polymer coated wire construction, with no exposed metal parts. Cable shall detect all fluids. The sensor cable can be flushed and dried in place and shall not require replacement. The cable shall have a breaking strength of 100 pounds.

INSTALLATION

The installing contractor shall handle the system in accordance with the directions furnished by the manufacturer and as approved by the architect and engineer. The casing shall be air tested at 15 PSIG and the service piping shall be hydrostatically tested to 150 PSIG or 1½ times the operating pressure, or as specified in the contract documents. The test pressure shall be held for not less than one hour.

BACKFILL

A 4-inch layer of sand or fine gravel shall be placed and tamped in the trench to provide uniform bedding for the system. The entire trench shall be evenly backfilled with a similar material as the bedding in 6-inch compacted layers to a minimum height of 6 inches above the top of the insulated piping system. The remaining trench shall be evenly and continuously backfilled in uniform layers with suitable excavated soil.

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