GALVA-GARD

Guide Specifications

GENERAL

All underground {steam, hot water or condensate} lines, as indicated on contract drawings, shall be the drainable and dryable GALVA-GARD type piping system as manufactured by PERMA-PIPE. 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 on the carrier pipe and anticipated thermal movement of the service pipe. The system design shall be in strict conformance with ANSI B31.1, latest edition. Factory trained field technical assistance shall be provided for the critical periods of 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 2 1/2 inches and greater, and socket welded for 2 inches and below. Where possible, straight sections shall be supplied in 40-foot random lengths 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 sub-assemblies shall be designed to allow for complete draining and drying of the conduit system.

INSULATION

Carrier pipe insulation shall be calcium silicate or mineral wool. Split insulation shall be held in place by stainless steel bands installed on 18 inch centers. The insulation shall have passed the most recent boiling test and other requirements specified in the Federal Agency Guidelines Specifications. The insulation shall be applied to a thickness of _____ inches.

OUTER CONDUIT

The steel conduit casing shall be smooth wall, spiral weld steel conduit of the thickness specified below:

Conduit Size	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 carrier pipe expansion, shall be accomplished by eccentric and/or concentric fittings and shall provide for continuous drainage.

CONDUIT CLADDING

The conduit system shall be hot dipped galvanized and sections shall be covered with PERMA-PIPE's polyester fiberglass cladding. Quality control at the

manufacturing facility shall ensure that all cladding are designed for a 35,000 volt holiday test. The cladding shall be filament wound fiberglass per ASTM 2996 onto a shot blasted steel conduit to a minimum thickness of 100 mils. All field joints shall be covered with a heat-shrinkable, adhesive-backed sleeve. The factory applied coating on the conduit fittings shall be chopped sprayed fiberglass to a minimum thickness of 100mils.

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% of the annular air space. Supports shall be of the type where calcium silicate pipe insulation thermally and electrically isolates the carrier pipe from the outer conduit. Supports which directly contact both the carrier pipe and the outer casing shall not be allowed. The surface of the insulation shall be protected at the support by a metal sleeve not less than 12 inches long, fitted with traverse and where required, rotational arresters.

ENERGY MONITORING SYSTEM

The secondary containment system manufacturer shall furnish a PAL-AT cable type energy monitoring 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 90o 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] 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 energy monitoring 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 + 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 energy monitoring 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 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 hammer tested to 150 psig or 1 1/2 times the operating pressure, or as specified in the contract documents. The test pressure shall be held for not less than one hour. The contractor shall holiday test the entire conduit system at 5,000 volts. All holidays shall be repaired and tested.

BACKFILL

A 4-inch layer of sand or fine gravel shall be placed and tamped in the trench to provide a uniform bedding for the pipe. The entire trench width 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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