PERMA-PIPE
Inspection Services
Buried Piping Symptoms

Buried piping systems often emit telltale signs that are symptomatic of system problems. These symptoms, if left unchecked, can lead to physical deterioration and eventual failure of the system. These symptoms include:

- Excessive demand for makeup water
- Steaming vents and manholes
- Dead grass or melted snow directly above the pipeline
- Water running out of conduit drains
- Significant increase in energy costs
- Plugged heat traced lines
- Undermining of surface

Services

Locating leaks accurately in buried thermal distribution systems requires more than the latest testing equipment and technology. Experienced, certified technicians are the key to proper equipment use and precise analysis of data.

Infrared Leak Detection Survey locates areas of high thermal loss that are indicative of wet insulation due to conduit or service pipe leaks.

Test Method
Thermal energy losses from the buried conduit or pipe are conducted through the soil to the surface where they can be seen through the infrared imaging video camera. Areas of excessive heat loss are studied to determine if they are leak locations.

Report Documentation
The report includes a videotape of the survey and a sketch of each anomaly and dimensions to fixed landmarks for excavation and repair. Leaks are classified by priority for repairs and repair procedures are suggested to aid in minimizing repair costs.
**Sonic Leak Detection Survey** is a detailed aboveground search to locate, pinpoint and classify leaks on buried water distribution systems.

**Test Method**
Testing is conducted using sonic amplification equipment designed to filter out all sounds except those generated by leaking water. Special ground contact microphones and direct contact microphones are used to conduct the survey over the buried piping. Leak locations are pinpointed by technicians trained to identify leak sound frequencies.

**Report Documentation**
Customer supplied piping drawings are marked showing leak locations. Sketches of each leak are submitted with dimensions to fixed landmarks for excavations and repair. Each leak is classified as to severity for prioritizing repairs.

**Tracer Gas Survey** locates, pinpoints and classifies conduit leaks in steel conduit systems. The system can be in service during the survey. A survey can also be conducted on any buried pipe where the product can be replaced with a tracer gas.

**Test Method**
Surveys are conducted on conduit and piping that fail to hold an air test. The conduit or piping is pressurized with a lighter-than-air gas that escapes through breaks in the conduit or pipe, saturates the soil atmosphere and surfaces over the leak. Using an instrument that is sensitive to the gas, the technician samples the soil atmosphere, locating leaks by noting the strongest concentration of gas.

**Report Documentation**
Leaks are located on customer supplied drawings and a dimensioned sketch of each leak is prepared.

**Infrared Energy Evaluation Survey** locates and quantifies BTU heat loss on underground piping systems in areas of high thermal loss.

**Test Method**
An infrared thermal image of the ground above the piping system is recorded using a video thermal imaging radiometer with microprocessor that has the capabilities to: 1) measure real time temperature and correct for emissivity; 2) average area temperatures; 3) define areas of equal temperature; 4) provide multiple color palates; and 5) produce thermal profiles of anomalies. The information gathered in the field is run through proprietary software that calculates actual BTU heat losses.

**Report Documentation**
The report includes a videotape of the survey, detailed energy analysis containing a diagrammatic report of each anomaly detected and computer generated heat loss summary data. Also included is a comparison of actual heat loss versus heat loss of the system as new areas of high thermal loss. An option available is an evaluation of economic alternatives using Net Present Value analysis. For example — comparing a replacement system versus an existing system repaired, versus an existing system left unrepaired. The evaluation is prioritized by payback period.
**Ultrasonic Testing Survey** measures the remaining pipe wall thickness. Corrosion, erosion and general pitting can also be detected.

**Test Method**
Exposed pipe is tested using an ultrasonic test meter incorporating a transducer probe. The probe is placed on the pipe, sound waves are transmitted through the pipe wall and reflected back to the transducer from the back wall of the pipe. The time out and back is converted mathematically to thickness.

**Report Documentation**
The report compares thicknesses recorded during the survey to ANSI B31.1 Code for Pressure Piping at the operating temperature and pressure of the system and rates the pipe as "Excellent", "Good", "Poor" or "Replace."

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**Electronic Mapping** plots the location, including depth, of metallic piping systems and other metallic structures.

**Test Method**
An electronic signal is either placed on the pipe by direct contact or is induced using a signal generator. A technician walks over the area with a receiver that reads the signal, pinpoints the pipe and determines the depth of bury.

**Report Documentation**
The standard report notes locations and depths of bury on customer supplied drawings.

Optional reporting includes newly generated drawings noting the above information and the location of additional utilities based upon the review of archival data.

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**Coating Discontinuity Test** locates areas of coating damage (holidays) on existing buried systems.

**Test Method**
Audio frequency AC energy is applied between the coated pipe and the ground. A significant change in potential from the average potential as picked up by the receiver, indicates a holiday.

**Report Documentation**
The report includes a sketch of each holiday detected with dimensions to fixed landmarks.

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**Cathodic Protection Services** includes complete system testing for buried metallic structures under cathodic protection.

**Test Method**
Existing cathodic protection systems are tested to determine if the system is operating within accepted standards. All points of electrical isolation are tested. Systems not operating at accepted standards are further investigated to locate cause.

**Report Documentation**
The report includes system analysis of survey results, with recommendations for repair.
Buried Thermal Distribution Systems are readily susceptible to external corrosion because of direct exposure to low resistivity soil. If the system is not inspected and maintained on a regular schedule, physical deterioration and a steady decline in system performance will occur until total failure.

Through the years, leaks in underground piping systems were often left unaddressed because there were no accurate, cost-effective methods to test and evaluate them. Buried thermal distribution systems must be maintained for maximum performance.

PERMA-PIPE Inspection Services responds to customer needs and developed methods for evaluating buried systems using advanced technology and computer-aided engineering. Leaks are accurately identified, located and evaluated by certified technicians using the latest testing instruments and drawing upon PERMA-PIPE’s expertise in designing, applying, and maintaining thermal piping systems.

PERMA-PIPE Inspection Services:
- Saves the expense of unnecessary exploratory excavations
- Locates system problems in early stages before more costly, irreparable damage occurs to the system
- Reduces system downtime and minimizes repair costs.
- Prioritizes maintenance schedule and/or replacement of pipe
- Eliminates unnecessary pipe replacement
INNOVATIVE PRODUCTS FOR ENERGY DISTRIBUTION

INSULATED PIPING SYSTEMS

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