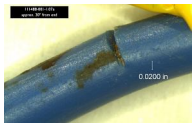
Tracer Wire for HDD Applications

Extensive research and testing has culminated in the release of a new report that provides valuable information on tracer-wire products for use in horizontal directional drilling (HDD) operations.



Project Description

For more than 20 years, the installation of solid copper tracer wire – buried alongside polyethylene (PE) pipes – has been the standard practice used to help utilities locate underground plastic piping. Copper wire is readily available, highly conductive, and relatively easy to handle. However, the increased use of more demanding operations – such as horizontal directional drilling (HDD) operations – creates challenges and can cause breaks in solid copper tracer wire during installation.

In HDD operations, some utilities pull multiple wires, while others may rely on a single large-gauge wire. The desire for a stronger tracer wire has even led some utilities to turn to copper-clad steel (CCS) wire.

Other options for tracing plastic pipe have been brought to market with mixed levels of satisfaction. These systems primarily lack the needed tensile strength.

The objective of this project is to provide the gas industry with information on the properties and performance of currently used tracer wire products as well as new, potentially stronger, tougher-to-cut, and more "HDD friendly" products.

Tracer wires being pulled through the borehole along with the pipe.

Researchers are also investigating a product that may overcome the tensile-strength issue. The product differs from common tracer wire in that traditional tracer-wire construction employs a layer of insulation placed over the conductive metallic core, where the new product uses a polymeric woven fiber strip with an insulated wire integrally woven to it. Such woven-fiber configurations have a very high strength-to-weight ratio and in larger sizes are commonly used in industrial lifting and towing applications with very high levels of loading.

In theory, the woven fabric would contribute to the bulk of the product's tensile strength and afford additional abrasion resistance, both protecting the wire from damage and reducing the chance of breakage.

Deliverable

Data is provided in a technical report available through the OTD website.

Benefits

Information developed in this project is expected to set researchers on a path toward providing an improved product that can be used for trenchless HDD applications.

A more effective tracer wire that is readily locatable, strong, and easy to handle would improve the safety and efficiency of gas operations by:

- Preventing wire breaks which result in unlocatable plastic (therefore, reducing the risk of third-party damage and potential incidents)
- Reducing cost by allowing for the use of a single wire for a directional-bore pullback instead of using multiple tracer wires
- Providing faster installations by reducing the time required to address breakage of the wire during challenging HDD pipe operations.

Technical Concept & Approach

This project included the following tasks:

- Product Review and Test Protocol Development
- Laboratory Testing
- Field Testing
- Development of Recommendations.

Products tested in this program are manufactured by: Agave Wire, Ltd.; Copperhead Industries, LLC; Kris-Tech Wire; NEPTCO, Inc.; Paige Electric Company, LLP; and Pro-Line Safety Products Company.

Results

In 2011, a project survey was conducted and summarized in a report.

The survey focused on:

- Currently Used Tracer Wire Products for HDD
- Installation Processes for HDD
- Tracer Wire Failure
- Connectors
- Additional Information and Expected Improvement for Trenchless Installation.

Based on survey results, tension load could result in the wire breaking during the installation. Previous tensile tests show that the same type of tracer wires with the same gauge but manufactured from different manufacturers have varied peak tensile loads. This indicates that the manufacturing process may significantly affect the tensile properties of the tracer wire, and the performance of the wires might be significantly different even though the same type of wire is used. Therefore, tensile testing was needed to verify the tensile strength of each candidate wire. In the tensile test, the load at which the plastic insulation yields was also recorded and compared.

Wearing off of the plastic jacket on the tracer wire – or the jacket breaking by the pull – could result in wire corrosion during the service. The jacket materials from different manufacturers may vary because the physical properties of PE material may be different depending on the type of PE and manufacture process. To address the issue, researchers conducted combined Taber abrasion-resistance and scrape-resistance testing of the wire insulation to simulate worst-scenario conditions in the field (e.g., where the wire is pulling through a rocky area) that may cause coating breakage by the combination of abrasion and scrape damage.

Five tracer wires were used during an HDD pipe installation field test.

The research team received different tracer wires from the sponsoring companies and the woven-fiber wire from the manufacturer for laboratory testing.

A field HDD installation was performed in 2011. Four wires were installed through the HDD installation process. Except for one wire that was left in the field, the tracer wires were pulled out and evaluated.

A second field test was conducted on April 30, 2012, in Batavia, IL. This approximately 340-foot HDD water-pipe installation project was in a very rocky area. Four wires were pulled through and brought back for inspection.

Researchers also evaluated the tensile properties of the various wires that were tested in this project and initiated corrosion chamber tests.

Status

Testing is completed. Data is presented in a new technical report, *Tracer Wire for HDD Applications*, which is available through the OTD website: otd-co.org.

For more information:

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