

Long-Seam Pipeline Crack Inspection

In Liquid Propane



Challenge

A North American operator required inspection of a liquid propane line critical to the company's business. This 6" thin walled liquid propane line is an extremely difficult environment for conventional ultrasonic inline inspection (ILI) methods.

The medium's volatility can cause variations in sound velocity from 1,520 mph (680 m/s) to as high as 2,235 mph (1000 m/s), depending on pipeline pressure and temperature. This large swing degrades the accuracy of ordinary tools and can render them ineffective.

Solution

After careful evaluation of the options to inspect the 62 mile line, the operator chose NDT Global's EVO 1.0 UC ultrasonic crack inspection tool. This tool offers axial resolution of 1.5 mm (0.06 in), and circumferential resolution of 7 mm (0.27 in).

The tool detects and sizes cracks and crack-like features using industry-leading ultrasonic technology. Ultrasonic crack inspection enables early detection and sizing of irregularities. This allows the operator to take appropriate measures to avoid pipeline failures caused by cracks. Purpose-made configurations detect axial and circumferential cracks.

NDT Global applied its deep knowledge base and extensive experience with liquid propane lines to identify the necessary angle of incidence required to conduct an accurate, ultrasonic ILI run in this challenging medium.

- Axial Cracks
- Circumferential Cracks
- Metal Loss
- Geometry Ovalities
- Mapping

Small-diameter, sixty mile liquid propane line is crack-inspected with 97% accuracy



Results

- **High-accuracy inline inspection** revealed hundreds of crack-like anomalies requiring operator attention. Most of these were lack-of-fusion defects typical in long-seam ERW pipe. Nearly 100 dents were also reported. All of the reported crack-like and crack-field features were calculated in absolute depths. Inspection accuracy was confirmed by the unity plot, which showed a 97% correlation of field investigation and inspection results.
- **NDT Global provided** the operator with a comprehensive, on-time, post-inspection Pipeline Integrity Assessment that included a detailed, in-depth analysis of data collected from the ILI run, as well as insights to pipeline condition, repair, and maintenance. Proven, proprietary algorithms maximized data accuracy.
- **Close correlation of field investigation** and inspection results, along with insights from NDT Global, enabled the operator to design and implement a more aggressively proactive pipeline integrity management program. This inspection enabled the operator to substantially reduce ongoing operational risk.

Advanced, high-accuracy ultrasonic ILI technology overcomes inspection barriers caused by liquid propane volatility.

Key performance specifications for liquid propane (referring to API 1163)

POD for axial cracks, crack-like anomalies and linear indications ≥ 90%
Min. depth of crack with L ≥ 20 mm (0.79 in) and axial resolution 1.5 mm

- | | |
|---------------------------|----------------|
| • Base material & at weld | 1 mm (0.04 in) |
| • In weld | 2 mm (0.08 in) |

Depth sizing accuracy at 80% certainty

- | | |
|---|-------------------|
| • 1 ... < 3 mm (0.04 ... < 0.12 in) for wt ≤ 7.1 mm (0.28 in) | ±1.2 mm (0.05 in) |
| • 1 ... < 3 mm (0.04 ... < 0.12 in) for wt > 7.1 mm (0.28 in) | ±1.4 mm (0.06 in) |
| • ≥ 3 mm (0.12 in) | |

Length sizing accuracy at 90% certainty

±10 mm (0.39 in)

Location in pipe wall

- | | |
|---------------------|-----|
| • Internal/external | Yes |
|---------------------|-----|