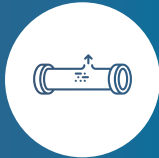


RoCorr MFL-A Ultra Service

In-line Ultra-High-Resolution Metal Loss Detection and Sizing



Reliably detect leak threats before they impact pipeline safety



Reliable assessment of pinholes and complex corrosion



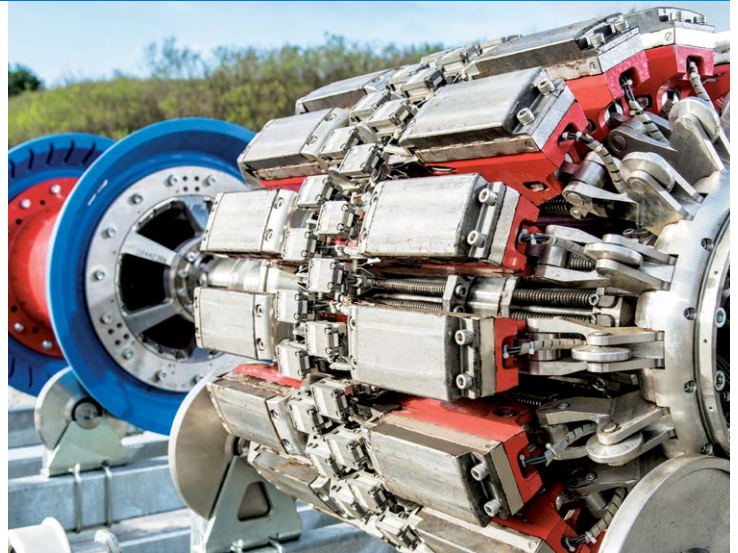
Assess the integrity of your onshore and offshore pipeline assets

Undetected and untreated corrosion within your pipeline assets will lead to performance loss and containment failure. Making in-line inspection (ILI) services a part of your integrated pipeline threat management strategy will help you manage this risk. Our RoCorr Service Suite is designed to detect, evaluate and locate metal loss due to corrosion and associated threats. This allows you to take remedial action before your pipeline integrity suffers.

Drawing on the largest ILI tool fleet in the world, our RoCorr features multiple and flexible options to suit your inspection needs while minimizing impact on pipeline operations. This includes a wide range of sensors that incorporate leading technologies to address your pipeline threats. The data gathering is supported by our unique data analysis and reporting tools, delivered by a dedicated team of experts. RoCorr reduces your corrosion and metal loss threat risk.

Our MFL-A Ultra Service offers an ultra-high resolution approach that overcomes the historically conservative evaluation of metal loss. The MFL-A Ultra Service identifies pinholes down to one millimeter in diameter. It also defines the exact structures of defects, such as complex corrosion. Machine-learning systems and Finite Element Modeling (FEM) bring new standards in data evaluation for ultra-precise results delivery.

- Superior integrity assessment through enhanced accuracy
- Reduction of unnecessary and costly dig-ups
- Ultra-precise evaluation of sizeable data volumes
- Minimizing the impact of inspections on daily operations through:
- Speed control units to maintain full production flow during inspection
- Combined diagnostics solutions to reduce the number of inspection runs required by combining technologies in one ILI tool



Benefits

- Improved sizing accuracies enable most accurate integrity assessments to reduce conservatism and significantly reduce unnecessary digs
- Superior pipeline and defect imaging through enhanced MFL technology with ultra-high definition sensors
- Detailed insights into a breadth of defect morphologies and different corrosion types such as pinhole in pit and pinhole colonies provided by ultra-high resolution sensors
- Enhanced sensor suspension for smoother girth weld passage overcomes long-standing industry limitations
- Well-proven tools deliver consistent data quality with a first run success rate of 95%

Remarks and Features

- Other tool sizes are available on request
- Higher pressure rating available on request
- Tailored solutions with different specifications available
- API 1163 certified services
- CE and ATEX certification available
- Contact ROSEN for more detailed information about the presented service
- Specifications are subject to change, depending on specific requirements or tool configurations

Technical Specifications

Detection and Sizing Accuracy for Anomalies in Body of Pipe

	General metal loss	Pitting	Pinhole ¹⁾	Axial grooving	Circumf. grooving	Axial slotting ²⁾	Circumf. slotting ¹⁾
Min. Depth at POD = 90%	0.05t	0.08t	0.10t	0.08t	0.05t	0.15t	0.05t
Depth sizing accuracy at 80% certainty	±0.08t	±0.08t	±0.08t	±0.10t	±0.08t	±0.12t	±0.08t
Width sizing accuracy at 80% certainty	±8 mm (±0.32")	±6 mm (±0.24")	±6 mm (±0.24")	±10 mm (±0.39")	±10 mm (±0.39")	±12 mm (±0.47")	±10 mm (±0.39")
Length sizing accuracy at 80% certainty	±7 mm (±0.27")	±4 mm (±0.16")	±4 mm (±0.16")	±7 mm (±0.27")	±7 mm (±0.27")	±10 mm (±0.39")	±7 mm (±0.27")
Depth sizing accuracy at 90% certainty	±0.10t	±0.10t	±0.10t	±0.13t	±0.10t	±0.15t	±0.10t
Width sizing accuracy at 90% certainty	±10 mm (±0.39")	±8 mm (±0.31")	±8 mm (±0.31")	±13 mm (±0.51")	±13 mm (±0.51")	±15 mm (±0.59")	±13 mm (±0.51")
Length sizing accuracy at 90% certainty	±9 mm (±0.35")	±5 mm (±0.20")	±5 mm (±0.20")	±9 mm (±0.35")	±9 mm (±0.35")	±13 mm (±0.51")	±9 mm (±0.35")

¹⁾ Min(L,W) ≥ ½A
²⁾ Min(W) ≥ ½A and Max(L) ≤ 30 mm

Pinhole Detection Capabilities for Anomalies in Body of Pipe

	Pinhole
Minimum pinhole diameter at POD=90% if depth=0.5wt	2 mm (0.08")*
Minimum pinhole diameter at POD=90% if depth=0.2wt	3 mm (0.12")*

*Detection only.

Detection and Sizing Accuracy for Anomalies in Girth Weld or Heat Affected Zone

Within $\pm 2A$ of the weld ($A = \text{Max (wt, 10 mm / 0.39")}$) detection and sizing are affected by the weld. The extent of this effect depends on weld quality and the weld impact on the tool dynamics. During passage of the magnetic yoke over a weld sizing accuracy might be affected slightly.

	General metal loss	Pitting	Pinhole ¹⁾	Axial grooving	Circumf. grooving	Axial slotting ²⁾	Circumf. slotting ¹⁾
Min. Depth at POD = 90%	0.08t	0.13t	0.15t	0.13t	0.12t	0.28t	0.12t
Depth sizing accuracy at 80% certainty	$\pm 0.13t$	$\pm 0.13t$	$\pm 0.13t$	$\pm 0.18t$	$\pm 0.13t$	$\pm 0.22t$	$\pm 0.13t$
Width sizing accuracy at 80% certainty	$\pm 16 \text{ mm } (\pm 0.63")$	$\pm 12 \text{ mm } (\pm 0.47")$	$\pm 12 \text{ mm } (\pm 0.47")$	$\pm 20 \text{ mm } (\pm 0.78")$	$\pm 20 \text{ mm } (\pm 0.78")$	$\pm 24 \text{ mm } (\pm 0.95")$	$\pm 20 \text{ mm } (\pm 0.78")$
Length sizing accuracy at 80% certainty	$\pm 14 \text{ mm } (\pm 0.55")$	$\pm 10 \text{ mm } (\pm 0.39")$	$\pm 10 \text{ mm } (\pm 0.39")$	$\pm 14 \text{ mm } (\pm 0.55")$	$\pm 14 \text{ mm } (\pm 0.55")$	$\pm 20 \text{ mm } (\pm 0.79")$	$\pm 14 \text{ mm } (\pm 0.55")$
Depth sizing accuracy at 90% certainty	$\pm 0.17t$	$\pm 0.17t$	$\pm 0.17t$	$\pm 0.23t$	$\pm 0.17t$	$\pm 0.28t$	$\pm 0.17t$
Width sizing accuracy at 90% certainty	$\pm 21 \text{ mm } (\pm 0.83")$	$\pm 15 \text{ mm } (\pm 0.59")$	$\pm 15 \text{ mm } (\pm 0.59")$	$\pm 26 \text{ mm } (\pm 1.02")$	$\pm 26 \text{ mm } (\pm 1.02")$	$\pm 31 \text{ mm } (\pm 1.22")$	$\pm 26 \text{ mm } (\pm 1.02")$
Length sizing accuracy at 90% certainty	$\pm 18 \text{ mm } (\pm 0.71")$	$\pm 13 \text{ mm } (\pm 0.51")$	$\pm 13 \text{ mm } (\pm 0.51")$	$\pm 18 \text{ mm } (\pm 0.71")$	$\pm 18 \text{ mm } (\pm 0.71")$	$\pm 26 \text{ mm } (\pm 1.02")$	$\pm 18 \text{ mm } (\pm 0.71")$

¹⁾ $\text{Min(L,W)} \geq \frac{1}{2}A$

²⁾ $\text{Min(W)} \geq \frac{1}{2}A$ and $\text{Max(L)} \leq 30 \text{ mm}$

Pinhole Detection Capabilities for Anomalies in Girth Weld or Heat Affected Zone

	Pinhole
Minimum pinhole diameter at POD=90% if depth=0.5wt	4 mm (0.16")*
Minimum pinhole diameter at POD=90% if depth=0.2wt	6 mm (0.24")*

*Detection only.

Location and Orientation Capabilities

Axial position accuracy from reference marker	1:1000 (1 m on 1000 m marker distance) (1 ft. on 1000 ft. marker distance)
Axial position from closest weld	$\pm 0.1 \text{ m } (\pm 4")$
Circumferential position accuracy	$\pm 10^\circ$

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