

Applications
Brochure

ADVANCED WELD INSPECTION FOR BOILER TUBES AND SMALL DIAMETER PIPES

The low-profile scanner solution delivering
high-profile inspection results

Perform weld inspection of remarkably small pipe diameters with
phased array ultrasonic testing (PAUT) precision.

THE BEYOND CURRENT SOLUTION

One of the existing challenges involves examining small-diameter pipe or tube welds in confined spaces. Ensuring the integrity of these welds is crucial for the safety and reliability of the component throughout its life. While radiography was previously the main method for examinations, PAUT techniques are now preferred for inspection.

Eddyfi Technologies offers a wide array of innovative PAUT inspection solutions, which use non-intrusive techniques primarily on a test component's external surface. These solutions provide plan view, cross-sectional, and 3D imagery, visually indicating material integrity variations in easily interpretable graphics.

Imagine having a toolkit that not only includes a state-of-the-art inspection instrument and scanner but also encompasses specialized probes and wedges tailored for the intricacies of boiler tubes and small-diameter pipes. Eddyfi Technologies understands the unique demands of your role as an NDT inspector, and our complete solution is crafted to address these challenges comprehensively.

MEET THE PAUT POWERHOUSE

Eddyfi Technologies probes and wedges are specifically designed to complement the capabilities of the CIRC-IT scanner, creating a synergy that enhances the overall effectiveness of your inspections. This integrated approach empowers you to tackle the complexities of weld inspection with confidence and efficiency.

The CIRC-IT scanner, used with Eddyfi Technologies' market-leading phased array instruments, achieves rapid and efficient encoded probe positioning circumferentially around small diameter pipes and tubes. The ultra-low profile of the CIRC-IT scanner when paired with our A15 probes, allows operation within an 11mm (0.43in) radial clearance envelope on pipes and tubes as small as 21.4mm (0.84in) up to 114mm (4.5in), preventing interference from adjacent obstructions.



Figure 1: CIRC-IT examines the welds of small pipe diameters.

The most important characteristic of the PAUT probes and wedges is their extremely low overall height, enabling inspection of closely stacked pipes or tubes with just an 11mm (0.43in) clearance. Additionally, optimized wedge design reduces the distance between the probes and the weld center line, improving coverage. When deploying the TOFD method, we recommend LIMBOTOFD™, which provides a unique low-profile integral TOFD probe that can be paired with the scanner.

This scanner uses multiple links to quickly adapt to various diameters (simply add or remove links), ensuring that each probe is held stable and constant with adequate pressure to deliver reliable UT signals. This feature remains effective even when the scanner is installed and operated from one side of a row of pipes with limited access from both sides.

*LIMBOTOFD is a trademark of GB Inspections Systems Ltd.

APPLICATIONS

- Boiler tubes
- Small-diameter pipes
- Carbon steel/austenitic

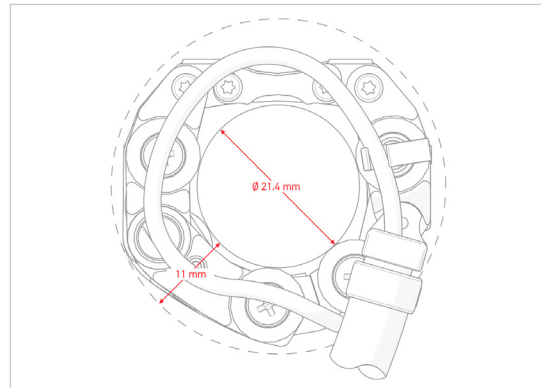


Figure 2: Design showing how CIRC-IT can operate with an 11mm (0.43in) radial clearance on pipes and tubes as small as 21.4mm (0.84in).

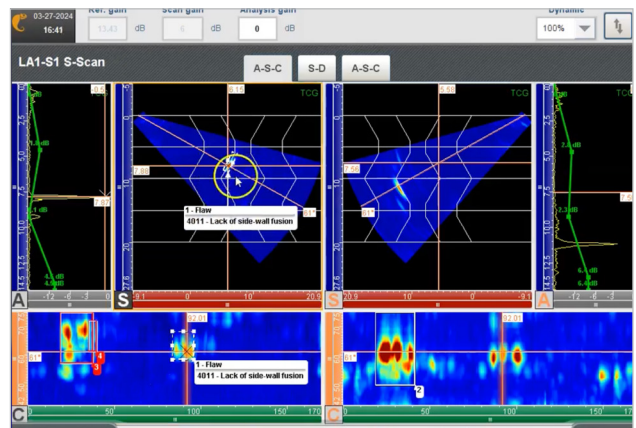


Figure 3: Advanced assisted analysis.

FEATURES

- Accommodates standard pipes with diameters ranging from 21-114mm (0.84-4.5in)
- 11mm (0.4in) clearance, ideal for restricted access areas (< 12.7mm/0.5in)
- Enables one- or two-sided inspection in a single pass
- Easy setup and operation from a single side of a pipe row
- Ensures stable and consistent pressure throughout the scan
- Features smooth rolling movement with minimal axial drift
- Compact, lightweight, and portable design for enhanced maneuverability
- Facilitates quick and effortless wedge and probe changes
- Compatible with both ferromagnetic and nonferromagnetic pipes
- Boasts waterproof and rust-free construction

LOW PROFILE PHASED ARRAY PROBES AND WEDGES

Linear Array

- Low-profile A15 phased array probes series
- Curved array for optimized focusing which enhances the detection of small defects in thin-walled pipes
- Wedge kit covers 12.7-114.3mm (0.5-4.5in) diameter and flat surface applications



Figure 5: Low-profile A15 phased array probe.

Dual Linear Array (DLA)*

- Low-profile A25 DLA probe series
- Dedicated to austenitic material that cannot be inspected using an A15 probe in pulse echo mode
- Composed of two arrays to conform to the wedge roof angle, optimized according to the diameter of the pipe being inspected



Figure 6: Low-profile A25 DLA probe.

Advanced 2D Matrix Array

- Low-profile M15 2D matrix array
- Ability to actively focus in primary and secondary axis for optimum detection, characterization, and sizing in thin-walled pipes
- Compatible with A15 wedges and CIRC-IT scanner
- Intuitive setup in TOPAZ®64 or Gekko®64 focal law calculators

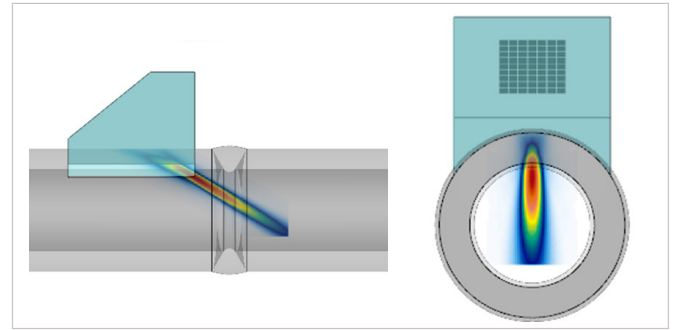


Figure 4: M15 beam profile.

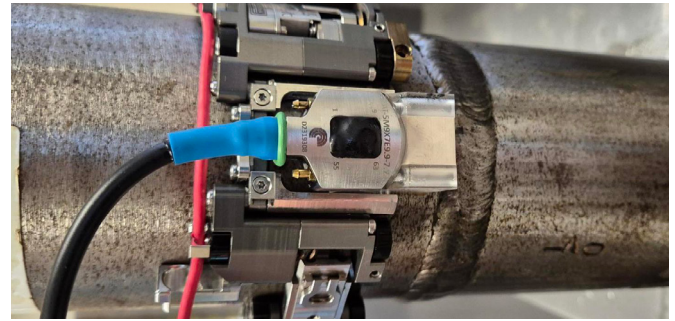


Figure 5: M15 matrix array probe with CIRC-IT scanner.

Probe selection and UT approach is the foundation of a successful inspection. The new M15 2D matrix array probe for small bore inspection greatly improves the beam profile to improve characterization, detection and SNR when it matters most. Explore the following [blog](#) for further details about the M15 probe.

TOFD*

- The CIRC-IT is compatible with conventional UT transducers and wedges for TOFD inspections
- LIMBOTOFD is recommended when paired with the CIRC-IT with its extra-low profile 10mm (0.4in) TOFD probes

*When using standard TOFD, M15, and a DLA probe, the height clearance is increased.

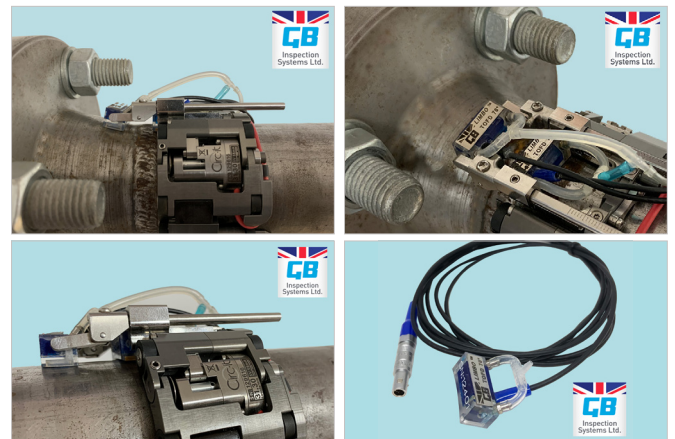


Figure 6, 7, 8, and 9: LIMBOTOFD paired with the CIRC-IT scanner. Image courtesy of GB Inspections Systems Ltd.

ORDERING INFORMATION

Carbon Steel

ITEM	DESCRIPTION
Solution kit is compatible with the following instruments: Mantis™, Gekko®, TOPAZ®, Emerald, Panther™	
SCAN-CIRC-IT-1PA-LE	CIRC-IT scanner – for 1 probe - 0.84in - 4.5in diameter range - LEMO 16 Encoder connector - Radial Clearance: 11mm (0.43in) - Irrigation fittings and tube included. Does not include probes nor wedge kit.
SCAN-CIRC-IT-2PA-LE	CIRC-IT scanner – for 2 probes - 0.84in - 4.5in diameter range - LEMO 16 Encoder connector - Radial Clearance: 11mm (0.43in) - Irrigation fittings and tube included. Does not include probes nor wedge kit
7.5CCEV35-A15-16-8X10-2.5-IPEX	16-element linear array probe - 7.5MHz - Concave Elevation Focused 35mm radius - Active aperture of 8mm x 10mm - Pitch: 0.5mm - Elevation: 10 mm - A15 casing - Impedance matching to Rexolite - 2.5m cable - IPEX connector
WSA15-KIT-0.5TO4NPS	Wedge kit for A15 phased array probe - 60-degree SW nominal angle - Irrigation channels and probe holder fixtures – kit contains 10 contoured pairs of wedges to cover OD from 0.5 (0.84in) to 4 (4.5in) NPS and a pair of flat wedges
TOFD-LPL-10MHz-3mm	LIMBOTOFD 60° 10MHz ø 3mm, Composite Compression Wave with integral cable and Lemo, 00 connector. Flat Left
TOFD-LPR-10MHz-3mm	LIMBOTOFD 60° 10MHz ø 3mm, Composite Compression Wave with integral cable and Lemo, 00 connector. Flat Right
CIRC-IT-SPARE	Spare part kit – Mechanical parts + encoder assembly
SCAN-MANUAL-PUMP-CIRC	Manual water pump - 1.0 L - Compatible with CIRC-IT scanners

NOTE: DE15 encoder cable and ZPAC probe connectors also available. Splitter required when utilizing more than one probe connector.
*Choose either 1PA or 2PA scanner depending whether single sided or dual sided inspection is required.

Stainless Steel

ITEM	DESCRIPTION
Solution kit is compatible with the following instruments: Mantis™, Gekko®, TOPAZ®, Emerald, Panther™	
SCAN-CIRC-IT-1PA-LE	CIRC-IT scanner – for 1 probe - 0.84in - 4.5in diameter range - LEMO 16 Encoder connector - Radial Clearance: 11mm (0.43") - Irrigation fittings and tube included. Does not include probes nor wedge kit.
SCAN-CIRC-IT-2PA-LE	CIRC-IT scanner – for 2 probes - 0.84in - 4.5in diameter range - LEMO 16 Encoder connector - Radial Clearance: 11mm (0.43") - Irrigation fittings and tube included. Does not include probes nor wedge kit
5DL16-A25-12X5-2.5-IPEX	16-element linear array probe - 5MHz - Active aperture of 12mm x 5mm - Pitch: 0.75mm - Elevation: 5mm - A25 casing - 2.5m cable - IPEX connector
WSA25-TRL-KIT-IH	Wedge kit for TRL inspection using A25 probes - Irrigation channels and probe holder fixtures - flat wedge plus 9 curved wedges NPS 0.5 (0.840in) to NPS 4.0 (4.500in) - Circumferential flaw detection
CIRC-IT-SPARE	Spare part kit – mechanical parts + encoder assembly
SCAN-MANUAL-PUMP-CIRC	Manual water pump - 1.0 L - Compatible with CIRC-IT scanners

NOTE: DE15 encoder cable and ZPAC probe connectors also available. Splitter required when utilizing more than one probe connector.
*Choose either 1PA or 2PA scanner depending whether single sided or dual sided inspection is required.

ORDERING INFORMATION

Advanced 2D Matrix - Carbon & Stainless Steel

ITEM	DESCRIPTION
Solution kit is compatible with the following instruments: Gekko®64, TOPAZ®64	
SCAN-CIRC-IT-1PA-LE	CIRC-IT scanner – for 1 probe - 0.84in - 4.5in diameter range - LEMO 16 Encoder connector - Radial Clearance: 11mm (0.43in) - Irrigation fittings and tube included. Does not include probes nor wedge kit.
SCAN-CIRC-IT-2PA-LE	CIRC-IT scanner – for 2 probes - 0.84in - 4.5in diameter range - LEMO 16 Encoder connector - Radial Clearance: 11mm (0.43in) - Irrigation fittings and tube included. Does not include probes nor wedge kit
5M9x7-M15-9.9x7.7-2.5-IPEX	63-element matrix array probe - 5MHz - Active aperture of 9.9mm x 7.7mm - Pitch A: 1.1mm - Pitch B: 1.1mm - M15 casing - 2.5m cable - IPEX connector
WSA15-KIT-0.5TO4NPS	Wedge kit for A15 phased array probe - 60-degree SW nominal angle - Irrigation channels and probe holder fixtures – kit contains 10 contoured pairs of wedges cover OD from 0.5 (0.84 in) to 4 (4.5 in) NPS and a pair of flat wedges
CIRC-IT-SPARE	Spare part kit – Mechanical parts + encoder assembly
SCAN-MANUAL-PUMP-CIRC	Manual water pump - 1.0 L - Compatible with CIRC-IT scanners

Please note that although they still bear the Zetec logo and branding, the ultrasound instruments and software products are manufactured by Eddyfi Technologies, whereas Zetec branded EC and SG products are manufactured by Zetec Inc. Although affiliated to Eddyfi Technologies, Zetec Inc. remains an independently managed company because of contractual obligations with the US government as a key supplier for classified business. The information in this document is accurate as of its publication. Actual products may differ from those presented herein. © 2024 Eddyfi UK Ltd. Eddyfi Technologies, Eddyfi, LYNCS, Gekko, Mantis, TOPAZ, and their associated logos are trademarks or registered trademarks of Eddyfi Technologies (wholly owned subsidiary of Eddyfi NDT, Inc.) in Canada and/or other countries. Eddyfi Technologies reserves the right to change product offerings and specifications without notice. Eddyfi Technologies is a Previa Business Unit.