

Procedure For The Ultrasonic Testing Of Full Penetration Butt Welds In Steel Plate And Pipe to BS EN ISO 17640

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1. Scope

This procedure describes the method of ultrasonic examination of full penetration butt welded joints in steel plate and pipe sections and must be adhered to as applicable to ensure customer requirements are met and that compliance with orders received is achieved.

This procedure only covers the pulse echo contact method of ultrasonic examination of fusion welded joints in low alloy ferrous steel having wall thickness of between 8mm and 100mm and at temperatures between 0 °C and 50 °C.

Welds undergoing ultrasonic inspection shall be subject to 100% volumetric examination of the weld body and heat affected zone.

2. References

This procedure makes reference to the following documents:-

BS EN ISO 9712:2022 Non-destructive testing. Qualification and certification of NDT personnel.

BS EN ISO 17640:2018 Non-destructive testing of welds. Ultrasonic testing. Techniques, testing levels, and assessment

BS EN ISO 7963:2022 Non-destructive testing. Ultrasonic testing. Specification for calibration block No. 2

BS EN ISO 22232-1:2020 Non-destructive testing. Characterization and verification of ultrasonic test equipment. Part 1: Instruments

BS EN ISO 22232-2:2020 Non-destructive testing. Characterization and verification of ultrasonic test equipment. Part 2: Probes

BS EN ISO 22232-3:2020 Non-destructive testing. Characterization and verification of ultrasonic test equipment. Part 3: Combined equipment

BS EN ISO 16810:2024 Non-destructive testing. Ultrasonic testing. General principles

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3. Definitions & Abbreviations

The following definitions and abbreviations are used in this procedure.

BWE	Back wall echo
DAC	Distance amplitude correction
dB	Decibel
FSH	Full screen height
PCN	Personnel Certification in NDT
SDH	Side drilled hole
UT	Ultrasonic Testing

4. Personnel Qualifications

All personnel operating to this procedure shall hold a minimum of Level 2 certification in accordance with BS EN ISO 9712 in the ultrasonic testing of welds, e.g. PCN Level 2.

Note: It is critical that UT operator certification must cover the configuration of weld that is to be tested i.e. 3.1 and 3.2 for plate and pipe welds.

All personnel shall also hold a valid eyesight certificate (meeting the requirements of BS EN ISO 9712 Section 7.4) obtained within the last 12 months.

5. Surface Finish

Surfaces from which scanning is carried out shall be such that satisfactory acoustic coupling can be maintained at all times.

Surfaces shall be free from scale, foreign material, rust, oil/grease, gouge marks, burning slag residue or any other material that could affect the sensitivity of the test.

The scanning zone width shall be at least 1.25 × the full skip distance (p), see Appendix A.

6. Equipment

The following equipment shall be used when working to this procedure.

- A-scan ultrasonic flaw detector.
- No. 2 calibration block.
- 0° Twin crystal, 45°, 60°, 70° single and/or twin crystal 10mm Ø, 4-5MHz probes.
- Commercial couplant.
- DAC block with 3mm Ø transverse drilled holes at different depths made from the same or equivalent material as the item to be tested.

All flaw detectors and probes used shall comply with BS EN ISO 22232. All flaw detectors shall have a valid external calibration certificate issued within the last twelve months.

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7. Equipment and Performance Checks

All functional and calibration checks of equipment shall be performed in accordance with BS EN ISO 22232-3.

Daily checks to include:-

- Probe index point
- Probe beam angle
- Physical state and external aspects.

Weekly checks to include:-

- Timebase linearity
- Amplification linearity
- Probe signal to noise ratio
- Pulse duration

All equipment checks shall be recorded by the operator and shall be made available upon future request.

8. Couplant

Commercial couplant shall be used. e.g. UCA-7 or Sonagel. Other coupling media may be used provided they are in accordance with BS EN ISO 16810.

The choice of couplant used shall not be harmful to the material being tested.

The coupling medium used for range and sensitivity setting and for the test shall be the same.

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