



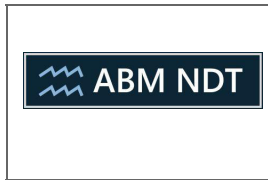
**Procedure For The Ultrasonic Testing
Of Solid Steel Bars To BS EN 10308:2002**

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ULTRASONIC INSPECTION PROCEDURE

Reference: PROC/GEN/UT/10308:2002 Issue:01 | Date of Issue: 10/02/2018

1. Scope

This procedure covers the ultrasonic inspection of square and rectangular steel bar products using the longitudinal wave manual pulse-echo technique.

This procedure follows practices laid down in BS EN 10308:2002

This procedure is only to be used for the inspection of newly manufactured wrought bar products and does not cover in-service inspection or items which have been subject to any repair work

This procedure covers the testing of martensitic, ferritic, austenitic and austenoferritic type wrought/forged steel and stainless steel materials.

This procedure does not cover any bar stock which has been extensively machined (i.e. into components) except where proof machining/turning has taken place to improve surface condition.

This procedure only covers solid bar products and is not applicable to bar which is either hollow or has been bored.

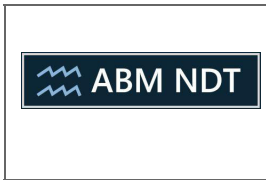
This procedure shall be carried out once all heat treatment operations have been completed and at least 48 hours after the final heat treatment operation has been completed.

This procedure covers the ultrasonic testing of square/rectangular bar stock of cross sectional thickness up to and including 400mm.

2. References

This procedure makes reference to the following documents:-

BS EN 10308:2002	Non-destructive testing - Ultrasonic Testing Of Steel Bars
BS EN ISO 9712:2012	Non-destructive Testing. Qualification and certification of NDT personnel.
BS EN ISO 2400:2012	Non-Destructive testing - Ultrasonic Examination - Specification for calibration block No. 1
BS EN 12668-1:2010	Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 1: Instruments
BS EN 12668-2:2010	Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 2: Probes
BS EN 12668-3:2013	Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 3: Combined equipment
BS EN 1330-1:2014	Non-destructive testing - Terminology - List of general terms



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BS EN 1330-4:2010 Non-destructive testing - Terminology - Terms used in ultrasonic testing

BS EN ISO 16811:2014 Non-destructive testing - Ultrasonic testing - Sensitivity And Range Setting

3. Definitions & Abbreviations

As well as the terms defined in BS EN 1330-1 and BS EN 1330-4 this procedure uses the following definitions:

PCN	Personnel certification in Non-destructive testing
COSHH	Control of substances hazardous to health
PPE	Personal protective equipment
FBH	Flat-bottom hole
FSH	Full screen height
DAC	Distance-amplitude correction

4. Safety

All consumables used shall have accompanying COSHH data sheets and shall be disposed of in a way that is non-injurious to site personnel or to the environment.

Personnel working to this procedure shall at all times wear mandatory PPE; overalls, safety boots, hard hat, high visibility clothing, safety eyewear.

5. Personnel Qualifications

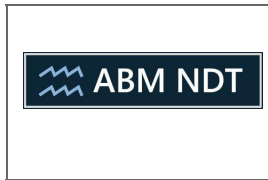
All personnel following this procedure must be currently certified by PCN (or ISO 9712 equivalent body) to a minimum of Level 2 covering the ultrasonic testing of forgings and wrought products.

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

Documentation relating to ultrasonic operators working on-site for the steel supplier/end user shall be kept on file at the administration offices for review purposes.

6. Identification And Datum Points

All bars tested shall be permanently stamped/engraved at one end with an identifying cast number and where more than one bar from the same cast is to be tested, each bar shall be uniquely numbered with indelible ink at the same end for identification purposes.



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The end of the bar marked with the cast number shall be used as the datum point for reporting purposes (See appendix A).

7. Surface Preparation

The surface condition shall be such that satisfactory coupling conditions can be maintained at all times.

All surfaces to be examined shall be clean and free from paint, non-adhering scale, dry couplant, surface irregularities or any other substance that could reduce coupling efficiency, hinder the free movement of the probe or cause errors in interpretation.

Where bars have been milled the surface condition shall be such that a regular smooth surface is achieved so that spurious indications do not affect the sensitivity of the test.

If a bar is found to have a surface condition which means that a complete satisfactory ultrasonic examination cannot take place, then company management and/or the responsible Level 3 shall be informed so that corrective action can be taken before the bar is subject to ultrasonic testing.

8. Extent Of Inspection

All bars tested in accordance with this procedure shall be examined using the longitudinal wave manual pulse-echo technique on:

- In the case of square/rectangular bars: 100% of two perpendicular faces parallel to the direction of rolling.
- In the case of round bars: At least 180° of the cylindrical surface of the bar along full length.

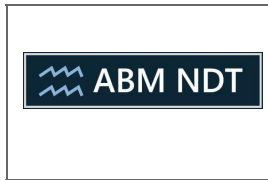
This procedure does not cover the examination of the bar in the longitudinal direction nor does this procedure cover the examination of the bar using angle (shearwave) probes.

This procedure only covers solid round, square and rectangular bar stock and is not applicable to bar stock which has been bored.

9. Equipment Specification

The following equipment is required in order to carry out this procedure:

An ultrasonic flaw detector with an A-scan presentation which meets the requirements of BS EN 12668-1.



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A calibration block No. 1 manufactured in accordance with BS EN 12223.

A set of reference blocks as described in BS EN 10308:2002 part 8.4 which cover the section thickness of the bars to be examined and of the relevant FBH diameter (See appendix B).

Reference test blocks shall be manufactured out of the same (or acoustically similar) material as the items under test and shall also have a comparable surface finish to the items under test.

Both single and combined double probes may be used with diameter of 9-25mm and a nominal frequency range of 1-6 MHz (See appendix C). All probes used shall comply with the requirements of BS EN 12668-2.

Commercial couplant. Note: the same couplant shall be used throughout calibration, sensitivity settings, scanning and evaluation of discontinuities.

Consumables: Indelible ink pens, rags, solvent cleaner, PPE.

10. Equipment Calibration

All ultrasonic flaw detectors used shall be externally calibrated annually in accordance with BS EN 12668-1.

All calibrated equipment shall display a calibration sticker showing start/end date of calibration and the company which performed the calibration.

Calibration and certificates of conformance for ultrasonic inspection equipment shall be located at the company technical office.

All reference blocks shall be uniquely identifiable.

If a piece of equipment is found to be out of calibration it should immediately be taken out of service and quarantined as per section 15.

11. Equipment Checks

The following equipment checks shall be carried out for all pieces of equipment to be used in this procedure in accordance with the techniques detailed in BS EN 12668-3

Weekly Checks

- Linearity of timebase (BS EN 12668-3 Part 3.2.1)
- Linearity of equipment gain (BS EN 12668-3 Part 3.2.2)
- Sensitivity and signal-to-noise ratio (BS EN 12668-3 Part 3.4.3)
- Pulse duration (BS EN 12668-3 Part 3.4.4)