


# Procedure For The Ultrasonic Testing Of Forgings And Forged, Extruded And Wrought Bars to DEF STAN 02-729 Part 5

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## 1. Scope

This procedure covers the manual ultrasonic testing of forgings and of forged, extruded and wrought bars, rods and sections using the compression (longitudinal) and shear wave pulse-echo contact technique, in accordance with DEF STAN 02-729 Part 5 Issue 4 clause 20, for on-site and in-house use.

This procedure covers forged, extruded and wrought bars, rods and sections in carbon, low alloy and stainless steels, austenitic steel forgings, and non-ferrous forgings, bars, rods and sections (e.g. nickel aluminium bronze, phosphor bronze, copper-nickel alloys and Hiduron).

For steel forgings, excluding austenitic, DEF STAN 02-729 Part 5 clause 20.1 requires BS EN 10228-3 to apply. Those forgings shall be tested to a BS EN 10228-3 procedure, not to this procedure.

Where DEF STAN 02-729 Part 5 is referenced from a material specification (e.g. DEF STAN 02-833 Part 2 or 02-838 Part 2), the material specification has precedence over this procedure (clause 1.5). The relevant steps of this procedure shall be applied as derived from the material specification (clause 20.1).

In non-ferrous bar, the detection of sub-surface defects is limited by the relationship between grain size, ultrasonic wavelength and the size of the smallest detectable defect. Ultrasonic testing of non-ferrous bar is only practical where attenuation does not preclude the use of reflection techniques (clause 20.1).

This procedure is to be used for the inspection of newly manufactured products and, where suitable, can be used for in-service inspection or items which have been subject to repair work.

This procedure does not cover forgings which have been extensively machined (i.e. into complex components) except where turning has taken place to improve surface condition.

Unless otherwise specified in the Contract Documents, testing shall be performed on the item in the final surface condition and the final heat-treatment condition (clause 6 b)).

## 2. References

This procedure makes reference to the following documents:-

**DEF STAN 02-729 Part 5 Issue 4** Requirements for Non-Destructive Examination Methods. Part 5: Ultrasonic

**BS EN 10228-3:2016** Non-destructive testing of steel forgings. Part 3: Ultrasonic testing of ferritic or martensitic steel forgings

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

**BS EN ISO 18490:2026** Non-destructive testing. Evaluation of vision acuity of NDT personnel

**BS EN ISO 2400:2025** Non-destructive testing. Ultrasonic testing. Specification for standard block No. 1

**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 1330-1:2014** Non-destructive testing. Terminology. List of general terms

**BS EN ISO 5577:2025** Non-destructive testing. Ultrasonic testing. Vocabulary

**BS EN ISO 16811:2025** Non-destructive testing. Ultrasonic testing. Sensitivity and range setting

**BS EN ISO 16827:2025** Non-destructive testing. Ultrasonic testing. Characterization and sizing of discontinuities

## 3. Definitions & Abbreviations

As well as the terms defined in BS EN 1330-1 and BS EN ISO 5577 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 |
| **SDH** | Side drilled hole |
| **FSH** | Full screen height |
| **BWE** | Back wall echo |
| **DEF STAN** | Defence Standard |
| **DAC** | Distance-amplitude correction |

**Contract Documents:** The purchase order, drawings, material specification and any other documents that specify the requirements for the item.

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**Design Authority:** The authority responsible for the design of the item, as identified in the Contract Documents.

**Approval Authority:** The authority responsible for approving the examining authority, its procedures and personnel, as identified in the Contract Documents.

**Material specification:** The DEF STAN or other specification to which the material is supplied, e.g. DEF STAN 02-833 Part 2 or 02-838 Part 2.

## 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 operating to this procedure shall hold a minimum of Level 2 certification in accordance with BS EN ISO 9712 in the ultrasonic testing of forgings and wrought products, e.g. PCN Level 2.

All personnel shall meet the vision requirements of BS EN ISO 9712 and provide documentary evidence (DEF STAN 02-729 Part 5 clause 7.1 a)): near vision acuity shall permit reading a minimum of Jaeger number 1 or Times Roman N 4.5 or equivalent letters (1.6 mm high) at not less than 30 cm, with one or both eyes, corrected or uncorrected; colour vision shall be sufficient to distinguish and differentiate between the colours or shades of grey used in the method. Vision shall be tested annually. Information on vision testing is given in BS EN ISO 18490.

Personnel shall be able to demonstrate their ability to meet the requirements of this procedure (clause 7.1 b)). A register of approved personnel shall be kept (clause 7.1 h)).

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

## 6. Identification And Datum Points

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

The end of the item marked with the cast number shall be used as the datum point for reporting purposes.

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