Procedure For The Ultrasonic Testing Of Forgings to ASTM A388/API 6A PSL3/4

SAMPLE DOCUMENT – NOT FOR USE

This is an extract from a sample procedure, provided so you can see the layout and level of detail. The full procedure is available to buy from **ABM NDT Ltd** at www.n-d-t.com. Every procedure is written and approved by a PCN Level 3 and comes with your company's name, procedure number and issue date, ready for you to authorise for use. It is supplied as a PDF, normally within 24 hours. To order, or to ask a question first, use the **Ask the Level 3** enquiry button on the Procedures page, or call **0800 599 9908**.

Authored By: Mr A Sample PCN Level 3	**Authorised For Use By:**
Signed: Mr A Sample **Date:**	**Signed:** **Date:**

CONTENTS

1. Scope

2. References

3. Definitions & abbreviations

4. Safety

5. Personnel qualifications

6. Identification and datum points

7. Surface finish

8. Extent of inspection

9. Equipment specification

10. Equipment calibration

11. Equipment checks

12. General technique

13. Assessment of ultrasonic indications

14. Reporting

15. Non-compliance statement

Appendix A – Straight beam probes

Appendix B – Sensitivity settings

Appendix C – Scan plans

Appendix D – Revision history

SAMPLE

1. Scope

This procedure covers the ultrasonic inspection of wrought steel products (bar, forgings, hollow forgings, rings, discs and stem material) using the manual pulse-echo straight beam and angle beam techniques for on-site and in-house use.

This procedure follows practices laid down in API Spec 6A (PSL 3 and PSL 4) and ASTM A388/A388M.

This procedure covers the testing of ferritic, martensitic, austenitic and duplex stainless steels, steel alloys and super-alloys (e.g. Inconel).

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

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

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.

2. References

This procedure makes reference to the following documents:-

API Spec 6A, 21st Edition Specification for Wellhead and Tree Equipment

ASTM A388/A388M-26 Standard Practice for Ultrasonic Examination of Steel Forgings

ASTM E127-20 Standard Practice for Fabrication and Control of Flat Bottomed Hole Ultrasonic Standard Reference Blocks

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

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

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

SAMPLE

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

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

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

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

3. Definitions & abbreviations

As well as the terms defined in 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
FSH	Full screen height
DAC	Distance-amplitude correction
SDH	Side-drilled hole
PSL	Product specification level

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 also hold a valid eyesight certificate (meeting the requirements of BS EN 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.

SAMPLE

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.

7. Surface finish

The surface roughness of exterior finishes shall not exceed 250 µin [6 µm] unless otherwise shown on the forging drawing or stated in the order or the contract.

Regardless of surface condition, all surfaces to be examined shall be clean and free from paint, 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.

Unsatisfactory surface finish shall be categorised as a non-conformance to procedure as per section 15.

8. Extent of inspection

All items tested in accordance with this procedure shall be examined using the manual pulse-echo technique as follows:

- In the case of square/rectangular bars: 100% of all four faces parallel to the direction of rolling.
- In the case of round bars: 360° of the cylindrical surface of the bar along its full length.
- Where possible an end-to-end scan shall be performed from both end faces where the sound path covers the full length of the item under test. Where not possible this shall be supplemented with a longitudinal angle scan.
- A longitudinal angle scan shall be undertaken on any stem material that is longer than six times the diameter.
- Disc forgings shall be scanned using the straight beam technique from at least one flat face and radially from the circumference, where practical.
- Cylindrical sections and hollow forgings shall be scanned radially using the straight beam technique, and where possible in the axial direction as well.

SAMPLE