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1988 cd

ULTRASONIC TESTING OF FERRITIC STEEL FORGINGS

1065—1988 **Non-destructive testing—Ultrasonic testing of carbon and low alloy steel forgings**
(In Update Service 19) A4 29pp *F*

Sets out methods for manual ultrasonic testing of carbon and low alloy steel forgings at three recording levels by the use of equivalent reflector sizes. Appendices provide information on probe selection, reflectivity diagrams, testing of curved surfaces, selection of beam angle and classification of discontinuities.

Committee MT/7. Supersedes AS 1065—1978. Draft for comment DR 86155.
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STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Associated Chambers of Manufactures of Australia
Australian Atomic Engery Commission
Australian Chamber of Commerce
Australian Institute of Non-destructive Testing
Australian Welding Institute
Bureau of Steel Manufacturers
Department of Defence
Department of Labour and Industry
Department of Productivity
Electricity Supply Association of Australia
Institute of Australian Foundrymen
National Association of Testing Authorities
Metal Trades Industry Association of Australia
Railways of Australia Committee

This standard, prepared by Committee MT/7, Non-destructive Testing of Metals and Materials, was approved by the Metals Standards Board on behalf of the Council of the Standards Association of Australia on 7 February 1978, and was published on 1 May 1978.

To keep abreast of progress in industry, Australian standards are regularly reviewed. Suggestions for improvements to published standards, addressed to the head office of the Association, are welcomed.

This standard was issued in draft form for public review as DR 77069.

AUSTRALIAN STANDARD

METHODS FOR ULTRASONIC TESTING OF FERRITIC STEEL FORGINGS

AS 1065—1978

First published (as AS 1065, Part 1) ... 1971
Revised 1978

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PREFACE

This standard was prepared by the Association's Committee on Non-destructive Testing as a revision of AS 1065, Part 1—1971. It forms part of a series dealing with methods for non-destructive testing being prepared by the committee.

Whilst methods of test are outlined, the standard does not give guidance as to when this type of testing should be employed nor does it give standards of acceptance. Both of these aspects should be covered in the appropriate product specification or be agreed between contracting parties.

During the preparation of the standard the committee considered testing methods written into overseas standards, and practices which have evolved in the field of non-destructive testing in Australia; these include the following standards:

JIS Z2344	Ultrasonic Testing of Metals by the Pulse Echo Technique
ASTM A388	Ultrasonic Examination of Heavy Steel Forgings
ASTM E317	Evaluating Performance Characteristics of Pulse-echo Ultrasonic Testing Systems

The standard covers the use of pulse-echo ultrasonic testing equipment under direct contact conditions. It describes various test methods (using ultrasonic sound waves) which may be specified by manufacturers of forgings, inspecting authorities, or purchasers for the testing of steel forgings.

The standard has been rearranged to a new layout and contains methods specified in more detail than previously. New methods have been introduced for the sizing of discontinuities based on a 6 dB or 20 dB intensity drop system.

Details and examples are given of the use of reflectivity diagrams for both normal and angle probes. A nomograph has also been included for different probe sizes when determining compensation for curvature.

Additional guidelines have also been introduced for use by purchasers, designers, and testing authorities.

The whole procedure of ultrasonic examination rests on the technical competence of the testing personnel and their ability to interpret results. It is essential that testing personnel be conversant with the test equipment and be capable of demonstrating to the satisfaction of interested parties their technical competence and interpretative ability (see also Appendix A).

It is emphasized that diagnosis of the nature of discontinuities located by ultrasonic testing can only be made by consideration of both metallurgical and ultrasonic factors. Consideration should therefore be given to the method of manufacture of the forging under test, and the type, position and probable distribution of any discontinuities likely to be present.

It should be noted that facilities for non-destructive testing are afforded by laboratories registered by the National Association of Testing Authorities, Australia, for the field and class of testing covered by this standard.

This standard may require reference to the following Australian standards:

AS 1929 Glossary of Terms used in Non-destructive Testing

AS 1965 The Measurement of Surface Roughness with Direct-reading Stylus Electronic Instruments

AS 2083 Calibration Blocks and Their Methods of Use in Ultrasonic Testing.

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METHODS FOR ULTRASONIC TESTING OF FERRITIC STEEL FORGINGS

1 SCOPE. This standard describes procedures for the ultrasonic testing of ferritic steel forgings.

NOTE: Supplementary information required to complete the standard is set out in Appendix A.

2 APPLICATION. These methods are to be used when ultrasonic testing is specified on the purchase order, or required by an application code or forging specification.

The examination of forgings which have not been machined or which have not received a grain-refining heat treatment may be severely restricted and comparison with a calibration block cannot be applied rigidly under these conditions. The ultrasonic testing of forgings in either of these conditions is not recommended.

The ultrasonic testing of forgings is generally carried out using normal probes. Angle or shear wave probes are used where the geometry of the forging prevents a comprehensive test or to further evaluate indications detected by normal probes.

3 TERMS AND DEFINITIONS. For the purposes of this standard the terms and definitions given in AS 1929* apply.

4 EQUIPMENT.

4.1 General. The ultrasonic testing system shall be capable of displaying the presence of discontinuities likely to be present in forgings and of delineating their boundaries and contours.

4.2 Presentation. A-scan presentation shall be used.

4.3 Assessment of Horizontal and Vertical Linearity. Horizontal and vertical linearity shall be assessed for the test ranges to be used. Any deviation of the horizontal linearity exceeding 2 percent over the full screen width or deviation of the vertical linearity exceeding ± 2 dB between 30 percent and 100 percent graticule height shall be known and recorded.

4.4 Gain Control. A gain control calibrated in steps not exceeding 2 dB shall be used for measuring the ratios of ultrasonic amplitudes.

4.5 Frequency Range. The equipment shall be capable of testing at a frequency within the range 1 MHz to 10 MHz.

*AS 1929, Glossary of Terms used in Non-destructive Testing.