Australian Standard™

Non-destructive testing—Ultrasonic testing of ferritic steel castings

Standards Australia

This Australian Standard was prepared by Committee MT/7, Non-destructive Testing of Metals and Materials. It was approved on behalf of the Council of Standards Australia on 16 June 2000 and published on 6 November 2000.

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Australian Aerospace Non-Destructive Testing Committee

Australian Industry Group

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MT/7, Non-destructive Testing of Metals and Materials, to supersede AS 2574—1982, *Non-destructive testing—Ultrasonic testing of steel castings and classification of quality*.

The objective of this revision is to upgrade the requirements for the A-scan ultrasonic testing of ferritic steel castings that are 15 mm or greater in thickness.

During this revision, cognizance was taken of the following Standards:

ASTM A 609-91 Practice for castings, carbon, low-alloy, and martensitic stainless steel, ultrasonic examination thereof.

BS 6208:1990 Ultrasonic testing of ferritic steel castings including quality levels.

Currently there are no International Standards (ISO) published on the subject.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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FOREWORD

The detection and the location of discontinuities in steel castings are facilitated if a grain-refining heat treatment and appropriate test surface preparation have been carried out.

Where an adequate grain refining heat treatment has not been carried out, it is difficult to make a direct comparison of the ultrasonic response from a casting with that of a distance-amplitude curve (DAC) produced from standard fine-grained reference blocks, or to use recognized distance-gain-size (DGS) principles. In this case, alternative blocks, or sections of the casting itself, should be used to establish the test sensitivity.

Ultrasonic testing of castings is carried out using compression wave (normal) probes, and shear wave (angle) probes where the geometry of the casting limits the effectiveness of normal probes.

Indicated discontinuity sizes should not be taken as absolute in any assessment of serviceability of the casting. Ultrasonic testing can only produce an indication of the response of a discontinuity to ultrasound. The sizing techniques described in this Standard can, in some circumstances, underestimate the true size of small discontinuities.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE AND APPLICATION

This Standard sets out methods for the ultrasonic testing of specified areas of heat-treated ferritic steel castings that are 15 mm or greater in thickness, using A-scan presentation. It employs three evaluation sensitivity levels and divides the casting wall thickness into zones.

NOTES:

1 Advice and recommendations on information to be supplied by the purchaser at the time of enquiry and order are contained in the purchasing guidelines set out in Appendix A.

2 This Standard does not apply to the testing of austenitic steel castings unless by agreement, because such castings have a columnar structure which is not amenable to grain refining by heat treatment.

3 The level of evaluation of discontinuities is normally specified in relevant product Standards or is determined by agreement between the contracting parties after due consideration of the size, configuration and the service requirements of the casting.

4 Steel deposited during repair welding is deemed to be part of the casting.

5 This Standard does not include methods for the ultrasonic immersion testing of castings.

Procedures described in this Standard enable the test operator to determine the location, size, shape and often, the identification of discontinuities in all specified zones of heat-treated steel castings. To enable the accurate sizing of discontinuities, castings should be machined or ground to provide optimum probe contact. For unmachined castings it is necessary that some form of surface preparation be carried out.

The recording requirements and the acceptance criteria, as specified in Sections 3 and 5 respectively, may not apply to complicated castings where heavy indentations or shapes are to be produced by machining, e.g. gear teeth or splines, because the zone parameters (see Section 5) cannot be rigidly applied.

NOTE: In such cases the recording/acceptance criteria is subject to negotiation between the purchaser and the supplier.

Although the methods outlined in this Standard are intended to be applied to heat-treated castings, they may be used on non heat-treated castings, by agreement, provided that it is recognized that some types of discontinuity may be difficult to detect in structures that have not been grain refined. In this case, an acceptance standard cannot be applied. For non heat-treated castings, where direct comparison with standard fine grained calibration blocks, or the use of recognized distance-gain-size (DGS) principles, is not appropriate, alternative blocks, or sections of the casting itself, should be used to evaluate discontinuities.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1929 Non-destructive testing—Glossary of terms

2083 Calibration blocks and their methods of use in ultrasonic testing

