Australian Standard™

Non-destructive testing

Part 2: Radiographic determination of quality of ferrous castings

Standards Australia

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The following are represented on Committee MT-007:

Australian Railway Association

Australian Aerospace Non-Destructive Testing Committee

Australian Industry Group

Australian Institute for Non-Destructive Testing

ANSTO

Australian Pipeline Industry Association

Bureau of Steel Manufacturers of Australia

Institution of Engineers Australia

National Association of Testing Authorities Australia

TestSafe Australia

Victoria Workcover Authority

Welding Technology Institute of Australia

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Part 2: Radiographic determination of quality of ferrous castings

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MT-007, Non-Destructive Testing of Metals and Materials, at the request of industry. This Standard supersedes, in part, AS 3507—1987, *Non-destructive testing—Radiography of steel castings and classification of quality*.

This Standard was prepared by the Australian members of the joint Standards Australia/Standards New Zealand Committee MT-007. After consultation with shareholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify acceptance zoning for defects in ferrous castings.

This Standard is Part 2 of a series of Standards covering the radiography of ferrous castings.

The series comprises the following Parts:

AS		
3507	Non-destructive testing-radiography	
3507.1	Part 1:	Guide to radiography for ferrous castings
3507.2	Part 2:	Radiographic determination of quality of ferrous castings (this Standard)

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

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FOREWORD

Soundness of castings depends on such factors as size, section, configuration, method of moulding and design of runner and riser systems. These factors, and other aspects such as heat treatment, affect grain structure and location and orientation of possible discontinuities. These factors have to be considered when choosing the appropriate test method and sensitivity.

Radiographic methods described in this Standard determine size and nature but not necessarily depth of discontinuities in castings. Each radiographic method can yield a radiograph with a range of sensitivities depending upon section thickness.

For convenience in the assessment of integrity of castings, discontinuities in castings have been graded into severity indexes, which vary according to type of discontinuity. However, acceptance criteria or quality classes for discontinuities are normally specified in relevant product standards or determined by agreement between the contracting parties after due consideration of size, configuration, and service requirements of the casting.

Where alternatives exist, the exact grading should be agreed between customer and contractor, if not covered by the product or application standard.

Non-destructive testing methods are mutually complementary; it is emphasized that the results of one test should be considered in relation to those obtained by another method. Accordingly, differing interpretations may be required to be reassessed by alternative methods.

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1 SCOPE

The Standard specifies the method of classification for acceptance zoning for radiography of ferrous castings as a whole or part of a section.

Six quality classifications are given based on the number and degree of discontinuities observed in radiographs, see Table 1.

2 REFERENCED DOCUMENTS

The following document is referred to in this Standard.

AS	
1929	Non-destructive testing—Glossary of terms
3998	Non-destructive testing—Qualifications and certification of personnel (ISO 9712)

3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 1929 apply.

4 RADIOGRAPHIC TECHNIQUE SELECTION

Radiographic technique selection may indicate variations in concentrations of discontinuities by varying the film sensitivity. Therefore the principle for test method radiographic selection should be based on the casting's intended application, as an example, high sensitivity should be recommended for castings intended for the use in the nuclear industry, creep environments, extremely high pressure and/or temperature or hydrogen exposure. Normal sensitivity should be recommended for castings used in lower tier services even if subject to pressure or high temperatures.

5 EVALUATION OF TEST DATA

5.1 General

The location of the discontinuity shall be taken into account, where further radiography or complimentary ultrasonic techniques are used to establish the exact location.

Discontinuities observed in radiographs shall be located and interpreted against the quality classifications set out in Clause 6.

The type, size and orientation of discontinuities in a casting are influenced by the design, the method of manufacture and the metallurgical factors involved in the solidification of the metal. Discontinuities that may be present tend to be associated with particular features of the casting so that each type of discontinuity has a characteristic location and orientation. In assessing discontinuities by radiography, the casting thickness, discontinuity type, amount and location (Zone A or Zone B) shall be taken into consideration with respect to discontinuity criteria as follows:

(a) Gas porosity, blowholes and inclusions (sand and/or slag)—diameter and location.