



## **Non-destructive testing – Penetrant testing**

### **Part 1: General principles**

STANDARDS  
Australia



Currently in preview, click buy full version

AS ISO 3452.1:2020

This Australian Standard® was prepared by MT-007, Non-Destructive Testing Of Metals And Materials. It was approved on behalf of the Council of Standards Australia on 24 February 2020.

This Standard was published on 6 March 2020.

The following are represented on Committee MT-007:

- Australasian Thermographers Association
- Australian Institute for Non-Destructive Testing
- Australian Nuclear Science and Technology Organisation
- Austrroads
- Engineers Australia
- Institute of Electrical Inspectors
- National Aerospace Non-Destructive Testing Board of Australia
- Weld Australia

This Standard was issued in draft form for comment as DR AS ISO 3452.1:2019.

#### **Keeping Standards up-to-date**

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

[www.standards.org.au](http://www.standards.org.au)

ISBN 978 1 76072 752 9



## **Non-destructive testing – Penetrant testing**

### **Part 1: General principles**

Originally part of AS B260.3A—1968.  
Revised and redesignated as AS 2062—1977.  
Revised, amalgamated with AS 2565—1982 and redesignated as AS 2062—1997.  
Revised and redesignated as AS ISO 3452.1:2020.

#### **COPYRIGHT**

© ISO 2020 — All rights reserved  
© Standards Australia Limited 2020

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

## Preface

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee MT-007, Non-Destructive Testing of Metals and Materials, to supersede AS 2062—1997, *Non-destructive testing — Penetrant testing of products and components*.

After consultation with stakeholders 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 a method of penetrant testing used to detect discontinuities, e.g. cracks, laps, folds, porosity and lack of fusion, which are open to the surface of the material to be tested. It is mainly applied to metallic materials, but can also be performed on other materials, provided that they are inert to the test media and not excessively porous (castings, forgings, welds, ceramics, etc.)

This Standard also includes requirements for process and control testing, but is not intended to be used for acceptance criteria and gives neither information relating to the suitability of individual test systems for specific applications nor requirements for test equipment.

This Standard is identical with, and has been reproduced from, ISO 3452-1:2013, *Non-destructive testing — Penetrant testing — Part 1: General principles*.

As this document has been reproduced from an International Standard, the following applies:

- (a) In the source text “this part of ISO 3452” should read “this Australian Standard”.
- (b) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

# Contents

Preface .....	ii
Foreword .....	v
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Safety precautions</b> .....	<b>1</b>
<b>5 General principles</b> .....	<b>2</b>
5.1 Personnel .....	2
5.2 Description of the method .....	2
5.3 Process sequence .....	2
5.4 Equipment .....	3
5.5 Effectiveness .....	3
<b>6 Products, sensitivity and designation</b> .....	<b>3</b>
6.1 Product family .....	3
6.2 Testing products .....	3
6.3 Sensitivity .....	3
6.4 Designation .....	3
<b>7 Compatibility of testing materials with the part(s) to be tested</b> .....	<b>4</b>
7.1 General .....	4
7.2 Compatibility of penetrant testing products .....	4
7.3 Compatibility of penetrant testing materials with parts under examination .....	4
<b>8 Test procedure</b> .....	<b>5</b>
8.1 Written test procedure .....	5
8.2 Precleaning .....	5
8.2.1 General .....	5
8.2.2 Mechanical precleaning .....	5
8.2.3 Chemical precleaning .....	5
8.2.4 Drying .....	5
8.3 Temperature .....	5
8.4 Application of penetrant .....	5
8.4.1 Methods of application .....	5
8.4.2 Penetration time .....	6
8.5 Excess penetrant removal .....	6
8.5.1 General .....	6
8.5.2 Water .....	6
8.5.3 Solvents .....	6
8.5.4 Emulsifier .....	6
8.5.5 Water and solvent .....	6
8.5.6 Excess penetrant removal check .....	7
8.5.7 Drying .....	7
8.6 Application of developer .....	7
8.6.1 General .....	7
8.6.2 Dry powder .....	7
8.6.3 Water-suspendable developer .....	8
8.6.4 Solvent-based developer .....	8
8.6.5 Water-soluble developer .....	8
8.6.6 Water- or solvent-based for special application (e.g. peelable developer) .....	8
8.6.7 Development time .....	8
8.7 Inspection .....	9
8.7.1 Viewing conditions .....	9
8.7.2 General .....	9

8.7.3	Wipe-off technique.....	9
8.7.4	Recording.....	10
8.8	Postcleaning and protection.....	10
8.8.1	Postcleaning.....	10
8.8.2	Protection.....	10
8.9	Retesting.....	10
<b>9</b>	<b>Test report.....</b>	<b>10</b>
<b>Annex A</b>	(normative) <b>Main stages of penetrant examination.....</b>	<b>12</b>
<b>Annex B</b>	(normative) <b>Process and control tests.....</b>	<b>13</b>
<b>Annex C</b>	(informative) <b>Example test report.....</b>	<b>21</b>
<b>Bibliography</b>	.....	<b>22</b>

Currently in preview, click buy full version.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents)

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - supplementary information](#)

The committee responsible for this document is ISO/TC 138, ISO 3452-1 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 138, *Non-destructive testing*, in collaboration with ISO Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 2, *Surface methods*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 3452-1:2008) which has been technically revised. Changes from the first edition include a table referring to the testing products.

This corrected version of ISO 3452:2013 incorporates the following corrections: a footnote has been added to Table 1; the flowchart of [Annex A](#) has been modified.

ISO 3452 consists of the following parts, under the general title *Non-destructive testing — Penetrant testing*:

- Part 1: General principles
- Part 2: Testing of penetrant materials
- Part 3: Reference test blocks
- Part 4: Equipment
- Part 5: Penetrant testing at temperatures higher than 50 °C
- Part 6: Penetrant testing at temperatures lower than 10 °C

NOTES

Currently in preview, click buy full version

# Australian Standard®

## Non-destructive testing – Penetrant testing

### Part 1: General principles

#### 1 Scope

This part of ISO 3452 specifies a method of penetrant testing used to detect discontinuities, e.g. cracks, laps, folds, porosity and lack of fusion, which are open to the surface of the material to be tested. It is mainly applied to metallic materials, but can also be performed on other materials, provided that they are inert to the test media and not excessively porous (castings, forgings, welds, ceramics, etc.)

It also includes requirements for process and control testing, but is not intended to be used for acceptance criteria and gives neither information relating to the suitability of individual test systems for specific applications nor requirements for test equipment.

NOTE 1 Methods for determining and monitoring the essential properties of penetrant testing products to be used are specified in ISO 3452-2 and ISO 3452-3.

NOTE 2 The term *discontinuity* is used in this part of ISO 3452 in the sense that no evaluation concerning acceptability or non-acceptability is included.

#### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3059, *Non-destructive testing — Penetrant testing and magnetic particle testing - Viewing conditions*

ISO 3452-2, *Non-destructive testing — Penetrant testing — Part 2: Testing of penetrant materials*

ISO 3452-3, *Non-destructive testing — Penetrant testing — Part 3: Reference test blocks*

ISO 3452-4, *Non-destructive testing — Penetrant testing — Part 4: Equipment*

ISO 3452-5, *Non-destructive testing — Penetrant testing — Part 5: Penetrant testing at temperatures higher than 50 degrees C*

ISO 3452-6, *Non-destructive testing — Penetrant testing — Part 6: Penetrant testing at temperatures lower than 10 degrees C*

ISO 12706, *Non-destructive testing — Penetrant testing — Vocabulary*

#### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12706 apply.

#### 4 Safety precautions

As penetrant inspection techniques often require the use of harmful, flammable and/or volatile materials, certain precautions shall be taken.

Prolonged or repeated contact of these materials with the skin or any mucous membrane should be avoided. Working areas shall be adequately ventilated and sited away from sources of heat, sparks or naked flames in accordance with local regulations.