
testing —
Part 2:
Testing of penetrant materials

Essais non destructifs — Examen par ressuage —
Partie 2: Essais des produits de ressuage
(standards.iteh.ai)

ISO 3452-2:2000

<https://standards.iteh.ai/catalog/standards/sist/69eb7c76-edf0-4eb6-8ea2-cf0604ca8afd/iso-3452-2-2000>



This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 3452-2:2000

<https://standards.iteh.ai/catalog/standards/sist/69eb7c76-edf0-4eb6-8ea2-cf0604ca8afd/iso-3452-2-2000>

© ISO 2000

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to member bodies for voting. Publication as an International Standard requires approval by at least 75 % of member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 3452 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3452-2 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee TC 135, *Non-destructive testing*, Subcommittee SC 2, *Surface methods*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this standard, read "...this European Standard..." to mean "...this International Standard...".

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

- *Part 1: General principles* [ISO 3452-2:2000](https://standards.iteh.ai/catalog/standards/sist/69eb7c76-edf0-4eb6-8ea2-cf0604ca8afd/iso-3452-2-2000)
- *Part 2: Testing of penetrant materials* <https://standards.iteh.ai/catalog/standards/sist/69eb7c76-edf0-4eb6-8ea2-cf0604ca8afd/iso-3452-2-2000>
- *Part 3: Reference test blocks*
- *Part 4: Equipment*

Annexes A and B form a normative part of this part of ISO 3452. Annexes C and D are for information only.

Annex ZZ provides a list of corresponding International and European Standards for which equivalents are not given in the text.

Contents

	Page
Foreword	v
Introduction	v
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Safety precautions	1
5 Classification	2
6 Testing of penetrant materials	3
7 Test methods and requirements	5
8 Packaging and labelling	13
Annex A (normative) Comparison of fluorescent brightness	14
Annex B (normative) Process control tests	16
Annex C (informative) Determination of fluorescent penetrant sensitivity levels	25
Annex D (informative) Example of indication visibility measuring equipment	26
Annex ZZ (informative) Corresponding International and European Standards for which equivalents are not given in the text	28

Foreword

The text of EN ISO 3452-2:199 has been prepared by Technical Committee CEN/TC 138 "Non-destructive testing", the secretariat of which is held by AFNOR, in collaboration with Technical Committee ISO/TC 135 "Non-destructive testing".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2000, and conflicting national standards shall be withdrawn at the latest by October 2000.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. This European Standard is considered to be a supporting standard to those application and product standards which in themselves support an essential safety requirement of a New Approach Directive and which make reference to this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

EN ISO 3452 comprises a series of European standards of penetrant testing which is made of the following:

- EN 571-1 Non-destructive testing - Penetrant testing - Part 1: General principles
- EN ISO 3452-2 Non-destructive testing - Penetrant testing - Part 2: Testing of penetrant materials
- EN ISO 3452-3 Non-destructive testing - Penetrant testing - Part 3: Reference test blocks
- EN ISO 3452-4 Non-destructive testing - Penetrant testing - Part 4: Equipment

STANDARD PREVIEW
(standards.iteh.ai)

Introduction

ISO 3452-2:2000

<https://standards.iteh.ai/catalog/standards/sist/69eb7c76-edf0-4eb6-8ea2-c80f4eaa1030/iso-3452-2-2000>

At the present time, one part of this standard is published independently on the European and ISO levels, the others are under Vienna agreement and consequently have the ISO number at the European level. However, the Vienna agreement was applied during the work, so some European Standards have referenced them under their previous European number. The following table gives the correspondance between these different numbers.

	CEN Number	
	previous number *	official number
Non destructive testing - Penetrant testing		
Part 1: General principles		EN 571-1
Part 2: Testing of penetrant materials	prEN 571-2	EN ISO 3452-2
Part 3: Reference test blocks	prEN 571-3	EN ISO 3452-3
* Number under which the document is referenced in some European Standards		

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

ISO 3452-2:2000

<https://standards.iteh.ai/catalog/standards/sist/69eb7c76-edf0-4eb6-8ea2-cf0604ca8afd/iso-3452-2-2000>

1 Scope

This European Standard specifies the technical requirements and test procedures for penetrant materials for their type testing and batch testing. It also details on site testing requirements and methods.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to, or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revisions. For undated reference the latest edition of the publication referred to applies.

EN 473, *Qualification and certification of NDT personnel - General principles*.

EN 571-1, *Non-destructive testing - Penetrant testing - Part 1: General principles*.

EN 10204, *Metallic products - Types of inspection documents*.

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

EN ISO 3452-3, *Non-destructive testing - Penetrant testing - Part 3: Reference test blocks*. (ISO 3452-3:1998)

EN ISO 12706, *Non-destructive testing - Terminology - Terms used in penetrant testing*. (ISO 12706:1999)

3 Definitions

For the purpose of this standard the definitions of EN ISO 12706 and the following definition apply:

batch

quantity of material produced at one operation having uniform properties throughout and with a unique identifying number of mark.

4 Safety precautions

The materials required by this standard include chemicals which may be harmful, flammable and/or volatile. All necessary precautions shall be observed. All relevant European, national and local regulations pertaining to health and safety, environmental requirements, etc. shall be observed.

5 Classification

Penetrant testing materials covered by this specification shall be classified as follows:

5.1 Testing products

The testing products are classified according to table 1:

Table 1 - Testing products

Penetrant		Excess penetrant remover		Developer	
Type	Denomination	Method	Denomination	Form	Denomination
I	Fluorescent penetrant	A	Water	a	Dry
II	Colour contrast penetrant	B	Lipophilic emulsifier 1 Oil-based emulsifier 2 Rinsing with running water	b c d	Water soluble Water suspendable Solvent-based (non-aqueous wet)
II	Dual purpose (fluorescent colour contrast penetrant)	C D E	Solvent (liquid) Hydrophilic emulsifier 1 optional prerinse (water) 2 emulsifier (water diluted) 3 finalrinse (water) Water and solvent	e	Water or solvent based for special application (e. g. peelable developer)

5.2 Sensitivity levels

5.2.1 Fluorescent product family

Sensitivity level 1 (normal)
Sensitivity level 2 (high sensitivity)
Sensitivity level 3 (ultra high for specialised uses)

5.2.2 Colour contrast product family

Sensitivity level 1 (normal)
Sensitivity level 2 (high sensitivity).

5.2.3 Dual purpose product family

There are no specific sensitivity levels for dual purpose penetrants. Classification can be carried out as for colour contrast systems.

6 Testing of penetrant materials

6.1 Testing facilities

6.1.1 Type testing

Type testing shall be carried out on penetrant materials according to EN 571-1 to ensure their conformance to the requirements of this European Standard. The test shall be carried out by an independent laboratory.

6.1.2 Batch testing

Batch testing to the requirements of this European Standard shall be carried out on each production batch according to EN 571-1 to ensure that, where applicable, it has the same properties as its corresponding type approval sample. In case of penetrant material packed in spray cans, the content of sulfur and halogens shall be additionally determined according to 7.12.

6.1.3 Process control testing

Process control testing shall be carried out or commissioned by the user in accordance with the requirements of EN 571-1, EN ISO 3452-2 and EN ISO 3452-3.

6.2 Reporting

6.2.1 Type testing

The independent laboratory (see 6.1.1) shall provide a certificate of compliance with this standard and a report that details the result obtained.

If any changes are made to the penetrant material composition then a new type test and product identity shall be required.

6.2.2 Batch testing

The manufacturer of the penetrant materials shall provide a certificate of compliance with this standard, e. g. as specified in EN 10204.

6.2.3 Process control testing

Results obtained shall be recorded (see Annex B).

6.3 Required tests

6.3.1 Penetrants

Type and/or batch testing shall be carried out for the properties of penetrants using the test methods according to table 2.

Table 2 - Properties of penetrants and required tests

Property	Test	Test method according to clause
Appearance	Batch	7.1
Sensitivity	Type and batch	7.2
Density	Type and batch	7.3
Viscosity	Type and batch	7.4
Flash point	Type and batch	7.5
Penetrant washability (method A penetrants only)	Batch	7.6
Fluorescent brightness (type I penetrants)	Batch	7.7
UV stability (type I penetrants)	Type	7.8
Thermal stability (type I penetrants)	Type	7.9
Water tolerance (method A penetrants only)	Type	7.10
Corrosive properties	Type and batch	7.11
Content of sulfur and halogens*)	Type and batch	7.12
Other contaminants on request (as required)	Batch	
*) Only required for products designated "Low in sulfur and halogens"		

(standards.iteh.ai)

6.3.2 Excess penetrant removers (excluding method A)

Type and/or batch testing shall be carried out for the properties of excess penetrant removers using the test methods according to table 3.

Table 3 - Properties of excess penetrant removers and required tests

Property	Test	Test method according to clause
Appearance	Batch	7.1
Sensitivity	Type and batch	7.2
Density	Type and batch	7.3
Viscosity (for method B and D only)	Type and batch	7.4
Flash point	Type and batch	7.5
Water tolerance (method B only)	Type and batch	7.10
Corrosive properties	Type and batch	7.11
Content of sulfur and halogens*)	Type and batch	7.12
Residue on evaporation (method C and E only)	Type and batch	7.13
Penetrant tolerance (method B and D only)	Type	7.14
Other contaminants on request (as required)	Batch	
*) Only required for products designated "Low in sulfur and halogens"		

6.3.3 Developers

Type and/or batch testing shall be carried out for the properties of developers using the test methods according to table 4.

Table 4 - Properties of developers and required tests

Property	Test	Test method according to clause
Appearance	Batch	7.1
Flash point (form d only)	Type and batch	7.5
Corrosive properties (except form a)	Type and batch	7.11
Content of sulfur and halogens*)	Type and batch	7.12
Solid content (form d only)	Type and batch	7.13
Developer performance (except form e)	Type and batch	7.15
Re-dispersibility (form c and d only)	Type and batch	7.16
Density (of carrier liquid) (form d only)	Type and batch	7.17
Other contaminants on request (as required)	Batch	
*) Only required for products designated "Low in sulfur and halogens"		

(standards.iteh.ai)

6.3.4 Batch control tests for pressurised containers

Batch control testing shall be carried out using the following test:
 Product performance, see 7.18

The first aerosol container of each batch shall be tested.

7 Test methods and requirements

7.1 Appearance

The appearance of the sample shall be the same as that of the type test material.

7.2 Penetrant system sensitivity

See also Annex C.

7.2.1 Fluorescent penetrants

7.2.1.1 Test panels

Test panels of 10 µm, 20 µm and 30 µm from type 1 reference block in accordance with EN ISO 3452-3 are used. These test panels shall be reserved for the use with type I penetrants only.

7.2.1.2 Apparatus

The measurement of the visibility of indications is made electronically.

A visibility measuring equipment consists for example of the following elements (see Annex D):

- microscope assembly,
- test panel holder and moving table,
- recording system,
- suitable source of illumination,
- instrument calibration test piece.

7.2.1.3 Calibration

The visibility measuring equipment shall be calibrated using a calibration test piece consisting of a polished metal plate, approximately 33 mm x 95 mm which has transverse grooves across its width.

The groove length should be longer than 20 mm, the groove width should be 0,15 mm \pm 0,015 mm and the depth should be greater than 1 mm. These grooves are to be filled with a suitable powder.¹⁾

The test piece shall be used to calibrate visibility measurement equipment, the height of the peak on the chart recorder caused by the powder in the groove being taken as 100 % when used according to 7.2.1.4.

7.2.1.4 Method

For each test panel the number of discontinuities shall be counted using a microscope with a 20 times magnification.

As photomultipliers are sensitive to temperature, light and magnetic field changes, they should therefore be protected as required. Allow the equipment to stabilise prior to use.

The equipment shall be set up using a standard fluorescence sample (see D.4) to give approximately a 50 % full scale deflection. The zero shall be adjusted to read zero with an unprocessed test panel from type 1 reference block.

The test panel of 30 μ m depth from type 1 reference block shall be processed in accordance with the penetrant manufacturer's recommendations using a form d developer and a 10 minute development time. The brightness of the indications is quantified using the discontinuity intensity measuring equipment.

If it is necessary to change sensitivity ranges on a chart recorder between setting up with the standard sample and running the test panel, zero and full scale deflection settings shall remain unaltered. In such cases standard peak height and sample peak heights shall be compared taking the different chart recorder sensitivities into consideration.

7.2.1.5 Interpretation of results

The visibility measuring equipment having been set up according to 7.2.1.3, ("A" on figure 1), the base is taken as 0 % ("B" on figure 1). Individual peak heights are recorded except those affected by handling, etc. Grouped peaks ("C" on figure 1) are recorded as their mean value.

The mean peak height (\bar{x}) and standard deviation of the peak height (σ_{n-1}) are determined and the sensitivity level is then obtained by reference to figure 2.

¹⁾ KEMK 63/M is an example of a suitable product available commercially from Phosphor Technology Ltd. Middle Stray, Nazing, Essex, EN9 2LP, U. K. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN of the product named.