
**Non-destructive testing — Penetrant
testing —**

Part 3:
Reference test blocks

*Essais non destructifs — Examen par ressuage —
Partie 3: Pièces de référence*



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 the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the 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 3452-3 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...".

This first edition together with ISO 3452-1, ISO 3452-2 and ISO 3452-4 cancels and replaces ISO 3452:1984, which has been technically revised.

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

- *Part 1: General principles*
- *Part 2: Penetrant testing materials*
- *Part 3: Reference test blocks*
- *Part 4: Equipment*

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

© ISO 1998

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 the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Description of reference blocks	1
4 Type 1 reference block design and dimensions	1
5 Type 2 reference block design and dimensions	3
6 Identification	6
Annex ZA (normative) Normative references to international publications with their relevant European publications	7

STANDARDSISO.COM : Click to view the full PDF of ISO 3452-3:1998

Foreword

The text of EN ISO 3452-3:1998 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 June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

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.

STANDARDSISO.COM : Click to view the full PDF of ISO 3452-3:1998

Introduction

At the present time, one part of this Standard is published independently on the European and ISO levels, the others are under the 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.

Title	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	prEN ISO 3452-2
Part 3: Reference test blocks	prEN 571-3	EN ISO 3452-3
Part 4: Equipment	prEN 956	EN ISO 3452-4
*number under which this document is referenced in some European Standards		

STANDARDSISO.COM : Click to view the full PDF of ISO 3452-3:1998

STANDARDSISO.COM : Click to view the full PDF of ISO 3452-3:1998

1 Scope

This European standard describes two types of reference blocks:

- Type 1 reference blocks are used to determine the sensitivity levels of both fluorescent and colour contrast penetrant product families;
- Type 2 reference blocks are used for routine assessment of the performance of both fluorescent and colour contrast penetrant facilities and part-used containers.

The reference blocks are used in the same conditions as the pieces to be tested according to EN 571-1.

2 Normative references

This European standard incorporates by dated or undated reference, 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 revision. For undated references the latest edition of the publication referred to applies.

EN 571-1	Non destructive testing - Penetrant testing - Part 1: General principles
prEN ISO 3452-2	Non-destructive testing - Penetrant testing - Part 2: Testing of penetrant materials (ISO/DIS 3452-2:1996)
EN 10027-1	Designation systems for steel - Part 1: Steel names, principal symbols
EN 10088-1	Stainless steels - Part 1: List of standard stainless steels
EN 10204	Metallic products - Types of inspection documents
EURONORM 96	Tool steels - Quality requirements ¹

3 Description of reference blocks

The type 1 reference block consists of a set of four nickel-chrome plated panels with 10, 20, 30 and 50 µm thickness of plating, respectively. The 10, 20 and 30 µm panels are used for determination the sensitivity of fluorescent penetrant systems. The sensitivity of colour contrast penetrant systems is determined using the 30 and 50 µm panels.

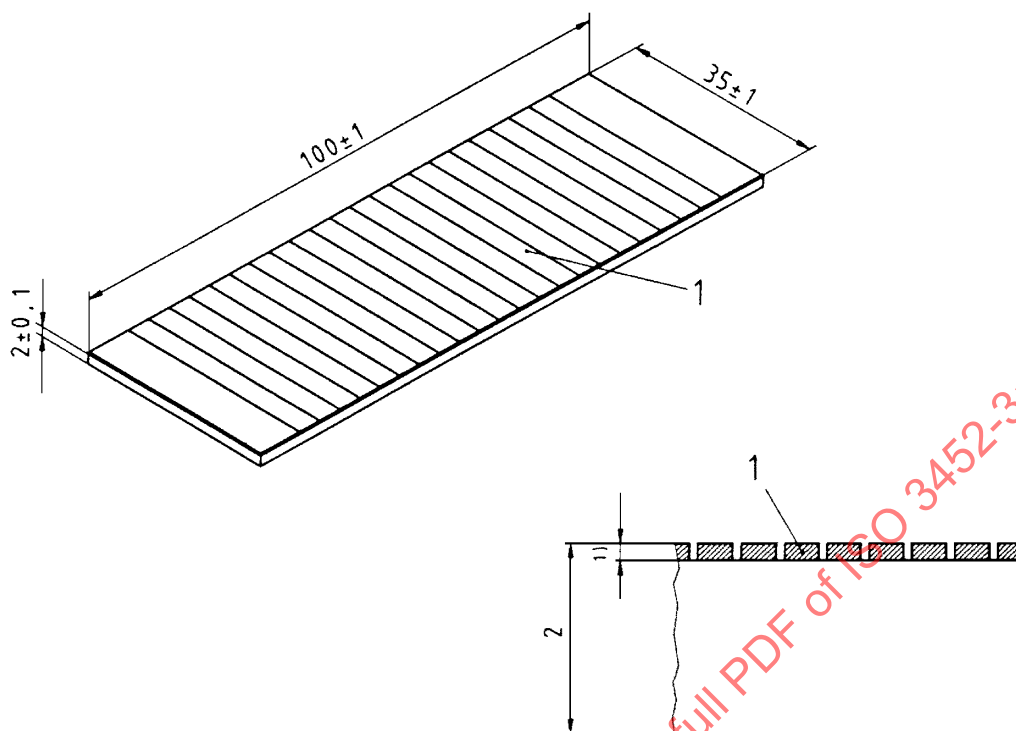
The type 2 reference block consists of a single panel of which one half has been plated with electroless nickel and a thin layer of chromium and the other half prepared to achieve areas of specific roughness. The plated side exhibits five star-shaped discontinuities.

4 Type 1 reference block design and dimensions

The type 1 panels are rectangular in shape with typical dimensions of 35 mm x 100 mm x 2 mm (see figure 1). Each panel consists of a uniform layer of nickel-chromium plated on to a brass base, the thickness of nickel-chromium being 10, 20, 30 and 50 µm respectively. Transverse cracks are made in each panel by stretching the panels in the longitudinal direction. The width to depth ratio of each crack should be approximately 1:20.

¹ Until this EURONORM is transformed into a European Standard it can be either implemented or reference is made to the corresponding national standards

Dimensions in millimetres



1 Transverse cracks

1) Nickel chromium plating thickness (μm)

Figure 1: Test panel from reference block type 1

5 Type 2 reference block design and dimensions

5.1 Design

5.1.1 General

The test panel (see figure 2) is rectangular in shape with dimensions of 155 mm x 50 mm x 2,5 mm.

NOTE: All dimensional tolerances are $\pm 10\%$ unless otherwise stated.

The base material is a stainless steel type X2 Cr Ni Mo 17-12.3 (1.4432) according to EN 10088-1 with initial hardness of HV 20 = 150 ± 10 or equivalent.

Dimensions in millimetres

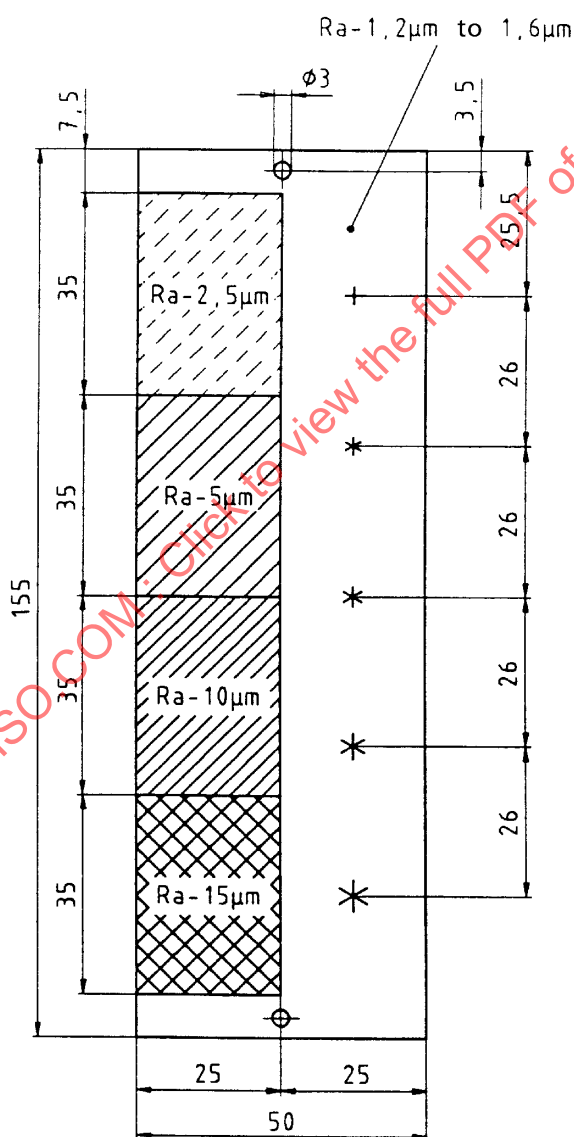


Figure 2: Reference block type 2

5.1.2 Rinsability area

For checking the rinsability of penetrants four adjacent areas sized 25 mm and 35 mm are produced down on one half of the test surface of the panel with roughness of $R_a = 2,5 \mu\text{m}$, $R_a = 5 \mu\text{m}$, $R_a = 10 \mu\text{m}$ and $R_a = 15 \mu\text{m}$ (see figure 2).

The area with $R_a = 2,5 \mu\text{m}$ may be produced by sand blasting and the other areas by electroerosion.

5.1.3 Defect area

The defect area is located on the other half of the test surface of the panel (see figure 2).

5.1.3.1 Plating

A $60 \mu\text{m} \pm 3 \mu\text{m}$ thickness of electroless nickel shall be plated on to the test surface of the panel to achieve a hardness value ranging from HV 0,2 = 500 to 600.

The nickel layer shall be plated with a thin layer of hard chromium of $0,5 \mu\text{m}$ to $1,5 \mu\text{m}$ thickness. The panel shall then be heat treated to achieve a hardness value ranging from HV 0,3 = 900 to 1000 by for example heating at 405°C for 70 min. The roughness R_a of the chromium plating shall be $1,2 \mu\text{m}$ to $1,6 \mu\text{m}$.

5.1.3.2 Artificial defect production

Five equidistant indentations shall be made under loads typical in the range 2 kN to 8 kN on the reverse side of the test surface (plated area).

For example, the production of the five artificial defects may be made using the following table 1:

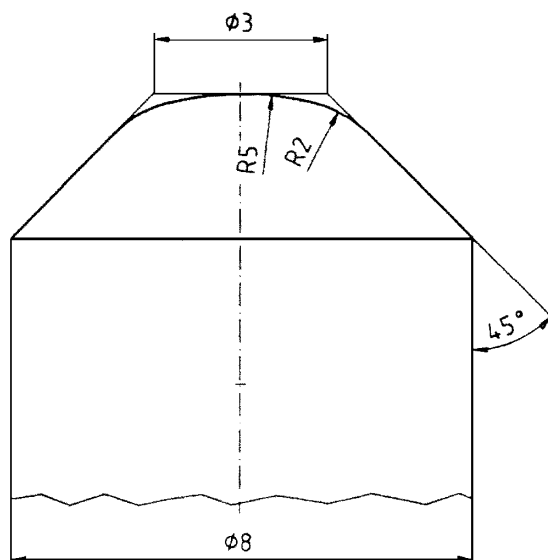
Table 1: Defect number

defect	1	2	3	4	5
Applied force kN	2,0	3,5	5,0	6,5	8,0

The indentations for artificial defect production are made using a compression machine (120 kN capacity) or an appropriate Vickers hardness machine fitted with a hemispherical-indenter.

Details of the specific indenter are given in figure 3. The indentations are made using a speed loading of 0,05 kN/s and a speed unloading of 0,5 k N/s with continuous application of the load.

Dimensions in millimetres



Steel designation: 90 MnV8 according to EU 96 at quenched and tempered condition or equivalent quality of hardness HRC 53 to 62.

Figure 3: Hemispherical indenter

The five indentations shall be uniformly spaced and in size order, the smallest being adjacent to the least rough area.

The artificial defects shall lie within circles of the following diameter given in table 2:

Table 2: Typical diameter of crack areas

Dimensions in millimetres

Defect number	Typical (diameter) dimensions
1	3
2	3,5
3	4
4	4,5
5	5,5

5.2 Measurement

The size of each defect is determined optically at its maximum diameter using calibrated scales.

A certificate, type 3.1.B according to EN 10204, giving the actual measured values of five artificial defects and the roughness of the four rinsability areas shall accompany each reference block.