



# SLOVENSKI STANDARD SIST EN ISO 3452-2:2001

01-maj-2001

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**Neporušitveno preskušanje - Penetrantski preskusi - 2. del: Preskušanje penetrantskih snovi (ISO 3452-2:2000)**

Non-destructive testing - Penetrant testing - Part 2: Testing of penetrant materials (ISO 3452-2:2000)

Zerstörungsfreie Prüfung - Eindringprüfung - Teil 2: Prüfung von Eindringprüfmitteln (ISO 3452-2:2000)

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Essais non destructifs - Examen par ressuage - Partie 2: Essais des produits de ressuage (ISO 3452-2:2000)

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**Ta slovenski standard je istoveten z: EN ISO 3452-2:2000**

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**ICS:**

19.100          Neporušitveno preskušanje          Non-destructive testing

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 3452-2**

April 2000

ICS 19.100

English version

**Non-destructive testing - Penetrant testing - Part 2: Testing of  
penetrant materials (ISO 3452-2:2000)**

Essais non destructifs - Examen par ressuage - Partie 2:  
Essais des produits de ressuage (ISO 3452-2:2000)

Zerstörungsfreie Prüfung - Eindringprüfung - Teil 2: Prüfung  
von Eindringprüfmitteln (ISO 3452-2:2000)

This European Standard was approved by CEN on 17 September 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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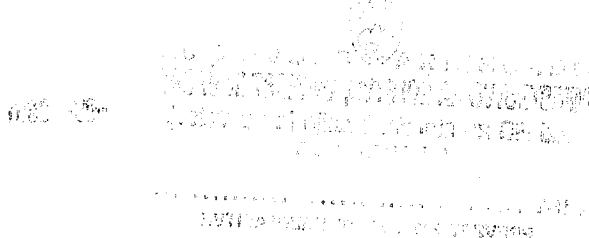
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## Foreword

The text of EN ISO 3452-2:1999 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*

## Introduction

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
Part 4: Equipment	prEN 956	EN ISO 3452-4
* Number under which the document is referenced in some European Standards		

## 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

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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	Water soluble
III	Dual purpose (fluorescent colour contrast penetrant)	C	Solvent (liquid)	c	Water suspendable
		D	Hydrophilic emulsifier 1 optional prerinse (water) 2 emulsifier (water-diluted) 3 final rinse (water)	d	Solvent-based (non-aqueous wet)
		E	Water and solvent	e	Water or solvent based for special application (e. g. peelable developer)

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## 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"

### 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"		

### 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  $\mu\text{m}$ , 20  $\mu\text{m}$  and 30  $\mu\text{m}$  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 1 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.<sup>1)</sup>

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  $\mu\text{m}$  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.

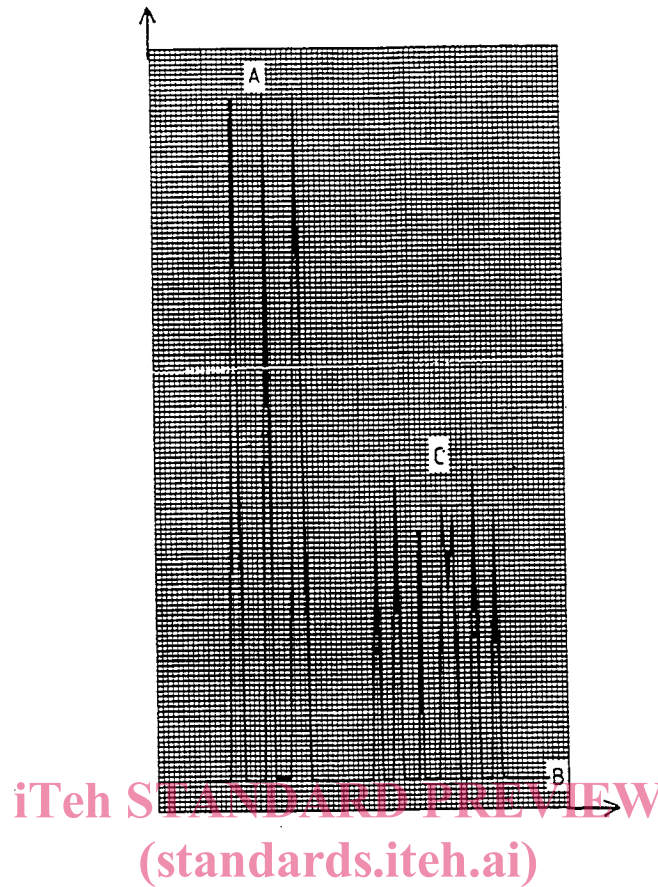
#### 7.2.1.5 Interpretation of results

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 ( $\sigma_{n-1}$ ) are determined and the sensitivity level is then obtained by reference to figure 2.

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<sup>1)</sup> 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.



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for this example  
 $\bar{x} = 41,8$  % of standard calibration level  
 $\sigma_{n-1} = 8,54$  % of  $\bar{x}$

Figure 1 - Example of trace from an indication visibility measuring equipment