SLOVENSKI STANDARD
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Neporušitveno preskušanje jeklenih izkovkov - 2. del: Preskušanje s penetranti

Non-destructive testing of steel forgings - Part 2: Penetrant testing

Zerstörungsfreie Prüfung von Schmiedestücken aus Stahl - Teil 2: Eindringprüfung

Essais non destructifs des pièces forgées en acier - Partie 2 : Contrôle par ressuage

Ta slovenski standard je istoveten z: **prEN 10228-2**

ICS:

77.040.20	Neporušitveno preskušanje kovin	Non-destructive testing of metals
77.140.85	Železni in jekleni kovani izdelki	Iron and steel forgings

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English Version

Non-destructive testing of steel forgings - Part 2: Penetrant testing

Essais non destructifs des pièces forgées en acier - Partie 2: Contrôle par ressuage

Zerstörungsfreie Prüfung von Schmiedestücken aus Stahl - Teil 2: Eindringprüfung

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If this draft becomes a European Standard, 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 10228-2:2014) has been prepared by Technical Committee ECISS/TC 111 “Steel castings and forgings”, the secretariat of which is held by AFNOR.

This document is currently submitted to the COCOR Vote.

This document will supersede EN 10228-2:1998.

EN 10228 consists of the following parts under the general title "*Non-destructive testing of steel forgings*":

— *Part 1: Magnetic particle inspection*

— *Part 2 : Penetrant testing*

— *Part 3 : Ultrasonic testing of ferritic or martensitic steel forgings*

— *Part 4: Ultrasonic testing of austenitic and ferritic-austenitic stainless steel forgings*

1 Scope

This part of EN 10228 describes techniques and acceptance criteria to be used for the penetrant testing of steel forgings. The method described is used for the detection of surface discontinuities.

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.

EN ISO 3059, *Non-destructive testing - Penetrant testing and magnetic particle testing - Viewing conditions* (ISO 3059)

EN ISO 3452-1 *Non-destructive testing -- Penetrant testing -- Part 1: General principles* (ISO 3452-1)

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

EN ISO 3452-4, *Non-destructive testing - Penetrant testing - Part 4: Equipment* (ISO 3452-4)

EN ISO 9712, *Non-destructive testing -- Qualification and certification of NDT personnel* (ISO 9712)

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

3 Definitions

For the purposes of this document the definitions given in EN ISO 12706:2009 shall apply.

4 Items for agreement

The following aspects concerning penetrant testing shall be agreed between the purchaser and the supplier at the time of enquiry and order:

a) the manufacturing stage(s) at which penetrant testing is to be performed. (see clause 8);

b) the surface areas to be examined. (see clause 9);

c) whether testing is to be performed with colour contrast or fluorescent penetrants (see 7.1);

d) the quality class required, or the quality classes and surfaces areas to which they apply. (see clause 14);

e) the applicable recording and acceptance criteria if different from those detailed in Table 1;

f) whether the test is to be conducted in the presence of the purchaser or his representative;

g) whether a written procedure shall be submitted for approval by the purchaser. (see clause 5);

5 Test procedure

5.1 General

Penetrant testing shall be performed in accordance with a written test procedure. Where specified in the enquiry or order, the written procedure shall be submitted to the purchaser for approval prior to the test.

5.2 Description

The written procedure shall be one of the following:

a) a product specification;

b) a procedure written specifically for the application;

c) this part of EN 10228 may be used if it is accompanied by testing details specific to the application.

5.3 Content

The written procedure shall contain the following details as minimum requirements:

a) description of the forgings to be tested;

b) reference documents;

c) qualification and certification of testing personnel;

d) stage of manufacture at which the test is carried out;

e) surface area(s) specified in terms of the applicable quality classes;

f) type of penetrant testing products used : penetrant, remover, emulsifier, developer;

g) surface conditions required;

h) viewing conditions;

i) description of pre-testing cleaning and drying, including cleaning materials used and minimum time allowed for drying;

j) description of penetrant application, including application temperature and penetration time;

k) description of excess penetrant removal and of drying before developer application;

l) description of developer application, including development time;

m) method of marking or recording indications;

n) acceptance criteria;

o) whether post-cleaning is required; if so, a description of the method;

p) test report.

6 Personnel qualification

Personnel shall be qualified and certified in accordance with EN ISO 9712.

7 Testing system

7.1 Testing products

Penetrant testing products (penetrant, emulsifier, remover and developer) shall conform to EN ISO 3452-1. The combination of penetrant testing products to be used shall meet the following requirements:

a) they shall conform to EN ISO 3452-1;

b) they shall be compatible with the material to be tested (see EN ISO 3452-1 for guidance);

c) they shall enable the applicable recording level (see Table 1) to be achieved (see EN ISO 3452-1) for the determination of sensitivity levels.

7.2 Equipment

The equipment used shall conform to EN ISO 3452-4.

The following equipment may be used:

a) Spray gun or aerosol spray.

b) Immersion tank.

c) Electrostatic spray gun.

7.3 Function test

The sensitivity of the penetrant shall be determined in accordance with EN ISO 3452-2.

NOTE The temperature of the forging should be checked to ensure that it is within the detection media manufacturer's specified temperature limits.

8 Stage of manufacture

Where practicable, final acceptance testing shall be performed on the forging in its delivery conditions (see clause 4).

9 Surface condition

Surfaces to be tested shall be clean and free from scale, oil, grease, machining marks, paint and any other contaminant which could adversely affect test sensitivity or the ability to interpret indications.

The surface finish of the surfaces to be tested shall be $\leq$ 6,3 μm R_a for quality classes 2, 3 and 4 and $\leq$ 12,5 μm R_a for quality class 1.

Table 1 — Surface condition

Surface roughness parameter R_a *), in µm	Quality classes[a]			
	1	2	3	4
$R_a \leq 12{,}5$ µm	X	–	–	–
$R_a \leq 6{,}3$ µm	X	X	X	X

[a] X signifies the quality class that can be achieved for the specified surface finish.

*) R_a = arithmetical mean deviation of the profile.

10 Coverage

Where practicable, the test shall be performed in such a way that 100 % coverage of the surface to be tested is achieved.

11 Penetrant testing process

The penetrant testing process shall conform to EN ISO 3452-1.

12 Viewing

12.1 General

Viewing shall start immediately after the developer is applied and shall continue periodically up to the completion of the development time, when final assessment of indications shall be made.

12.2 Viewing conditions

Viewing conditions shall be in accordance with EN ISO 3059:

a) Colour contrast penetrants

The surface under testing shall be viewed under white light of at least 500 lx intensity on the surface. Glare and reflections shall be avoided.

NOTE Lower illuminances may be agreed between purchaser and supplier.

b) Fluorescent penetrants

Viewing conditions shall be in accordance with EN ISO 3059.

Prior to the test at least 5 min shall be allowed for the operator's eyes to become adapted to the reduced background lighting and the UV-A lamp shall be allowed to warm up for at least 5 minutes.

13 Classification of indications

The following rules shall apply (see Figure 1):

a) A linear indication shall be considered “isolated” when it is not aligned with any other linear indication, or when it is aligned with another linear indication, but separated from it by more than five times the length of the longer of the two indications considered.

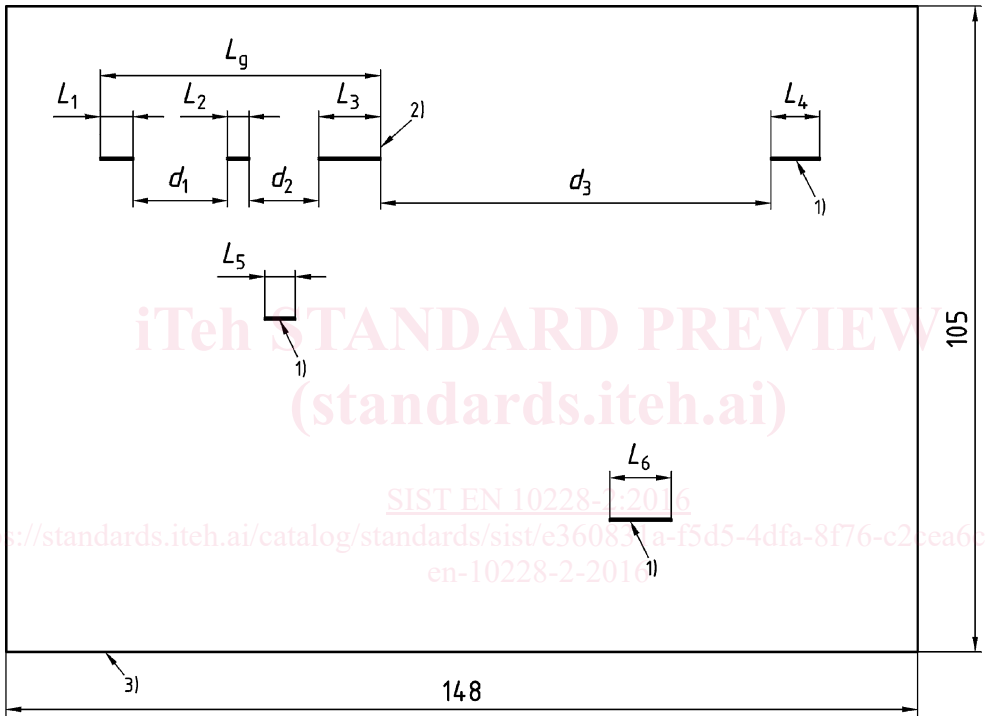
b) Interacting linear indications are two (or more) linear indications which are aligned, and shall be considered as one continuous length for the purpose of assessment if their separation is less than, or equal to, five times the length of the longer of the two indications considered. The length of interacting indications is the length measured between the opposite ends of the two outer indications.

c) The cumulative length of linear indications is the sum of the lengths of all linear indications detected in the reference surface (i.e. 148 mm × 105 mm, or = A6 format).

NOTE A linear indication is an indication the length of which is greater than three times the width.

d) A rounded indication is an indication the length of which is less than or equal to three times the width.

e) False indications due to the geometry of the part (change of section or slot etc.) or surface finish (scar or machining mark etc.) shall not be taken into account.



Key:

1 Isolated indications
2 Interacting indications
3 Reference surface

Figure 1 — Classification of linear indications