SLOVENSKI STANDARD
SIST EN 10307:2002

01-junij-2002

Neporuġitveno preskuġanje - Ultrazvoļ no preskuġanje avstenitnih in avstenitno-feritnih nerjavnih ploġļ atih jeklenih izdelkov debelin, ki so enake ali veļ je od 6 mm (odbojna metoda)

Non-destructive testing - Ultrasonic testing of austenitic and austenitic-ferritic stainless steels flat products of thickness equal to or greater than 6 mm (reflection method)

Zerstörungsfreie Prüfung - Ultraschallprüfung von Flacherzeugnissen aus austenitischem und austenitisch-ferritischem nichtrostendem Stahl ab 6 mm Dicke (Reflexionsverfahren)

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Essais non destructifs - Contrôle par ultrasons des produits plats en acier inoxydable austénitique et austéno-ferritique d'épaisseur égale ou supérieure a 6 mm (méthode par réflexion)

SIST EN 10307:2002
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Ta slovenski standard je istoveten z: **EN 10307:2001**

ICS:

77.040.20	Neporušitveno preskušanje kovin	Non-destructive testing of metals
77.140.50	Ploġļ ati jekleni izdelki in polizdelki	Flat steel products and semi-products

SIST EN 10307:2002 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 10307

October 2001

ICS 77.040.20; 77.140.50

English version

Non-destructive testing - Ultrasonic testing of austenitic and austenitic-ferritic stainless steels flat products of thickness equal to or greater than 6 mm (reflection method)

Essais non destructifs - Contrôle par ultrasons des produits plats en acier inoxydable austénitique et austéno-ferritique d'épaisseur égale ou supérieure à 6 mm (méthode par réflexion)

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This European Standard was approved by CEN on 30 September 2001.

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 Management Centre or to any CEN member.

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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 Management Centre 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.

SIST EN 10307:2002
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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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SIST EN 10307:2002

Contents

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 10307:2002
https://standards.iteh.ai/catalog/standards/sist/654fe374-137d-4e61-b506-4d194bae03f9/sist-en-10307-2002

SIST EN 10307:2002

Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 2 “Steel - Physico-chemical and non-destructive testing", the secretariat of which is held by AFNOR.

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 April 2002, and conflicting national standards shall be withdrawn at the latest by April 2002.

Annex A is informative.

This standard includes a Bibliography.

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.

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(standards.iteh.ai)

SIST EN 10307:2002
https://standards.iteh.ai/catalog/standards/sist/654fe374-137d-4e61-b506-4d194bae03f9/sist-en-10307-2002

SIST EN 10307:2002

1 Scope

This European Standard describes a method for the ultrasonic-testing of uncoated flat austenitic and austenitic-ferritic stainless steel product for internal discontinuities. It is applicable to flat product in nominal thickness range of 6 mm to 200 mm. Mechanised, semi-automatic or automatic techniques may be used but should be agreed between the purchaser and the supplier.

This standard also defines 3 quality classes for the flat product body (classes S_1, S_2 and S_3) and 4 quality classes (E_1, E_2, E_3, E_4) for the edges in accordance with the criteria specified in clause 12.

Other methods of testing, e.g. by transmission technique or other test equipments may be used at the manufacturer's discretion provided that they give equivalent results to those obtained under the conditions of this standard. In the event of a dispute, only the method defined in this standard prevails.

Testing of flat product of thickness less than 6 mm may be the subject of special agreements between the parties concerned.

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 (including amendments).

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

EN 583-2, *Non-destructive testing – Ultrasonic examination - Part 2 : Sensitivity and range setting.*

SIST EN 10307:2002
https://standards.iteh.ai/catalog/standards/sist/654fe374-137d-4e61-b506-4d194bae03f9/sist-en-10307-2002

EN 583-5, *Non-destructive testing - Ultrasonic examination - Part 5 : Characterization and sizing of discontinuities.*

EN 1330-4, *Non destructive testing - Terminology - Part 4 : Terms used in ultrasonic testing.*

EN 12223*; Non-destructive testing – Ultrasonic examination – Specification for calibration block n°1.*

EN 12668-1, *Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 1 : Instruments.*

EN 12668-2, *Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 2 : Probes.*

EN 12668-3, *Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 3 : Combined equipment.*

3 Terms and definitions

Definitions for general terms of non-destructive testing can be found in other European Standards, e.g. EN 1330-1 and EN 1330-2. For the purposes of this European Standard, the terms and definitions given in EN 1330-4 apply, together with the following :

3.1
internal discontinuity
any imperfection lying within the thickness of the flat product, e.g. planar or laminar imperfection, single-plane or multi-plane inclusion bands or clusters

NOTE It is referred in the text as discontinuity.

SIST EN 10307:2002

3.2
defect
internal discontinuity, exceeding the specified maximum size or population density limits

3.3
population density
the number of individual internal discontinuities of a size greater than a specified minimum size and less than a specified maximum size per specified area of body or length of edge zone

3.4
manual testing
testing by an operator applying an ultrasonic probe, or probes, to the flat product surface, manually executing the appropriate scanning pattern on the flat product surface and assessing ultrasonic signal indications on the electronic equipment screen either by direct viewing or by built-in signal amplitude alarm devices

3.5
automatic and semi-automatic testing
testing using a mechanized means of applying the ultrasonic probe or probes to, and executing the appropriate scanning pattern on the product surface, together with ultrasonic signal indication evaluation by electronic means

NOTE Such testing can be either fully automatic with no operator involvement, or semi-automatic when the operator performs basic equipment operation functions.

A list of equivalent terms in several European languages is given in annex A.

4 Items for agreements

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

SIST EN 10307:2002
https://standards.iteh.ai/catalog/standards/sist/654fe374-137d-4e61-b506-4d194bae03f9/sist-en-10307-2002

a) the manufacturing stage(s) at which ultrasonic testing shall be performed (see clause 10) ;

b) the volume(s) to be tested and whether grid scanning coverage or complete scanning coverage is required (see clause 13) ;

c) the Quality Class required, or the Quality Classes and the zones to which they apply (see clause 15) ;

d) the applicable recording level and acceptance criteria if different from those detailed in Tables 3 to 5 ;

e) whether any special scanning coverage, equipment or couplant is required in addition to that detailed in clauses 8 and 13 ;

f) the scanning technique to be used if not manual ;

g) the techniques to evaluate discontinuities (see clause 15) ;

h) the technique(s) to be used for setting sensitivity (see clause 12) ;

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

j) whether a written procedure shall be submitted for approval by the purchaser (see clause 6).

5 Principle

The method used is based on the reflection of ultrasonic waves (generally longitudinal), the direction of which is approximately perpendicular to the surface of the product. The examination consists of :

SIST EN 10307:2002

a) locating and evaluation of discontinuity by comparing the amplitude of the discontinuity echo with the amplitude of the echo of a flat-bottomed hole of a given diameter and located at the same depth as the discontinuity.

NOTE Only those discontinuities giving an echo amplitude equal or greater than that obtained with the reference flat-bottomed hole are taken into consideration ;

b) determining the area of the discontinuity according to the -6dB beam width technique. The width of the discontinuity shall be determined perpendicular to the rolling direction. The length shall be determined in the rolling direction.

If areas with particular permeability are located, the testing conditions shall be adjusted in order to test these areas with the required sensitivity level.

The examination is carried out during the first ultrasonic scan (first back wall echo) for all the product thicknesses and from one side only.

6 Procedure

The inspection is normally carried out in the place of production or on the premises of the supplier. If specified on the order, the inspection may take place in the presence of the purchaser or his representative[1)].

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

This written procedure shall be in the form of :

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a) a product specification ; or

b) a procedure written specifically for the application ; or

SIST EN 10307:2002

c) this European Standard may be used if it is accompanied by examination details specific to the application.

https://standards.iteh.ai/catalog/standards/sist/...
4d194bae03f9/sist-en-10307-2002

The procedure shall contain the following details as a minimum requirement :

a) description of the item to be examined ;

b) reference documents ;

c) qualification and certification of examination personnel ;

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

e) examination zones specified in terms of the applicable Quality Classes ;

f) any special preparation of scanning surfaces, if applicable ;

g) couplant ;

h) description of examination equipment ;

i) calibration ;

j) scanning plan ;

k) description and sequence of examination operations ;

l) recording levels ;

1) In this case, all steps should be taken to ensure that the production process is not disturbed.

SIST EN 10307:2002

m) characterisation of discontinuities ;

n) acceptance criteria ;

o) examination report.

7 Personnel qualification

It is assumed that ultrasonic testing is performed by qualified and capable personnel. In order to prove this qualification, it is recommended to certify the personnel in accordance with EN 473 or equivalent.

8 Ultrasonic test equipment

8.1 Instrument

Instrument for manual testing shall feature A-scan presentation and shall comply with the requirements of EN 12668-1.

8.2 Probe

8.2.1 General

The probes for manual testing shall conform to the requirements of EN 12668-2.

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The probe shall have a frequency and dimensions such that the required sensitivity can be secured throughout the extent of the test field.

SIST EN 10307:2002
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The single transducer probes shall be such that their dead zone is as small as possible, i.e. 15 % of the product thickness or 15 mm whichever is the smaller. The focusing zone of the double transducer probes shall be adapted to the product thickness.

8.2.2 Nominal frequency

The probes shall have a nominal frequency in the range of 1 MHz to 5 MHz. Probes of a nominal frequency that is outside the range of 1 MHz to 5 MHz may be used for automatic or semi-automatic testing and/or when the product exhibits high attenuation provided that the main requirements of this standard are met.

When double transducer probes are used, the barrier separating the two transducers shall be oriented by an angle of 45° to 90° to the scanning direction.

8.2.3 Type of probes

The greatest transducer dimension shall be in the range from 10 mm to 35 mm, unless otherwise agreed.

The type of the probe depends on the thickness of the flat product as given in Table 1 :