



SWEDISH
STANDARDS
INSTITUTE

SVENSK STANDARD
SS-EN 10307

Fastställd 2001-11-02

Utgåva 1

**Oförstörande provning – Ultraljudprovning av
austenitisk och austenit-ferritisk rostfri plåt och
band med tjocklek mellan 6 mm och 200 mm
(reflektionsmetod)**

**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)**

ICS 77.040.20; 77.140.50

Språk: engelska

Tryckt i december 2001

Europastandarden EN 10307:2001 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 10307:2001.

The European Standard EN 10307:2001 has the status of a Swedish Standard. This document contains the official English version of EN 10307:2001.

Dokumentet består av 19 sidor.

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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)

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

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.

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.



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EN 10307:2001 (E)

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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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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 S₁, S₂ and S₃) and 4 quality classes (E₁, E₂, E₃, E₄) 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).

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.*

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.

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

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

- 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 :

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- 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 representative¹⁾.

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 :

- a) a product specification ; or
b) a procedure written specifically for the application ; or
c) this European Standard may be used if it is accompanied by examination details specific to the application.

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.