SVENSK STANDARD
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Oförstörande provning – Ultraljudprovning – Undersökning av fel vinkelräta mot ytan (ISO 16826:2012)

Non-destructive testing – Ultrasonic testing – Examination for discontinuities perpendicular to the surface (ISO 16826:2012)

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Europastandarden EN ISO 16826:2014 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 16826:2014.

Denna standard ersätter SS-EN 583-4, utgåva 1 och SS-EN 583-4/A1:2004, utgåva 1.

The European Standard EN ISO 16826:2014 has the status of a Swedish Standard. This document contains the official version of EN ISO 16826:2014.

This standard supersedes the Swedish Standard SS-EN 583-4, edition 1 and SS-EN 583-4/A1:2004, edition 1.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

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Denna standard är framtagen av kommittén för Oförstörande provning, SIS/TK 125.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 16826

March 2014

ICS 19.100

Supersedes EN 583-4:2002

English Version

Non-destructive testing - Ultrasonic testing - Examination for discontinuities perpendicular to the surface (ISO 16826:2012)

Essais non destructifs - Contrôle par ultrasons - Contrôle des discontinuités perpendiculaires à la surface (ISO 16826:2012)

Zerstörungsfreie Prüfung - Ultraschallprüfung - Prüfung auf Inhomogenitäten senkrecht zur Oberfläche (ISO 16826:2012)

This European Standard was approved by CEN on 9 February 2014.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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Foreword

The text of ISO 16826:2012 has been prepared by Technical Committee ISO/TC 135 “Non-destructive testing” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 16826:2014 by Technical Committee CEN/TC 138 “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 September 2014, and conflicting national standards shall be withdrawn at the latest by September 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 583-4:2002.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 16826:2012 has been approved by CEN as EN ISO 16826:2014 without any modification.

Introduction

This International Standard is based on EN 583-4:2002+A1:2003, *Non-destructive testing — Ultrasonic examination — Part 4: Examination for discontinuities perpendicular to the surface*.

The following International Standards are linked.

ISO 16810, *Non-destructive testing — Ultrasonic testing — General principles*

ISO 16811, *Non-destructive testing — Ultrasonic testing — Sensitivity and range setting*

ISO 16823, *Non-destructive testing — Ultrasonic testing — Transmission technique*

ISO 16826, *Non-destructive testing — Ultrasonic testing — Examination for discontinuities perpendicular to the surface*

ISO 16827, *Non-destructive testing — Ultrasonic testing — Characterization and sizing of discontinuities*

ISO 16828, *Non-destructive testing — Ultrasonic testing — Time-of-flight diffraction technique as a method for detection and sizing of discontinuities*

Non-destructive testing — Ultrasonic testing — Examination for discontinuities perpendicular to the surface

1 Scope

This International Standard defines the principles for tandem- and longitudinal-longitudinal-transverse (LLT) wave examination for the detection of discontinuities perpendicular to the surface.

The general principles required for the ultrasonic examination of industrial products are described in ISO 16810. A list of symbols and equations is given in ISO 16811.

The tandem- or LLT-examination should be used for the detection of planar discontinuities with distance to the surface greater than 15 mm. This International Standard has been prepared for the examination of metallic materials with a thickness between 40 mm and 500 mm with parallel or concentric surfaces. It can, however, be used for other materials and smaller thickness provided special measures are taken.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5577, *Non-destructive testing — Ultrasonic inspection — Vocabulary*

ISO 16810, *Non-destructive testing — Ultrasonic testing — General principles*

ISO 16811, *Non-destructive testing — Ultrasonic testing — Sensitivity and range setting*

EN 1330-4, *Non-destructive testing — Terminology — Terms used in ultrasonic testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5577 and EN 1330-4 apply.

4 Tandem examination

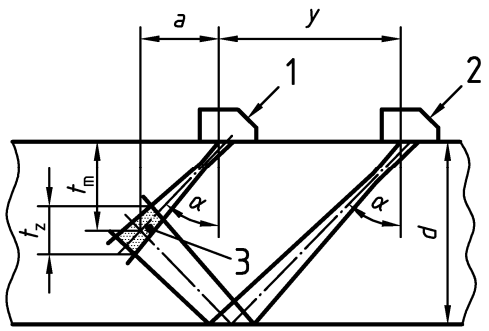
4.1 General

The examination is normally carried out using two similar 45° angle probes, one probe operating as the transmitter and the other probe as receiver. For wall thicknesses greater than approximately 160 mm, probes with different transducer sizes are preferred in order to ensure approximately the same beam diameters in the examination zone.

The use of probe angles other than 45° may be necessary to comply with particular geometrical conditions. Probe angles that give rise to mode conversions shall be avoided.

The probes are located in a line with their acoustic axis in the same direction. In this way the sound beam from the rear probe will, after reflection from the opposite surface, intersect the sound beam from the front probe at the centre of the examination zone.

Figure 1 shows the relationship between the spacing of the probes (y) and the examination depth of the crosspoint (t_m) and the height of the examination zone (t_z).



Key

1	Probe 1	d	Material thickness
2	Probe 2	t_m	Examination depth
3	Examination zone	y	Probe distance
a	Projection distance	t_z	Height of examination zone

Figure 1 — Basic principle of tandem technique

When examining objects with plane parallel surfaces the distance between the probes can be defined using the following equation:

$$y = 2 \tan \alpha (d - t_m) \quad (1)$$

for 45°

$$y = 2(d - t_m) \quad (2)$$

Scanning shall be performed in either of the following ways:

— both probes are moved along the surfaces with a fixed distance (y).

In this way only one examination zone is examined at a time, and the scanning shall be repeated with different probe distance until the complete examination volume has been examined;

— both probes are moved simultaneously, such that the sum of their distances from the required plane of intersection, e.g. the vertical weld axis, remains constant, thereby scanning the full object thickness in one continuous movement.

4.2 Time base adjustment

Basically all relevant echoes will appear at the same sound path distance, which corresponds to the V-path. Therefore, the adjustment of the time base is not important. It is, however, recommended that the echo from the V-path is located at a fixed position e.g. eight scale divisions.

4.3 Setting of sensitivity

The setting of sensitivity can be performed using the following reflectors:

— opposite surface, where the V-path echo is used as backwall echo;

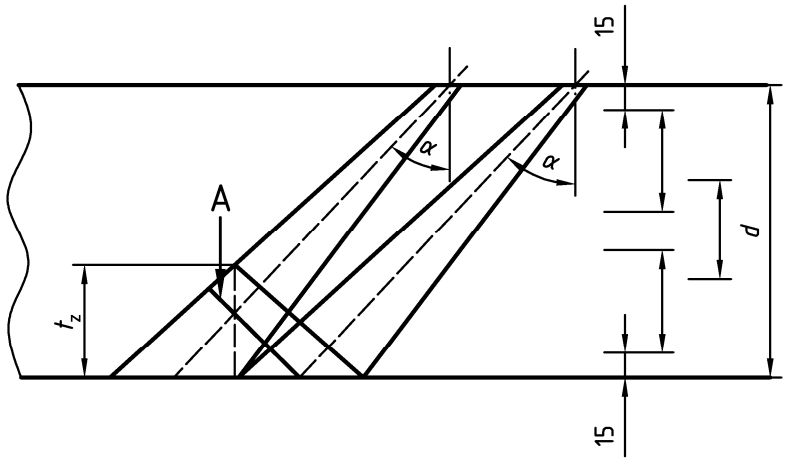
— disk-shaped reflectors perpendicular to the scanning surface (flat-bottomed holes). The reflectors shall be located at the intersection of the beam axes;

— side drilled holes located at the intersection of the beams and at the borders of the examination zones.

4.4 Determination of examination zones

The division into equally sized examination zones ensures that the sensitivity throughout the thickness does not fall below a certain level. The height of the examination zones is calculated so that the sensitivity at the edges of the examination zones is not more than 6 dB below the sensitivity in the intersection point of the beam axes, see Figure 2.

All dimensions in millimetres



Key

A Sound beam diameter
d Material thickness
t_z Height of examination zone

Figure 2 — Examination zones

The height of the examination zone (t_z) can be determined by using a reference block with reflectors in differentiated depths or calculated as follows based on the diameter of the direct beam and the largest sound path in the examination zone closest to the opposite surface (all dimensions in millimetres):

$$t_z \approx \frac{\lambda(d - 15\,\text{mm})}{\sin\alpha \cdot \cos\alpha \cdot D_{\text{eff}}} \tag{2}$$

for 45°

$$t_z \approx \frac{2 \cdot \lambda \cdot (d - 15\,\text{mm})}{D_{\text{eff}}}$$

where

D_{eff} effective transducer diameter.