

# SVENSK STANDARD

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### **Oförstörande provning – Karakterisering och kontroll av utrustning för ultraljudprovning – Del 2: Sökare**

### **Non-destructive testing – Characterization and verification of ultrasonic examination equipment – Part 2: Probes**

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The European Standard EN 12668-2:2010 has the status of a Swedish Standard. This document contains the official English version of EN 12668-2:2010.

This standard supersedes the Swedish Standard SS-EN 12668-2, edition 1 and SS-EN 12668-2/A1:2004, edition 1.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

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English Version

## Non-destructive testing - Characterization and verification of ultrasonic examination equipment - Part 2: Probes

Essais non destructifs - Caractérisation et vérification de l'appareillage de contrôle par ultrasons - Partie 2:  
Traducteurs

Zerstörungsfreie Prüfung - Charakterisierung und Verifizierung der Ultraschall-Prüfausrüstung - Teil 2:  
Prüfköpfe

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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 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 Management Centre has the same status as the official versions.

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## Foreword

This document (EN 12668-2:2010) has been prepared 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of an identical text or by endorsement, at the latest by August 2010, and conflicting national standards shall be withdrawn at the latest by August 2010.

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 12668-2:2001.

EN 12668, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment*, consists of the following parts:

- *Part 1: Instruments*
- *Part 2: Probes*
- *Part 3: Combined equipment*

Annex A is normative. Annex B is informative.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.



## 1 Scope

This European Standard covers probes used for ultrasonic non-destructive examination in the following categories with centre frequencies in the range 0,5 MHz to 15 MHz, focusing and without focusing means:

- a) single or dual transducer contact probes generating compressional or shear waves;
- b) single transducer immersion probes.

Where material-dependent ultrasonic values are specified in this document they are based on steels having a sound velocity of  $(5\,920 \pm 50)$  m/s for longitudinal waves, and  $(3\,255 \pm 30)$  m/s for transverse waves.

Periodic tests for probes are not included in this document. Routine tests for the verification of probes using on-site methods are given in EN 12668-3.

If parameters in addition to those specified in EN 12668-3 are to be verified during the probe's life time, as agreed upon by the contracting parties, the methods of verification for these additional parameters should be selected from those given in this document.

## 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.

EN 1330-4:2010, *Non-destructive testing — Terminology — Part 4: Terms used in ultrasonic testing*

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

EN ISO 7963<sup>1)</sup>, *Non-destructive testing — Ultrasonic testing Specification for calibration block n° 2 (ISO 7963:1985)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-4:2010 and the following apply.

### 3.1

#### **dead zone**

depth of the zone immediately beneath the coupling surface of the work piece, in which it is not possible to detect a given reflector

### 3.2

#### **focal distance**

#### **near field length**

point on the acoustical axis where the acoustic pressure is at its maximum

### 3.3

#### **horizontal plane of a sound beam**

<angle-beam probes> plane perpendicular to the vertical plane of the sound beam including the acoustical axis in the material

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1) Under preparation.

### 3.4 operating frequency

$f_o$

#### centre frequency

arithmetic mean of upper and lower cut-off frequency

$$f_o = \frac{f_u + f_l}{2} \quad (1)$$

NOTE In the frequency spectrum of an echo the upper and lower cut-off-frequencies are determined at -6 dB compared to the maximum amplitude.

### 3.5 peak-to-peak amplitude

$h$

maximum deviation between the largest positive and the largest negative cycles of the pulse

NOTE See Figure 1.

### 3.6 probe data sheet

sheet containing the information required by this standard

NOTE The data sheet need not necessarily be a test certificate of performance.

### 3.7 pulse duration

time interval over which the modulus of the unrectified pulse amplitude exceeds 10 % of its maximum amplitude, as shown in Figure 1

### 3.8 reference side

reference side is the right side of an angle beam probe looking in the direction of the beam, unless otherwise specified by the manufacturer

### 3.9 relative bandwidth

$\Delta f_{rel}$

ratio of the difference between the upper and lower cut-off frequencies  $f_u$  and  $f_l$  and the centre frequency  $f_o$

$$\Delta f_{rel} = [(f_u - f_l)/f_o] \times 100 \%$$

NOTE The relative bandwidth is expressed in percent (%).

### 3.10 squint angle for straight-beam probes

$\delta$

deviation between the axis of the beam and a perpendicular to the coupling surface at the emission point

NOTE 1 See Figure 2.

<angle-beam probes> angle between the sides of the probe housing and the measured beam axis, projected onto the plane of the probe face

NOTE 2 See Figure 3.

### 3.11 vertical plane of a sound beam

<angle-beam probes> plane in which the sound beam axis in the probe wedge and the sound beam axis in the inspected component both lie

## 4 General requirements for compliance

An ultrasonic probe complies with this standard if it satisfies the following conditions:

- a) the probe shall comply with Clause 7;
- b) either a declaration of conformity, issued by a manufacturer operating a certified quality management system, or issued by an organization operating an accredited test laboratory shall be available;

NOTE It is recommended that the certification is carried out in accordance with EN ISO 9001, or that the accreditation is carried out in accordance with EN ISO/IEC 17025.

- c) the probe shall be clearly marked to identify the manufacturer, and carry a unique serial number, showing operating frequency, transducer size, angle, or a permanent reference number from which this information can be traced;
- d) a technical specification (data sheet) for the appropriate type and series of probe which defines the performance criteria in accordance with Clause 5 shall be available.

The quality of probes will be assured in one of the following ways:

- e) by issuing a declaration of conformity based on statistical analysis where a number of identical probes are manufactured under a quality management system. The manufacturer shall supply a data sheet which includes the values of the specified parameters with tolerances;
- f) by issuing a declaration of conformity quoting the results of measurements made on each probe.

## 5 Technical specification for probes

Table 1 gives the list of information to be reported in a data sheet for all probes within the scope of this standard (I = Information, M = Measurement, C = Calculation). The data sheet shall also contain information concerning the ultrasonic instrument used for the test, its settings and coupling conditions, etc.

The operating temperature range of the probe, and any special conditions for storage or protection during transport shall also be stated in the data sheet.

For probes intended for use at elevated temperatures, the manufacturer shall provide information on the maximum operating temperature in relation to the time of use, and the effect of temperature on the sensitivity and on the beam angle.