

SVENSK STANDARD

SS-EN ISO 18563-2:2017



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Non-destructive testing – Characterization and verification of ultrasonic phased array equipment – Part 2: Probes (ISO 18563-2:2017)



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Europastandarden EN ISO 18563-2:2017 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 18563-2:2017.

Denna standard ersätter SS-EN 16392-2:2014, utgåva 1.

The European Standard EN ISO 18563-2:2017 has the status of a Swedish Standard. This document contains the official version of EN ISO 18563-2:2017.

This standard supersedes the Swedish Standard SS-EN 16392-2:2014, edition 1.

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EUROPEAN STANDARD

EN ISO 18563-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2017

ICS 19.100

Supersedes EN 16392-2:2014

English Version

Non-destructive testing - Characterization and verification of ultrasonic phased array equipment - Part 2: Probes (ISO 18563-2:2017)

Essais non destructifs - Caractérisation et vérification de l'appareillage de contrôle par ultrasons en multiéléments - Partie 2: Traducteurs (ISO 18563-2:2017)

Zerstörungsfreie Prüfung - Charakterisierung und Verifizierung der Ultraschall-Prüfausrüstung mit Phased-Arrays - Teil 2: Prüfköpfe (ISO 18563-2:2017)

This European Standard was approved by CEN on 3 May 2017.

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

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

SS-EN ISO 18563-2:2017 (E)

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European foreword

This document (EN ISO 18563-2:2017) has been prepared by Technical Committee ISO/TC 135 “Non-destructive testing” in collaboration with 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 February 2018, and conflicting national standards shall be withdrawn at the latest by February 2018.

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

This document supersedes EN 16392-2:2014.

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Endorsement notice

The text of ISO 18563-2:2017 has been approved by CEN as EN ISO 18563-2:2017 without any modification.

Non-destructive testing — Characterization and verification of ultrasonic phased array equipment —

Part 2: Probes

1 Scope

This document specifies the characterization tests performed at the end of the fabrication of a phased array probe. It defines both methodology and acceptance criteria.

This document is applicable to the following phased array probes used for ultrasonic non-destructive testing in contact technique (with or without a wedge) or in immersion technique, with centre frequencies in the range 0,5 MHz to 10 MHz:

- a) non-matrix array probes:
 - linear;
 - encircling;
 - partial annular sectorial (type “daisy”);
- b) 2D-matrix array probes.

This document does not give methods and acceptance criteria to characterize the performance of an ultrasonic phased array instrument or the performance of a combined system. These are given in ISO 18563-1 and in ISO 18563-3.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2400, *Non-destructive testing — Ultrasonic testing — Specification for calibration block No. 1*

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

EN 16018, *Non-destructive testing — Terminology — Terms used in ultrasonic testing with phased arrays*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5577 and EN 16018 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

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3.1 probe data sheet

document giving technical specifications of the same type of phased array probes

3.2 probe test report

document showing compliance with ISO 18563-2 giving the measured values of the required parameters of one specific phased array probe, including test equipment and conditions

3.3 element out of specification

element which does not meet the acceptance criteria of one of the tests defined in [8.3](#) and [8.4](#)

4 Symbols

Symbol	Unit	Meaning
CT	dB	Inter-element cross-talk
f_0	Hz	Centre frequency
f_u	Hz	Upper frequency limit at -3 dB
f_l	Hz	Lower frequency limit at -3 dB
Δf	Hz	Frequency bandwidth
Δf_{rel}	%	Relative bandwidth
S_{el}	dB	Relative pulse-echo sensitivity variation of each element
S_{pr}	dB	Probe sensitivity
V_{av}	V	Arithmetic mean of V_{el}
V_{el}	V	Amplitude of reference echo
V_{exc}	V	Amplitude of excitation burst
V_{rec}	V	Amplitude received by an adjacent element
V_{ref}	V	Amplitude of reference exciting signal

5 General compliance

An ultrasonic phased array probe complies with this document if it fulfils all of the following requirements.

- a) A probe data sheet corresponding to the probe which defines the performance criteria in accordance with [Clause 6](#) shall be available.
- b) The ultrasonic phased array probe shall comply with [Clause 8](#).
- c) The probe shall be clearly marked to identify the manufacturer and carry a unique serial number or show a permanent reference number from which information can be traced to the probe data sheet.
- d) A declaration of conformity shall be available, issued by either the manufacturer, by the purchaser or by a third party that could be a test laboratory.

6 Technical information for phased array probes

Technical information listed in [Table 1](#) shall be supplied with the probe (M = measurement, OI = other information). Optional technical information is listed in [Table 2](#).

Table 1 — List of information to be given in a probe data sheet or probe test report

Information required	Information type	Comments
Trade name	OI	—
Identification	OI	Serial number, reference
Probe type	OI	—
Probe dimensions	OI	Outer dimensions
Geometry of the array	OI	Shape, orientation, arrangement, dimension, pitch, space between elements and element dimensions
Type of connector	OI	Commercial name
Wiring plan	OI	Details of connections between elements and connector
Cable	OI	Cable length, outer diameter and outer material
Dimensions, geometry and material of integrated wedge	OI	Only valid for contact probes with integrated wedge
Physical aspects	OI	e.g. housing material and shape of the contact face; see 8.2
Nominal frequency, nominal relative bandwidth, nominal pulse duration	OI	—
Centre frequency, relative bandwidth and pulse duration	M	Measured for each element; see 8.4
Average centre frequency, average bandwidth and average pulse duration	M	Calculated for probe; see 8.4
Relative pulse-echo sensitivity	M	See 8.3
Nominal probe sensitivity	OI	—
Probe sensitivity	M	See 8.5
Nominal inter-element cross-talk	OI	Minimum value of the inter-element cross-talk
Maximum allowable squint angle (for contact probes only)	OI	Maximum value of the squint angle with indication of the plane of reference
Echo from the transducer backing	OI	Maximum amplitude of the backing echo compared to a reference echo (dB difference)
Environmental conditions	OI	For example, temperature range, humidity, sealing, pressure
Equipment and procedure reference used for characterization tests	OI	—
Special conditions	OI	For example, for storage, for protection during transportation

Table 2 — Optional technical information to be given

Optional information	Information type	Comments
General drawing and tolerances	OI	—
Inter-element cross-talk	M	Measured cross-talk value corresponding to the probe; see 8.6
Squint angle (for contact probe only)	M	Measured squint angle value with indication of the plane of reference
Echo from the transducer backing	M	Amplitude of the backing echo compared to a reference echo (dB difference)