
**Non-destructive testing —
Characterization and verification of
ultrasonic phased array equipment —
Part 2:
Probes**

*Essais non destructifs — Caractérisation et vérification de
l'appareillage de contrôle par ultrasons en multiéléments —
Partie 2: Traducteurs*

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html

This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 138, *Non-destructive testing*, in collaboration with ISO Technical Committee TC 135, *Non-destructive testing*, Subcommittee SC 3, *Ultrasonic testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 18563 series can be found on the ISO website.

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. [ISO 18563-2:2017](https://standards.iteh.ai/catalog/standards/iso/8e55da2f-92f-4754-9432-b50b690182d3/iso-18563-2-2017)

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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/>

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](#).