



**International
Standard**

ISO 18563-2

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

**Part 2:
Array probes**

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

Partie 2: Transducteurs multiéléments

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**Second edition
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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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of 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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 18563-2:2017), which has been technically revised.

<https://standards.iteh.ai/catalog/standards/iso/4aa776cd-af59-49dd-b336-73fabb8725a1/iso-18563-2-2024>
The main changes are as follows:

- terminology and types of array probes modified according to ISO 23243;
- the wording 'measurement' is replaced by 'determination' or 'evaluation', where applicable.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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

Part 2: Array probes

1 Scope

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

This document is applicable to the following array probes used for ultrasonic non-destructive testing [phased array technique or signal processing technique, e.g. full-matrix capture (FMC) and total-focusing technique (TFM)] in contact technique (with or without a wedge or delay line) or in immersion technique, with centre frequencies in the range 0,5 MHz to 10 MHz:

a) array probes with elements in one direction:

- 1-D-linear array (linear array);
- 1-D-curved array;
- annular array;

b) array probes with elements in two directions:

- 2-D-array (matrix array);
- sectorial annular array;
- partial sectorial annular array.

This document does not give methods and acceptance criteria to characterize the performance of an ultrasonic phased array instrument or the performance of a complete system, which 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*

ISO 23243, *Non-destructive testing — Ultrasonic testing with arrays — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5577, ISO 23243 and the following apply.

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

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

3.1

array probe data sheet

document giving technical specifications of the same type of array probes

3.2

array probe test report

document giving the determined values of the required parameters of one specific array probe, including test equipment and test conditions

4 Quantities and symbols

A full list of the quantities, units and symbols used throughout this document is given in [Table 1](#).

Table 1 — Quantities, units and symbols

| Symbol | Unit | Meaning |
|------------------|------|---|
| A_{CT} | dB | Inter-element cross-talk attenuation |
| f_0 | Hz | Centre frequency |
| f_u | Hz | Upper cut-off frequency at -6 dB |
| f_l | Hz | Lower cut-off frequency at -6 dB |
| Δf | Hz | Frequency bandwidth |
| Δf_{rel} | % | Relative bandwidth |
| S_{el} | dB | Relative pulse-echo sensitivity variation of each element |
| S_{pr} | dB | Array probe sensitivity |
| V_{av} | V | Arithmetic mean of V_{el} |
| V_{el} | V | Amplitude of reflector echo of each element |
| 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

The array probe shall be in accordance with the following requirements:

- a) An array probe data sheet shall be available corresponding to the array probe which specifies the performance criteria in accordance with [Clause 6](#).
- b) The array probe shall comply with [Clause 8](#).
- c) The array probe shall be clearly marked to identify the manufacturer and shall either carry a unique serial number or shall show a permanent reference number from which information can be traced to the array probe data sheet.
- d) An array probe test report shall be delivered together with the array probe, giving the determined values of the required parameters of one specific array probe, including at least the technical information given in [Clause 6](#), the used test equipment and its settings according to [Clause 7](#) and all test results according to [Clause 8](#).
- e) A statement of conformity shall be available, issued by either the manufacturer, by the purchaser or by a third party that could be a test laboratory.