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## Non-destructive testing — Ultrasonic testing with arrays — Vocabulary

*Essais non destructifs — Contrôle à l'aide de réseaux ultrasonores — Vocabulaire*

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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](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/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).

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](http://www.iso.org/members.html).

## Introduction

This document follows a structure similar to that in ISO 5577 but only takes into account terms related to ultrasonic arrays.

The general terms already defined in ISO 5577 are also valid for ultrasonic arrays.

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# Non-destructive testing — Ultrasonic testing with arrays — Vocabulary

## 1 Scope

This document defines terms used in ultrasonic testing with arrays. This includes phased array technology and signal processing technology using arrays, e. g. the full-matrix capture (FMC) (3.3.1.28) and the total focusing technique (TFM) (3.3.1.35).

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

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

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

### 3.1 Terms related to sound

#### 3.1.1

##### **main lobe** **main beam**

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sound beam in the intended direction, typically with the highest pressure within the sound field

Note 1 to entry: This applies to conventional and *array probes* (3.2.1.3).

#### 3.1.2

##### **side lobe**

part of the sound field which corresponds to a local maximum in the far field, deviating from the direction of the *main lobe* (3.1.1) and typically lower in amplitude

Note 1 to entry: This applies to conventional and *array probes* (3.2.1.3).

#### 3.1.3

##### **grating lobe**

parasitic replication of the *main lobe* (3.1.1) caused by spatial undersampling (low ratio between wavelength and *pitch* (3.2.1.16)), deviating from the direction of the main lobe and possibly of similar amplitude

Note 1 to entry: This applies to *array probes* (3.2.1.3) only.

## 3.2 Terms related to the test equipment

### 3.2.1 Probes

#### 3.2.1.1

##### **array**

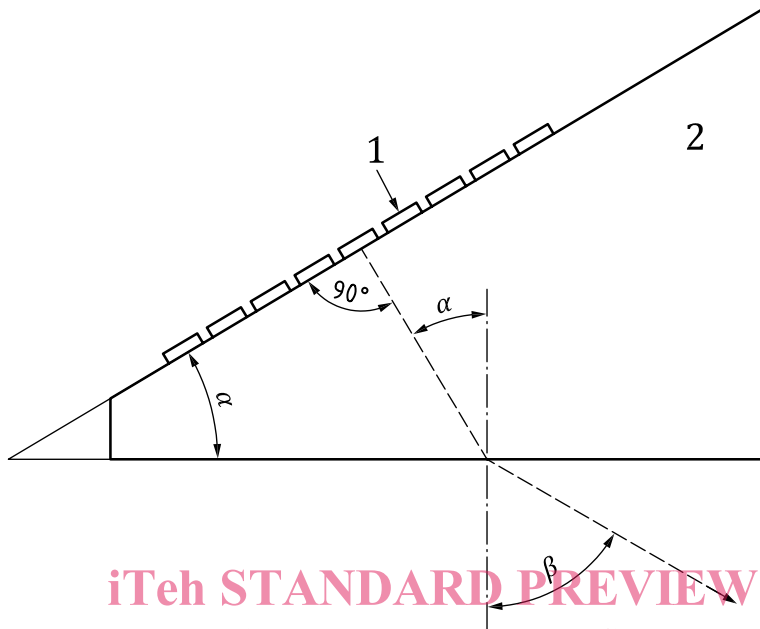
piezoelectric plate divided into several *elements* (3.2.1.2), which are acoustically and electrically separated

3.2.1.2

**array element  
element**

smallest part of the *array* (3.2.1.1) acting as a transducer

Note 1 to entry: See [Figure 1](#).



**Key**

- 1 array element
- 2 wedge
- $\alpha$  wedge angle
- $\beta$  natural refracted beam angle (3.2.1.26)

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**Figure 1 — Wedge and array with relevant parameters**

3.2.1.3

**array probe**

probe with an *array* (3.2.1.1) of *elements* (3.2.1.2) for transmitting and/or receiving

3.2.1.4

**arrangement of the array**

spatial distribution of all the *elements* (3.2.1.2) in an *array* (3.2.1.1)

3.2.1.5

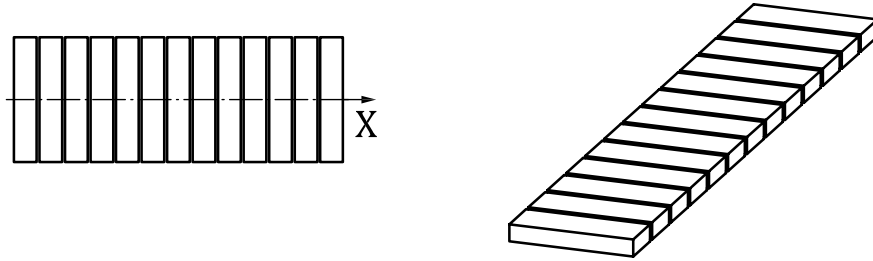
**linear array**

**1-D-linear array**

*array* (3.2.1.1) of *elements* (3.2.1.2) arranged in a single straight line allowing steering in one direction (*primary axis* (3.2.1.18)) and focusing in the depth direction

Note 1 to entry: See [Figure 2](#).





**Key**

X primary axis

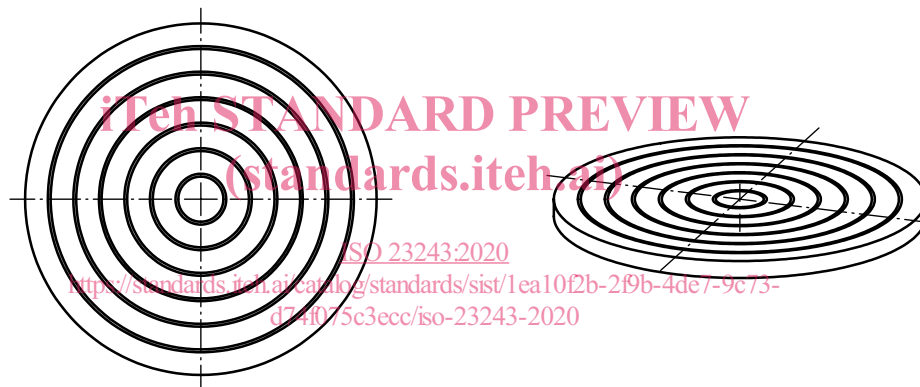
**Figure 2 — Linear array; 1-D-linear array**

**3.2.1.6**

**annular array**

*array* (3.2.1.1) of ring-shaped *elements* (3.2.1.2) arranged concentrically allowing focusing in the depth direction

Note 1 to entry: See [Figure 3](#).



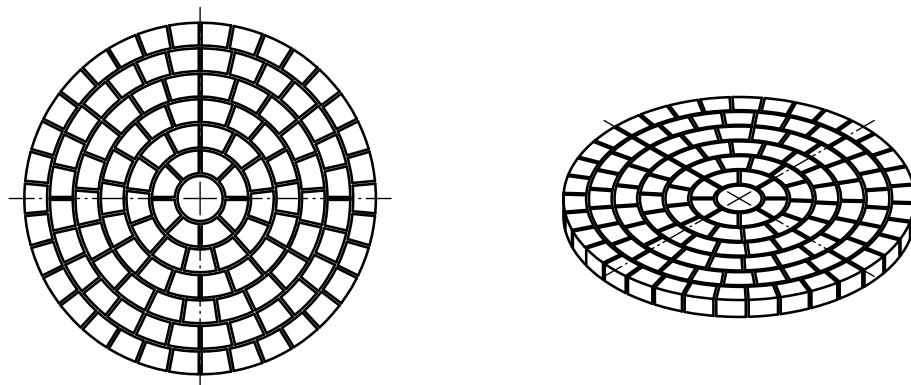
**Figure 3 — Annular array**

**3.2.1.7**

**sectorial annular array**

*annular array* (3.2.1.6) with the rings divided into sectors allowing steering in two directions and focusing in the depth direction

Note 1 to entry: See [Figure 4](#) and [Figure 5](#).



**Figure 4 — Sectorial annular array**

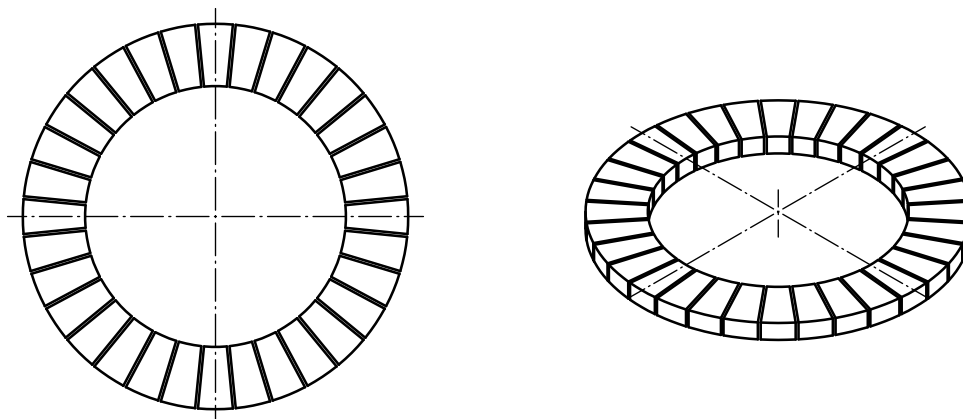


Figure 5 — Partial sectorial annular array

**3.2.1.8**

**1-D-curved array**

array (3.2.1.1) arranged on a complete or partial cylinder, where the major transmitting axis is radial

Note 1 to entry: See [Figure 6](#) and [Figure 7](#).

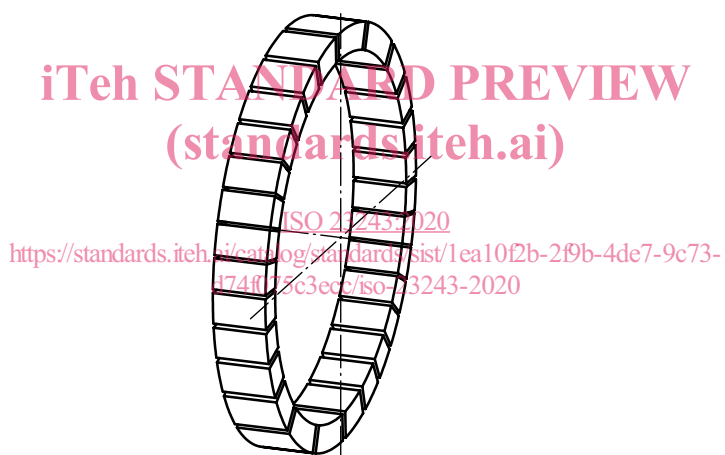


Figure 6 — 1-D-curved array covering a complete circle

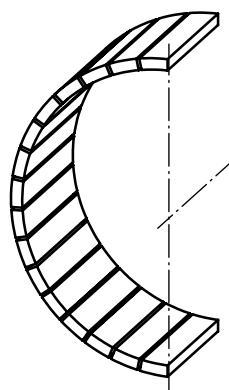


Figure 7 — 1-D-curved array covering part of a circle

**3.2.1.9**

**convex array**

1-D-curved array (3.2.1.8) typically used for the testing of tubes from the inside

**3.2.1.10**

**concave array**

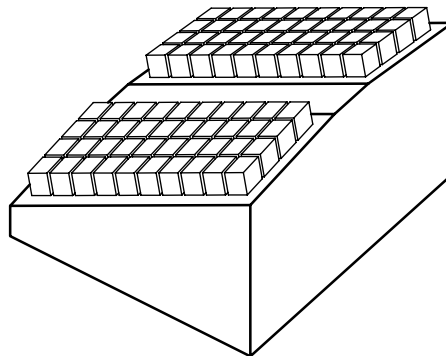
1-D-curved array (3.2.1.8) typically used for the testing of tubes from the outside

**3.2.1.11**

**dual-array probe**

probe with separate arrays (3.2.1.1) for transmitting and receiving

Note 1 to entry: See Figure 8.



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Figure 8 — Example of a dual-array probe  
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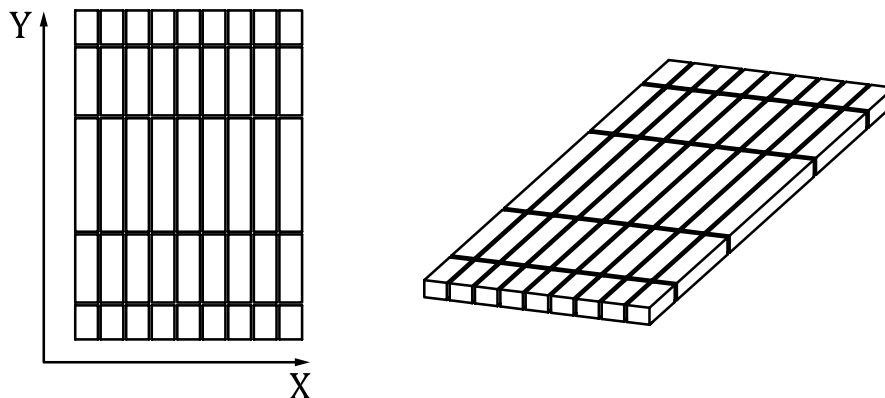
**3.2.1.12**

**2-D-array**

**matrix array**

array (3.2.1.1) of elements (3.2.1.2) arranged in a rectangular pattern allowing steering in both directions (*primary axis* (3.2.1.18) and *secondary axis* (3.2.1.19)) and focusing in the depth direction

Note 1 to entry: See Figure 9 and Figure 10.



**Key**

- X primary axis
- Y secondary axis

Figure 9 — Example of a 2-D-matrix array