



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 16828:2024**  
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**Neporušitvene preiskave - Ultrazvočne preiskave - Metoda zvočne poti za odkrivanje in ocenjevanje velikosti nezveznosti (ISO/DIS 16828:2024)**

Non-destructive testing - Ultrasonic testing - Time-of-flight diffraction technique for detection and sizing of discontinuities (ISO/DIS 16828:2024)

Zerstörungsfreie Prüfung - Ultraschallprüfung - Beugungslaufzeittechnik zum Auffinden und Ausmessen von Inhomogenitäten (ISO/DIS 16828:2024)

Essais non destructifs - Contrôle par ultrasons - Technique de diffraction du temps de vol pour la détection et le dimensionnement des discontinuités (ISO/DIS 16828:2024)

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19.100          Neporušitveno preskušanje          Non-destructive testing

**oSIST prEN ISO 16828:2024**

**en,de**





# DRAFT International Standard

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### Non-destructive testing — Ultrasonic testing — Time-of-flight diffraction technique for detection and sizing of discontinuities

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## ISO/DIS 16828:2024(en)

### 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)).

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

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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

This document was prepared by Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 3, *Ultrasonic testing*.

This second edition cancels and replaces the first edition (ISO 16828:2012), which has been technically revised.

The main changes are as follows:

- “as a method” deleted from the title;
- clarifications of abbreviations and symbols;
- figures have been updated;
- formulas have been corrected.

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).

**ISO/DIS 16828:2024(en)****Introduction**

The following documents are linked.

ISO 16810, *Non-destructive testing — Ultrasonic testing — General principles*

ISO 16811, *Non-destructive testing — Ultrasonic testing — Sensitivity and range setting*

ISO 16823, *Non-destructive testing — Ultrasonic testing — Through-transmission technique*

ISO 16826, *Non-destructive testing — Ultrasonic testing — Testing for discontinuities perpendicular to the surface*

ISO 16827, *Non-destructive testing — Ultrasonic testing — Characterization and sizing of discontinuities*

ISO 16828, *Non-destructive testing — Ultrasonic testing — Time-of-flight diffraction technique for detection and sizing of discontinuities*

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# Non-destructive testing — Ultrasonic testing — Time-of-flight diffraction technique for detection and sizing of discontinuities

## 1 Scope

This document specifies the general principles for the application of the time-of-flight diffraction (TOFD) technique for both detection and sizing of discontinuities in low-alloyed carbon steel components.

This document can also be used for other types of materials, provided the application of the TOFD technique is performed with necessary consideration of geometry, acoustical properties of the materials, and the test sensitivity.

Although, this document is applicable, in general terms, for discontinuities in materials and applications covered by ISO 16810, it contains references to the application on welds. This approach has been chosen for reasons of clarity as to the probe positions and directions of scanning.

Unless otherwise specified in the referencing documents, the minimum requirements of this document are applicable.

Unless explicitly stated otherwise, this document is applicable to the following product classes as defined in ISO 16811:

- class 1, without restrictions;
- classes 2 and 3, specified restrictions apply.

NOTE 1 See [Clause 10](#).

- classes 4 and 5 require special procedures, which are also addressed.

NOTE 2 See [Clause 10](#).

NOTE 3 Techniques for the use of TOFD for weld testing are described in ISO 10863 and the related acceptance criteria are given in ISO 15626.

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

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 16810, *Non-destructive testing — Ultrasonic testing — General principles*

ISO 16811, *Non-destructive testing — Ultrasonic testing — Sensitivity and range setting*

ISO 22232-1, *Non-destructive testing — Characterization and verification of ultrasonic test equipment — Part 1: Instruments*

ISO 22232-2, *Non-destructive testing — Characterization and verification of ultrasonic test equipment — Part 2: Probes*

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### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5577 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

##### scanning surface obscured zone

zone where indications may be obscured due to the presence of the *lateral wave*

#### 3.2

##### back wall obscured zone

zone where signals may be obscured by the presence of the back wall echo

#### 3.3

##### perpendicular scan

scan perpendicular to the ultrasonic beam direction (see [Figure 4](#))

#### 3.4

##### parallel scan

scan parallel to the ultrasonic beam direction (see [Figure 5](#))

#### 3.5

##### TOFD setup

##### time-of-flight diffraction setup

probe arrangement defined by probe characteristics (e.g. frequency, transducer size, beam angle, wave mode) and *probe centre separation* ([3.7](#))

#### 3.6

##### lateral wave

longitudinal wave traveling the shortest path from transmitter probe to receiver probe

#### 3.7

##### probe centre separation

PCS

distance between the index points of transmitter and receiver probe

Note 1 to entry: The PCS for two probes located on a curved surface is the straight-line, geometric separation between the two probe index points and not the distance measured along the surface.

### 4 Quantities, units 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**

Quantity, unit or symbol	Meaning
X	coordinate parallel to the scanning surface and parallel to a predetermined reference line. For weld testing this reference line should coincide with the weld. The origin of the axes may be defined as best suits the test object (see <a href="#">Figure 1</a> );
$\Delta x$	discontinuity length;
Y	coordinate parallel to the scanning surface, perpendicular to the predetermined reference line (see <a href="#">Figure 1</a> );
$\delta y$	inaccuracy in lateral position;
Z	coordinate perpendicular to the scanning surface (see <a href="#">Figure 1</a> );