

**Non-destructive testing - Ultrasonic testing -  
Time-of-flight diffraction technique as a method for  
detection and sizing of discontinuities (ISO 16828:2012)**

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 16828:2014 sisaldab Euroopa standardi EN ISO 16828:2014 inglisekeelset teksti.	This Estonian standard EVS-EN ISO 16828:2014 consists of the English text of the European standard EN ISO 16828:2014.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
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ICS 19.100

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English Version

**Non-destructive testing - Ultrasonic testing - Time-of-flight  
diffraction technique as a method for detection and sizing of  
discontinuities (ISO 16828:2012)**

Essais non destructifs - Contrôle par ultrasons - Technique  
de diffraction du temps de vol utilisée comme méthode de  
détection et de dimensionnement des discontinuités (ISO  
16828:2012)

Zerstörungsfreie Prüfung - Ultraschallprüfung -  
Beugungslaufzeittechnik, eine Technik zum Auffinden und  
Ausmessen von Inhomogenitäten (ISO 16828:2012)

This European Standard was approved by CEN on 9 February 2014.

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

## Foreword

The text of ISO 16828:2012 has been prepared by Technical Committee ISO/TC 135 “Non-destructive testing” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 16828:2014 by 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of an identical text or by endorsement, at the latest by September 2014, and conflicting national standards shall be withdrawn at the latest by September 2014.

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

This document supersedes EN 583-6:2008.

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### Endorsement notice

The text of ISO 16828:2012 has been approved by CEN as EN ISO 16828:2014 without any modification.

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## Introduction

This International Standard is based on EN 583-6:2008, *Non-destructive testing — Ultrasonic examination — Part 6: Time-of-flight diffraction technique as a method for detection and sizing of discontinuities*.

The following International Standards 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 — Transmission technique*

ISO 16826, *Non-destructive testing — Ultrasonic testing — Examination 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 as a method for detection and sizing of discontinuities*

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

## 1 Scope

This International Standard defines 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. It 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 sensitivity of the examination.

Although it is applicable, in general terms, to 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 ultrasonic probe positions and directions of scanning.

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

Unless explicitly stated otherwise, this International Standard 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 9.

The inspection of products of classes 4 and 5 requires special procedures, which are also addressed.

NOTE 2 See Clause 9.

NOTE 3 Techniques for the use of TOFD for weld inspection are described in ISO 10863.

NOTE 4 The related acceptance criteria are given in ISO 15626.

## 2 Normative references

The following referenced documents are indispensable for the application 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 9712, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

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

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

EN 12668-1, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 1: Instruments*

EN 12668-2, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 2: Probes*



EN 12668-3, *Non-destructive testing — Characterization and verification of ultrasonic examination equipment — Part 3: Combined equipment*

### 3 Terms, definitions, symbols and abbreviations

#### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

##### 3.1.1

##### **scanning surface dead zone**

zone where indications may be obscured due to the interface echo (lateral wave)

##### 3.1.2

##### **back wall dead zone**

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

##### 3.1.3

##### **A-scan**

display of the ultrasonic signal amplitude as a function of time

##### 3.1.4

##### **B-scan**

display of the time-of-flight of the ultrasonic signal as a function of probe displacement

##### 3.1.5

##### **non-parallel scan**

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

##### 3.1.6

##### **parallel scan**

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

#### 3.2 Abbreviations

— TOFD: time-of-flight diffraction

#### 3.3 Symbols

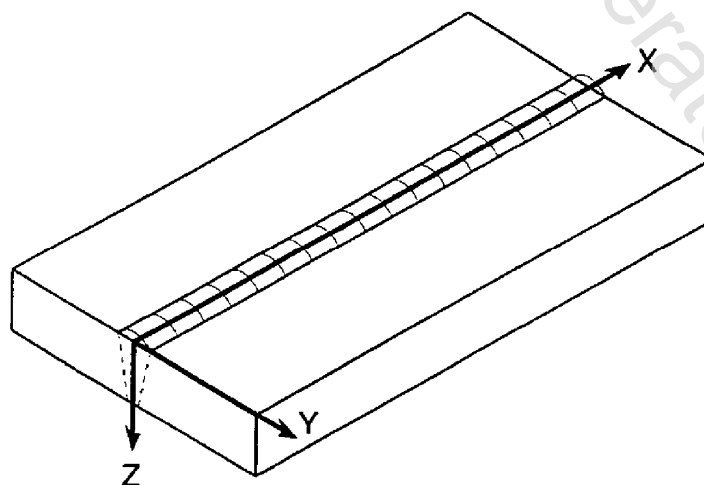


Figure 1 — Coordinate definition