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Non-destructive testing of welds — Ultrasonic testing — Use of time-of-flight diffraction technique (TOFD) (ISO 10863:2011)

This British Standard is the UK implementation of EN ISO 10863:2011. It supersedes DD CEN/TS 14751:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Zerstörungsfreie Prüfung von Schweißverbindungen - Ultraschallprüfung - Anwendung der Beugungslaufzeittechnik (TOFD) (ISO 10863:2011)

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Foreword

This document (ISO 10863:2011) has been prepared by Technical Committee CEN/TC 121 “Welding”, the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 44 "Welding and allied processes".

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of an identical text or by endorsement, at the latest by March 2012, and conflicting national standards shall be withdrawn at the latest by March 2012.

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 CEN/TS 14751:2004.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 10863 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding*, in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 5, *Testing and inspection of welds*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 5 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

Non-destructive testing of welds — Ultrasonic testing — Use of time-of-flight diffraction technique (TOFD)

1 Scope

This International Standard specifies the application of the time-of-flight diffraction (TOFD) technique to the semi- or fully automated ultrasonic testing of fusion-welded joints in metallic materials of minimum thickness 6 mm. It applies to full penetration welded joints of simple geometry in plates, pipes, and vessels, where both the weld and parent material are low-alloyed carbon steel. Where specified and appropriate, TOFD can also be used on other types of materials that exhibit low ultrasonic attenuation (especially that due to scatter).

Where material-dependent ultrasonic parameters are specified in this International Standard, they are based on steels having a sound velocity of $(5\,920 \pm 50)$ m/s for longitudinal waves, and $(3\,255 \pm 30)$ m/s for transverse waves. It is necessary to take this fact into account when examining materials with a different velocity.

This International Standard makes reference to the basic standard EN 583-6 and provides guidance on the specific capabilities and limitations of TOFD for the detection, location, sizing and characterization of discontinuities in fusion-welded joints. TOFD can be used as a stand-alone method or in combination with other non-destructive testing (NDT) methods or techniques, for manufacturing inspection, and for in-service inspection.

This International Standard specifies four testing levels (A, B, C, D) in accordance with ISO 17635 and corresponding to an increasing level of inspection reliability. Guidance on the selection of testing levels is provided.

This International Standard permits assessment of TOFD indications for acceptance purposes. This assessment is based on the evaluation of transmitted, reflected and diffracted ultrasonic signals within a generated TOFD image.

This International Standard does not include acceptance levels for discontinuities.

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 17635, *Non-destructive testing of welds — General rules for metallic materials*

ISO 17640:2010, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

EN 473, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

EN 583-6, *Non-destructive testing — Ultrasonic examination — Part 6: Time-of-flight diffraction technique as a method for detection and sizing of discontinuities*