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BSI Standards Publication

Non-destructive testing – Ultrasonic thickness measurement (ISO 16809:2017)

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National foreword

This British Standard is the UK implementation of EN ISO 16809:2019. It is identical to ISO 16809:2017. It supersedes BS EN 14127:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/46/3, Ultrasonic 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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Compliance with a British Standard cannot confer immunity from legal obligations.

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Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD **EN ISO 16809**

NORME EUROPÉENNE

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Supersedes EN 14127:2011

English Version

Non-destructive testing - Ultrasonic thickness measurement (ISO 16809:2017)

Essais non destructifs - Mesurage de l'épaisseur par ultrasons (ISO 16809:2017)

Zerstörungsfreie Prüfung - Dickenmessung mit Ultraschall (ISO 16809:2017)

This European Standard was approved by CEN on 8 April 2019.

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European foreword

The text of ISO 16809:2017 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 16809:2019 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of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

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

This document supersedes EN 14127:2011.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 16809:2017 has been approved by CEN as EN ISO 16809:2019 without any modification.

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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).

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For an explanation on 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 the following URL: 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 16809:2012), which has been technically revised. The main changes compared to the previous edition are as follows:

— editorial improvements have been made;

— the terminology has been adapted to the latest edition of ISO 5577;

— Formulae (5) and (6) have been corrected.

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Non-destructive testing — Ultrasonic thickness measurement

1 Scope

This document specifies the principles for ultrasonic thickness measurement of metallic and non-metallic materials by direct contact, based on measurement of time of flight of ultrasonic pulses only.

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*

3 Terms and definitions

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

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/

4 Measurement modes

The thickness of a part or structure is determined by accurately measuring the time required for a short ultrasonic pulse generated by a transducer to travel through the thickness of the material once, twice or several times.

The material thickness is calculated by multiplying the known sound velocity of the material with the transit time and dividing by the number of times the pulse transits the material wall.

This principle can be accomplished by applying one of the following modes, see Figure 1.

1) **Mode 1:** Measure the transit time from an initial excitation pulse to a first returning echo, minus a zero correction to account for the thickness of the probe's wear plate and the couplant layer (single-echo mode).

2) **Mode 2:** Measure the transit time from the end of a delay line to the first back wall echo (single-echo delay line mode).

3) **Mode 3:** Measure the transit time between back wall echoes (multiple-echo mode).

4) **Mode 4:** Measure the transit time for a pulse travelling from the transmitter to a receiver in contact with the back wall (through-transmission mode).

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