



## Non-destructive testing — Ultrasonic thickness measurement

STANDARDS  
Australia



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AS ISO 16809:2020

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The following are represented on Committee MT-007:

- Australasian Thermographers Association
- Australian Institute for Non-Destructive Testing
- Australian Nuclear Science and Technology Organisation
- Austrroads
- Engineers Australia
- Institute of Electrical Inspectors
- National Aerospace Non-Destructive Testing Board of Australia
- Weld Australia

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## Non-destructive testing — Ultrasonic thickness measurement

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## Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee MT-007, Non-Destructive Testing of Metals and Materials.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify 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.

This Standard is identical with, and has been reproduced from, ISO 16809:2017, *Non-destructive testing — Ultrasonic thickness measurement*.

As this document has been reproduced from an International Standard, a full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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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)).

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 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](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 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 updated to the latest edition of ISO 5577;
- Formulae (5) and (6) have been corrected.

NOTES

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# Australian Standard<sup>®</sup>

## 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).