
**Non-destructive testing — Eddy
current testing — General principles**

*Essais non destructifs — Contrôle par courants de Foucault —
Principes généraux*

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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).

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).

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.

This document was prepared by Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 4, *Eddy current testing*.

This second edition cancels and replaces the first edition (ISO 15549:2008), which has been technically revised.

The main change compared to the previous edition is as follows:

- rewriting of [Clause 5](#) "Qualification of personnel".

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.

Non-destructive testing — Eddy current testing — General principles

1 Scope

This document defines the general principles to be applied to non-destructive eddy current examination of products and materials in order to ensure defined and repeatable performance.

It includes guidelines for the preparation of application documents which describe the specific requirements for the application of the eddy current method to a particular type of product.

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

ISO 12718¹⁾, *Non-destructive testing — Eddy current testing — Vocabulary*

ISO 15548-1, *Non-destructive testing — Equipment for eddy current examination — Part 1: Instrument characteristics and verification*

ISO 15548-2, *Non-destructive testing — Equipment for eddy current examination — Part 2: Probe characteristics and verification*

3 Terms and definitions

ISO 15549:2019

<https://standards.iteh.ai/catalog/standards/iso/e849f2a0-102d-4b2e-a40f-62b241f9775c/iso-15549-2019>

For the purposes of this document, the terms and definitions given in ISO 12718 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 General principles

The eddy current examination is based upon the induction of an alternating electric current in a conducting material. The quantity measured and analysed is related to the distribution of the induced currents and it is represented by a vector in the complex plane.

The distribution of eddy currents in the depth of a material is governed by physical laws, the density of the currents decreasing drastically with the increasing depth. For a given frequency, this decrease is an exponential function of the depth.

The following properties, alone or in combination, of the product to be tested influence the measured quantity:

- the electrical conductivity of the material;
- the magnetic permeability of the material;

1) Under preparation.

- the size and geometry of the product to be tested;
- the geometrical relationship between the eddy current probe and the product to be tested.

More detailed information is obtained when the measured quantity is displayed in the complex plane.

The method can be applied using the following characteristics:

- the method does not involve any physical contact with the product;
- it does not need a coupling medium such as water;
- high throughput speeds can be used.

5 Qualification of personnel

Personnel who perform eddy current testing shall be certified in accordance with ISO 9712 or equivalent.

6 Purpose of examination and products to be tested

The purpose of the examination can be one or more of the following:

- to reveal discontinuities in the product which could affect its fitness for the purpose;
- to assess the thickness of coatings or layers;
- to assess other geometric characteristics;
- to assess metallurgical or mechanical properties of the product;
- to assess the electrical conductivity and/or permeability of the product;
- to sort products on the basis of any of the above-mentioned properties.

Examples of products to be tested are conducting materials such as:

- tubes, profiles, bars or wire rods;
- components in the automotive and machining industries;
- forged or cast products;
- multi-layer components in the aircraft industry.

Examples of the application of the method include:

- on-line testing in rolling mills, finishing lines or drawing lines;
- in-service inspection of the heat-exchanger tubing;
- verification of the properties of mass-produced articles and semi-finished products;
- maintenance inspection of an aircraft;
- inspection of the surfaces of cylindrical holes formed in products.

7 Examination techniques

Examination can be static or dynamic, the latter requiring the relative movement between the probe and the product to be tested.