
**Non-destructive testing — Equipment
for eddy current examination — Array
probe characteristics and verification**

*Essais non destructifs — Appareillage pour examen par courants
de Foucault — Caractéristiques des capteurs multiéléments et
vérifications*

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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 4, *Eddy current testing*.

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Non-destructive testing — Equipment for eddy current examination — Array probe characteristics and verification

1 Scope

This document identifies the functional characteristics of eddy current array probes and their interconnecting elements and provides methods for their measurement and verification.

The evaluation of these characteristics permits a well-defined description and comparability of eddy current array probes.

Where relevant, this document gives recommendations for acceptance criteria for the characteristics.

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 12718, *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 15548-2:2013, *Non-destructive testing — Equipment for eddy current examination — Part 2: Probe characteristics and verification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12718 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

element

single physical component such as a coil, a GMR or a Hall probe which has a basic function of excitation or reception

3.2

pattern

single physical and electronic arrangement of simultaneously active elements

3.3

sequencing

chronology of the activation of patterns

3.4

threshold

lowest acceptable sensitivity value defined in an application document

4 Probe and interconnecting elements characteristics

4.1 General characteristics

4.1.1 Application

Probes and interconnecting elements are selected to satisfy the requirements of the intended application.

The design is influenced by the instrument with which they are used.

4.1.2 Probe types

The probe is described by the following:

- type of material to be examined, i.e. ferromagnetic, non-ferromagnetic with high or low conductivity;
- the geometry of the examined zone;
- whether it is conformable or not;
- family, e.g. coaxial probe, surface probe;
- the receiver type;
- the number of elements (transmitters and/or receivers);
- shape and assembly of elements and spacing;
- purpose of the examination, e.g. detection of discontinuities, sorting or thickness measurement, etc.;
- specific features, e.g. focused, shielded, etc.;
- the function of the elements (transmission or reception) as well as the type of measurement (absolute or differential) may coexist in the same array probe depending on the patterns, the sequencing and the instrument software.

4.1.3 Interconnecting elements

They may include the following:

- active devices, e.g. multiplexer (built-in or external), amplifier;
- cables and/or extensions;
- connectors;
- slip rings;
- rotating heads;
- polarizers.

4.1.4 Physical characteristics

The following are to be stated among others:

- external size and shape;
- weight;
- information for mechanical mounting;

- model number and serial number;
- material of probe housing;
- composition and thickness of facing material;
- presence and purpose of core or shield;
- type of interconnecting elements (see 4.1.3);
- at least one position mark (electrical centre; see 8.5).

4.1.5 Safety

The probe and its interconnecting elements shall meet the applicable safety regulations regarding electrical hazard, surface temperature, or explosion.

Normal use of the probe should not create a hazard.

4.1.6 Environmental conditions

The temperature and humidity for normal use, storage and transport should be specified for the probe and its interconnecting elements.

The tolerance of the probe and its interconnecting elements to the effects of interference noise and electromagnetic radiation shall conform to electromagnetic compatibility (EMC) regulations.

Materials used in the manufacture of the probe should be resistant to contaminants.

4.2 Electrical characteristics

The electrical characteristics of a probe connected to a specified length and type of cable are the following:

- recommended range of excitation voltage for safe operation;
- recommended range of excitation frequencies.

The electrical characteristics of any extension cable are the following:

- resistance and capacitive reactance per length unit.

4.3 Functional characteristics

The functional characteristics of an array probe shall be determined for a defined system.

The measurement of the functional characteristics of a probe requires the use of reference blocks. The material used for the reference block is determined by the application.

The functional characteristics of a probe are the following:

- angular sensitivity;
- response to elementary discontinuities or variations (hole, slot, deposit, etc.);
- length and width of coverage for a given pattern;
- area of coverage for a given pattern;
- minimum dimensions of discontinuities for constant response;
- penetration characteristics;