SLOVENSKI STANDARD
oSIST prEN ISO 20339:2016

01-februar-2016

Neporušitveno preskušanje - Oprema za preiskave z vrtinčnimi tokovi - Značilnosti vrste sonde in preverjanje (ISO/DIS 20339:2015)

Non-destructive testing - Equipment for eddy current examination - Array probe characteristics and verification (ISO/DIS 20339:2015)

Zerstörungsfrei Prüfung - Ausrüstung zur Wirbelstromprüfung - Array-Prüfkopfeigenschaften und -überprüfung (ISO/DIS 20339:2015)

Essais non destructifs - Appareillage pour examen par courants de Foucault - Caractéristiques des capteurs multiéléments et vérifications (ISO/DIS 20339:2015)

Ta slovenski standard je istoveten z: **prEN ISO 20339**

ICS:

19.100 Neporušitveno preskušanje Non-destructive testing

oSIST prEN ISO 20339:2016 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 20339

ISO/TC **135**/SC **4** Secretariat: **AFNOR**

Voting begins on: **2015-12-03**

Voting terminates on: **2016-03-03**

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

ICS: 19.100

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
ISO/DIS 20339:2015(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

1 Scope

The purpose of this standard is to identify the functional characteristics of an eddy current array probe and its interconnecting elements and to provide methods for their measurement and verification.
The evaluation of these characteristics permits a well-defined description and comparability of an eddy current array probe.
This standard gives recommendations for acceptance criteria for the characteristics.

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

ISO 12718, *Non-destructive testing - Eddy current testing - Vocabulary*

3 Terms and definitions

For the purposes of this standard the definitions given in ISO 12718 apply, as well as the following definitions

Element:
single physical component (coil, GMR, Hall probe) which has a basic function (excitation, reception)

Pattern:
single physical and electronic arrangement of simultaneously active elements

Sequencing:
chronology of the activation of patterns

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:

- 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;

- function e.g. separate or combined transmit receive probe;

- family e.g. coaxial probe, surface probe;

- measurement mode e.g. absolute, differential;

- the receiver type;

- the number of elements (transmitters and/or receivers);

- shape 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.

4.1.3 Interconnecting elements

They may include:

- active devices, e.g. multiplexer (built-in or external), amplifier;

- cables and/or extensions;

- connectors;

- slip rings;

- rotating heads;

- transformers;

- polarizers.

4.1.4 Physical characteristics.

The following are to be stated amongst others:

- external size and shape;

- weight;

- information for mechanical mounting;

- model number and serial number;

- material of manufacture 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 8.4).

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:

- recommended range of excitation current and voltage for safe operation;

- recommended range of excitation frequencies;

- cross-talk.

The electrical characteristics of any extension cable are:

- 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:

- directionality;

- response to elementary discontinuities or variations (hole, slot, deposit..);
- 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;
- geometric effects;
- number of dead elements.

These characteristics cannot be used alone to establish the performance (e.g. resolution, largest undetectable discontinuity…) of the probe in a given test system, for a given application.

When relevant, the functional characteristics shall be measured on the probe with the interconnecting elements required by the application.

5 Verification

5.1 Level of verifications

Two levels of verification may be required:

Basic level: addresses detection performance.

Advanced level: addresses characterisation performance:

- Verification of a motion system where there is a need for mechanisation of some measurements (movement of the probe);
- Digitisation and scanning speed: number of measurement points per mm.

The qualification of a process which may imply an agreement between manufacturer and customer is not considered in this standard.

5.2 Characteristics to be verified

Characteristic	Basic level	Advanced level
Outer dimensions	I	M
Conformability of the probe	I	M
Area of coverage	I	M
Number of elements	I	M
Assembly	M	M
Excitation frequencies	M	M
Nature of elements	I	I
Element dimensions	I	I
Distances between elements	I	I
Arrangement	I	I
External or built-in multiplexer	I	I
Length and type of supplied cable	I	I

I: measured by the manufacturer or design data, reported on the technical specification.
M: measured by the manufacturer and/or the user.

Note 1: The manufacturer should add what type and orientation of discontinuity the probe is designed for.

Note 2: Where more information on the elements is needed by the user (e.g. for simulation), then it may be part of a specific agreement.

6 Measurement of electrical and functional characteristics of a probe.

6.1 Electrical characteristics

6.1.1 General

The electrical characteristics alone do not define the probe characteristics in its application.
The methods and measuring instruments given below are for guidance; other equivalent methods and instrumentation or modelling can be used.

6.1.2 Measurement conditions

Array probes (surface probes and coaxial probes) are in most cases specific to one application.
They are delivered with a cable the design of which depends on the number of elements and which cannot be removed for measurements. The characteristics of the cable are generally proprietary information.
The manufacturer provides a cable the length of which is compatible in terms of resonance and attenuation with the future use of the probe as described by the customer.
The following measurements are only applicable to elements consisting of coils.

The measurements are made at the probe connector which is at one end of the connecting cable, without the use of interconnecting elements of the inspection system. The probe is placed in air and away from any conductive or magnetic material. These measurements are only possible if no electronic components (such as amplifiers, multiplexers…) are active in the probe.
The measurements are made for each element of the probe accessible at the probe connector. The other elements are left open circuit.
When the probe is designed for use under particular conditions e.g. temperature or pressure, then any additional measurements that are required shall be specified in the application document.

6.1.3 Receiving element (or elements) impedance

The resistance, the inductance and capacitance shall be measured using an impedance meter. The impedance measured values can be given as a curve against frequency.

6.1.4 Impedance of a pattern

This measurement is not normally performed by the user as it is not possible once the probe is assembled. It is of the manufacturer's responsibility.

Carry out the measurements using a network analyser or an impedance meter.
Feed a current with the central frequency at the input and measure the voltage at the output.

Repeat the measurements on all the patterns

Verify the homogeneity of the results.
In case of significant deviation, apply the adequate corrections (connections…)

6.1.5 Channel assignment - Sequencing

Verification of channel assignment is essential. The following operating procedure is for guidance.
Measurements are carried out at the central frequency.
Produce a C-scan type cartography of a defect at angle with the direction of scanning: a slot at 45° (Block A1) for a surface probe, a helix on a tube wall (block B2) for coaxial probes.
The value of the angle shall be chosen in accordance with the scanning step and the dimensions of a pattern.
Verify the channel assignment and the uniformity of the signals obtained on those channels
In the case of complex configurations, the verification procedure is left to the manufacturer's initiative.

Note: the case of static probes in which scanning is performed electronically is not covered by this measurement; a case-by-case procedure shall be produced.

6.1.6 Cross-talk

Cross-talk always exists in array probes. It is actually attenuated by multiplexing non-neighbouring elements.
The level of cross-talk is very much dependent on the application; therefore, acceptance criteria cannot be given in this standard.