BS EN ISO 20339:2017

BSI Standards Publication

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

Documents
Document Sharing Hub

Full document details: BS EN ISO 20339:2017

National foreword

This British Standard is the UK implementation of EN ISO 20339:2017. It is identical to ISO 20339:2017.

The UK participation in its preparation was entrusted to Technical Committee WEE/46, Non-destructive 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.

© The British Standards Institution 2017
Published by BSI Standards Limited 2017

ISBN 978 0 580 91038 8

ICS 19.100

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2017.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN ISO 20339:2017

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 20339

April 2017

ICS 19.100

English Version

Non-destructive testing - Equipment for eddy current examination - Array probe characteristics and verification (ISO 20339:2017)

Essais non destructifs - Appareillage pour examen par courants de Foucault - Caractéristiques des capteurs multiéléments et vérifications (ISO 20339:2017)

Zerstörungsfreie Prüfung - Technische Ausrüstung für die Wirbelstromprüfung - Kenngrößen von Sensorarrays und deren Verifizierung (ISO 20339:2017)

This European Standard was approved by CEN on 5 February 2017.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2017 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members

Ref. No. EN ISO 20339:2017: E

Documents
Document Sharing Hub

Full document details: BS EN ISO 20339:2017

European foreword

This document (EN ISO 20339:2017) has been prepared by Technical Committee ISO/TC 135 "Non-destructive testing" in collaboration with 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 October 2017, and conflicting national standards shall be withdrawn at the latest by October 2017.

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

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 20339:2017 has been approved by CEN as EN ISO 20339:2017 without any modification.

Documents
Document Sharing Hub
Full document details: BS EN ISO 20339:2017

Contents

Page

Foreword ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Probe and interconnecting elements characteristics ... **2**
4.1 General characteristics ... 2
4.1.1 Application ... 2
4.1.2 Probe types ... 2
4.1.3 Interconnecting elements ... 2
4.1.4 Physical characteristics ... 2
4.1.5 Safety ... 3
4.1.6 Environmental conditions ... 3
4.2 Electrical characteristics ... 3
4.3 Functional characteristics ... 3

5 Verification ... **4**
5.1 Level of verifications ... 4
5.2 Characteristics to be verified ... 4

6 Measurement of electrical and functional characteristics of an array probe ... **5**
6.1 Electrical characteristics ... 5
6.1.1 General ... 5
6.1.2 Measurement conditions ... 5
6.1.3 Impedance of coil elements ... 5
6.1.4 Impedance of a pattern ... 5
6.1.5 Channel assignment — Sequencing ... 6
6.1.6 Cross-talk ... 6
6.2 Functional characteristics ... 6
6.2.1 General ... 6
6.2.2 Measurement conditions ... 6

7 Surface array probes ... **8**
7.1 Reference blocks ... 8
7.2 Probe motion ... 9
7.3 Reference signal — Normalization ... 9
7.4 Edge effect (measurable in the case of simple geometry, e.g. metal sheets, disks) ... 10
7.5 Response to a slot ... 11
7.6 Response to a hole ... 12
7.7 Length of coverage ... 12
7.8 Variation in sensitivity between patterns ... 12
7.9 Minimum slot length for constant probe response ... 13
7.10 Lift-off effect ... 13
7.11 Effect of probe clearance on slot response ... 13
7.12 Effective depth of detection of a sub-surface slot ... 14
7.13 Resolution ... 14
7.14 Defective element or pattern ... 14

8 Coaxial array probes ... **14**
8.1 General conditions ... 14
8.2 Reference blocks ... 14
8.3 Reference signal ... 16
8.4 Absence of defective elements ... 17
8.5 Position mark of the probe (mainly for positioning) ... 17
8.6 End effect ... 17
8.7 Length of coverage ... 17
8.8 Homogeneity of axial response ... 18

AVA Documents
Document Sharing Hub

© ISO 2017 – All rights reserved

Full document details: BS EN ISO 20339:2017

8.9 Eccentricity effect ... 19
8.10 Fill effect ... 19
8.11 Effective depth of penetration ... 19
8.12 Effective depth of detection under ligament ... 19

9 Influence of interconnecting elements ... 19

Annex A (informative) **Simulation of surface probe resolution ... 20**

© ISO 2017 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS EN ISO 20339:2017

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 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.*

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS EN ISO 20339:2017

This page deliberately left blank

Documents
Document Sharing Hub

Full document details: BS EN ISO 20339:2017

INTERNATIONAL STANDARD ISO 20339:2017(E)

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

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS EN ISO 20339:2017

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;

© ISO 2017 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS EN ISO 20339:2017