



SLOVENSKI STANDARD

SIST EN 13860-3:2004

01-junij-2004

Non-destructive testing - Eddy current examination - Equipment characteristics and verification - Part 3: System characteristics and verification

Non-destructive testing - Eddy current examination - Equipment characteristics and verification - Part 3: System characteristics and verification

Zerstörungsfreie Prüfung - Wirbelstromprüfung - Kenngrößen von Prüfeinrichtungen und deren Verifizierung - Teil 3: Kenngrößen des Systems und deren Verifizierung

Essais non destructifs - Examen par courants de Foucault - Caractéristiques et vérification de l'appareillage - Partie 3: Caractéristiques du système et vérifications

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Ta slovenski standard je istoveten z: EN 13860-3:2003

ICS:

19.100 Neporušitveno preskušanje Non-destructive testing

SIST EN 13860-3:2004

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13860-3

December 2003

ICS 19.100

English version

Non-destructive testing - Eddy current examination - Equipment characteristics and verification - Part 3: System characteristics and verification

Essais non destructifs - Examen par courants de Foucault -
Caractéristiques et vérification de l'appareillage - Partie 3:
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This European Standard was approved by CEN on 7 November 2003.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This document (EN 13860-3:2003) has been prepared by 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 June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document includes a Bibliography.

EN 13860 comprises a series of European Standards for "*Eddy current examination - Equipment*" which is made up of the following:

EN 13860-1 *Non-destructive testing - Eddy current examination - Equipment characteristics and verification - Part 1: Instrument characteristics and verification.*

EN 13860-2 *Non-destructive testing - Eddy current examination - Equipment characteristics and verification - Part 2: Probe characteristics and verification.*

EN 13860-3 *Non-destructive testing - Eddy current examination - Equipment characteristics and verification - Part 3: System characteristics and verification.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

EN 13860-3:2003 (E)**1 Scope**

This European Standard identifies the functional characteristics of a general purpose eddy current system and provides methods for their measurement and verification.

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

By careful choice of the characteristics, a consistent and effective eddy current examination system can be designed for a specific application.

Where accessories are used, these should be characterised using the principles of this standard.

This standard does not give the extent of verification nor acceptance criteria for the characteristics. These are given in the application documents.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1330-5:1998 *Non-destructive testing - Terminology - Part 5: Terms used in Eddy current testing.*

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3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1330-5:1998 apply.

4 System characteristics**4.1 General characteristics****4.1.1 Introduction**

The system is designed to examine a defined product, or perform a defined measurement; the eddy current techniques implemented shall be specified. A system comprises the instrument, interconnecting elements e.g. cable, slip rings ..., probe arrangement, mechanical arrangement, accessories, and reference pieces.

The general characteristics of a system include the following:

4.1.2 Physical characteristics

- throughput speed;
- scanning path;
- mechanical arrangement and settings and their interaction with the product to be tested.

4.1.3 Calibration related characteristics

- response to a reference block;
- correlation of response with inferred parameters e.g. coating thickness, crack depth, etc.

4.1.4 Functional characteristics

- instrument and accessory settings accessible on knobs or displays;
- balance and origin of complex plane display;
- dynamic range of test system in amplitude and phase.

4.2 Accessories

These are functional units that may be integrated into, or added to, the basic instrument, which have not been identified in the foregoing text e.g. lift-off compensation system, marking system, magnetic saturation unit, demagnetizing arrangements, data acquisition and analysis software.

The function of these units shall be described and their characteristics stated.

Where an accessory influences the test result, it shall undergo a specific verification in accordance with a written procedure.

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5 Verification

5.1 General

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For a consistent and effective eddy current examination it is necessary to verify that the performance of the component parts of the eddy current test system is maintained within acceptable limits.

The physical condition of the reference pieces shall be verified to be within acceptable limits before being used to verify the system, or probes.

The measuring equipment used for verification shall be in a known state of calibration.

For a better understanding, the verification procedure is identically described in all three parts of EN 13860

5.2 Levels of verification

There are three levels of verification. Each level defines the time intervals between verification and the complexity of the verification.

It is understood that initial type testing has already been done by the manufacturer or under his control.

LEVEL 1 – Global functional check

A verification performed at regular intervals of time on the eddy current test system using reference blocks to verify that the performance is within specified limits.

The verification is usually performed at the examination location.

The time interval and the reference pieces are defined in the verification procedure.

LEVEL 2 – Detailed functional check

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A verification on an extended time scale, performed to ensure the stability of selected characteristics of the eddy current instrument, probe, accessories, and reference blocks.

LEVEL 3 – Characterisation

A verification performed on the eddy current instrument, probe accessories, and reference blocks to assess conformity with the characteristics supplied by the manufacturer.

The organisation requiring the verification shall specify the characteristics to be verified.

The main features of verification are shown in Table 1.

Table 1 — Verification procedure

LEVEL	OBJECT	TYPICAL TIME PERIOD	INSTRUMENTS	RESPONSIBLE ENTITY
1 Global function check	Stability of system performance.	Frequently. e.g hourly, daily	Reference blocks.	USER
2 Detailed functional check and calibration	Stability of selected characteristics of the instrument, probes and accessories.	Less frequently but at least annually and after repair.	Calibrated measuring instruments, reference blocks.	USER
3 Characterisation	All characteristics of the instrument, probes and accessories.	Once (on release) and when required.	Calibrated laboratory measuring instruments and reference blocks.	MANUFACTURER, USER

5.3 Verification procedure

The characteristics to be verified are dependent on the application. The essential characteristics and the level of verification shall be specified in a verification procedure.

The examination procedure for the application shall refer to the verification procedure. This can restrict the number of characteristics to be verified for a defined application.

Sufficient data on the characteristics featured in an instrument, probe, and reference block, shall be provided in order that verification may be performed within the scope of this standard.

5.4 Corrective actions

LEVEL 1 – When the performance is not within the specified limits, then a decision shall be made concerning the product examined since the previous successful verification. Corrective actions shall be made to bring the performance within the acceptable limits.

LEVEL 2 – When the deviation of the characteristic is greater than the acceptable limits specified by the manufacturer or in the application document, then a decision shall be made concerning the instrument, the probe or the accessory being verified.

LEVEL 3 – When the characteristic is out of the acceptable range specified by the manufacturer or by the application document, then a decision shall be made concerning the instrument, the probe or the accessory being verified.

6 Implementation of the functional verification

Functional verification of the system cannot be limited to the verification of the elements of the system, taken separately. It shall be carried out on the system considered as a global entity.

Implementation of the functional verification of a system is specific of each application and requires a procedure to be defined in the application document and stating at least:

- periodicity of the verification;
- conditions triggering a verification: e.g. replacement of one of the elements of the system.

This implementation includes the following steps:

- setting and/or calibration of the system for the verification;
- assessment of the acceptable limits of performance;
- verification of specified items: at least signal-to-noise ratio for reference signals, phase and amplitude response on reference blocks, stability of balance;
- measurement method for each item.

If the results of the measurements indicate that the performance is out of the acceptable limits, this shall be reported and corrective actions shall be made to bring the performance within the acceptable limits.

These actions could be:

- re-calibration of the system;
- level 2 or level 3 verification for one or more elements of the system.

All of the product examined since the previous successful verification is considered not examined and the decision made concerning this product shall be reported e.g. re-examination or use of another NDT method.