Copper and copper alloys - Eddy current test for measuring defects on seamless round copper and copper alloy tubes - Part 1: Test with an encircling test coil on the outer surface

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NATIONAL FOREWORD

See Eesti standard EVS-EN 1971-1:2011 sisaldab Euroopa standardi EN 1971-1:2011 ingliskeelset teksti.	This Estonian standard EVS-EN 1971-1:2011 consists of the English text of the European standard EN 1971-1:2011.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 07.12.2011.	Date of Availability of the European standard is 07.12.2011.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Copper and copper alloys - Eddy current test for measuring defects on seamless round copper and copper alloy tubes - Part 1: Test with an encircling test coil on the outer surface

Cuivre et alliages de cuivre - Méthode de contrôle par courants de Foucault pour le mesurage des défauts des tubes ronds sans soudure en cuivre et alliages de cuivre - Partie 1: Essai avec une bobine encerclante sur la paroi externe

Kupfer und Kupferlegierungen - Wirbelstromprüfung an Rohren zur Messung von Fehlern an nahtlos gezogenen runden Rohren aus Kupfer und Kupferlegierungen - Teil 1: Prüfung mit umfassender Spule auf der Außenseite

This European Standard was approved by CEN on 5 November 2011.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 1971-1:2011) has been prepared by Technical Committee CEN/TC 133 “Copper and copper alloys”, the secretariat of which is held by DIN.

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 2012, and conflicting national standards shall be withdrawn at the latest by June 2012.

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.

This document supersedes EN 1971:1998.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 3 "Copper tubes (installation and industrial)" to revise the following document:

EN 1971:1998, *Copper and copper alloys — Eddy current test for tubes*

This is one of two parts of the standard for the eddy current test for measuring defects on seamless round copper and copper alloy tubes. The other part is:

EN 1971-2, *Copper and copper alloys — Eddy current test for measuring defects on seamless round copper and copper alloy tubes — Part 2: Test with an internal probe on the inner surface*

In comparison with the first edition of EN 1971:1998, the following significant technical changes were made:

— split of and extension in two parts;

— modification of Scope – introduction of the choice of test method with encircling coil or internal probe.

Introduction

The eddy current test described in this European Standard has the objective of detecting during production potential leaks and serious defects in seamless round copper and copper alloy tubes.

The eddy current test is able to detect material inhomogeneities and their positions throughout the length of tubes. The eddy current signals of material inhomogeneities are compared with reference signals of artificially produced test defects. It is possible to identify these inhomogeneities on the inner and outer surfaces as well as within the tube wall.

Since the distribution of eddy currents decreases as the distance from the test coil increases, the amplitude of defect signals also decreases with increasing distance from the test coil. Thus the eddy current test with encircling test coil on the outer surface is less sensitive to defects on the inner surface.

The purpose of this standard is not to define a method of measuring the actual extent of the material inhomogeneities as the signal amplitude is dependent on, amongst other factors, volume, form and position of the inhomogeneity.

Due to end effects, it is not possible to effectively test the ends of the tubes. The purchaser and the supplier could agree that the end effect may be overcome by cutting to length after testing.

1 Scope

This part of this European Standard specifies a procedure for the eddy current test with an encircling test coil for measuring defects on the outer surface of seamless round copper and copper alloy tubes.

NOTE The eddy current test method(s) required, together with the size range and acceptance level, are defined in the relevant product standard.

The choice of the method for eddy current test:

— with an encircling test coil on the outer surface according EN 1971-1;

or

— with an internal probe on the inner surface according EN 1971-2;

is at the discretion of the manufacturer if there are no other agreements between the purchaser and the supplier.

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.

EN 473, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

EN ISO 12718, *Non-destructive testing — Eddy current testing — Vocabulary (ISO 12718:2008)*

3 Terms and definitions

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

4 General requirements

4.1 Personnel qualification

The eddy current test shall be made by operators trained in this technique and it shall be done under the responsibility of qualified staff.

When agreed upon between the purchaser and the supplier, qualification of the personnel shall be certified according to EN 473.

4.2 Condition of tube to be tested

Tubes shall be sufficiently clean and straight to permit satisfactory operation of the drive mechanism and eddy current test equipment.

4.3 Equipment

The driving mechanism shall drive the tube through the encircling coil as concentrically and vibration-free as possible.

The variation in test sensitivity due to changes of speed and tube position within the encircling coil shall be maintained within ± 2 dB.

Either encircling test coils or a system that involves relative rotational motion between the tube and either one or several surface probes can be used for testing (see Figures 1 and 2).