



**NSAI**  
Standards

Irish Standard  
I.S. EN 1977:2013

## Copper and copper alloys - Copper drawing stock (wire rod)

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I.S. EN 1977:2013

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## English Version

## Copper and copper alloys - Copper drawing stock (wire rod)

Cuivre et alliages de cuivre - Fil machine en cuivre

Kupfer und Kupferlegierungen - Vordraht aus Kupfer

This European Standard was approved by CEN on 24 November 2012.

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<b>Contents</b>	<b>Page</b>
Foreword.....	3
Introduction .....	4
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions .....	5
4 Designations .....	5
4.1 Material .....	5
4.2 Product .....	6
5 Ordering information.....	7
6 Requirements .....	7
6.1 Composition .....	7
6.2 Elongation .....	7
6.3 Electrical properties.....	7
6.4 Annealability.....	12
6.5 Hydrogen embrittlement .....	12
6.6 Scale adhesion.....	13
6.7 Dimensions and tolerances .....	13
6.8 Surface condition.....	13
6.9 Joins .....	13
7 Sampling.....	13
7.1 General .....	13
7.2 Analysis (oxygen only) and measurement of diameter of Cu-ETP1 (CW003A) drawing stock .....	14
7.3 Annealability testing of Cu-ETP1 (CW003A) drawing stock.....	14
7.4 Analysis (other than oxygen) and measurement of elongation and electrical properties of Cu-ETP1 (CW003A) drawing stock .....	14
7.5 Tests on drawing stock in grades other than Cu-ETP1 (CW003A).....	14
8 Test methods.....	15
8.1 Analysis .....	15
8.2 Elongation .....	15
8.3 Electrical resistivity.....	15
8.4 Annealability.....	16
8.5 Hydrogen embrittlement .....	16
8.6 Scale adhesion.....	16
8.7 Rounding of results .....	16
9 Declaration of conformity and inspection documentation.....	16
9.1 Declaration of conformity .....	16
9.2 Inspection documentation .....	17
10 Marking.....	17
<b>Annex A (informative) Information on electrical resistivity and conductivity relationships.....</b>	<b>18</b>
A.1 Volume resistivity.....	18
A.2 Standard annealed copper (IACS) .....	18
A.3 Commercial annealed copper.....	18
A.4 Nominal mass resistivity.....	18
A.5 Differences between measured and nominal values .....	19
<b>Annex B (normative) Rapid Elongation Test method (AR-Test) for diameter 8 mm Cu-ETP1 wire rod.....</b>	<b>20</b>
B.1 General .....	20
B.2 Procedure .....	20
B.3 Test results.....	22
Bibliography.....	23

## Foreword

This document (EN 1977:2013) 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 July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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 1977:1998.

This document is one of a series of European Standards for products manufactured from refined copper grades.

Other products are specified as follows:

- EN 1976, *Copper and copper alloys — Cast unwrought copper products*
- EN 1978, *Copper and copper alloys — Copper cathodes*
- EN 13602, *Copper and copper alloys — Drawn, round copper wire for the manufacture of electrical conductors*

In comparison with EN 1977:1998, the following significant technical changes were made:

- a) Table 2, Cu-FRHC, Other elements: content has been modified and a new footnote “d” has been added;
- b) 6.4 and 8.4 “Annealability” have been modified;
- c) A.2 “Standard annealed copper (IACS)” has been modified;
- d) Annex B (normative) “Rapid Elongation Test method (AR-Test) for diameter 8 mm Cu-ETP1 wire rod” has been added.

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

Copper drawing stock (wire rod) is normally manufactured by one of the following process routes:

- continuous casting and hot rolling in tandem;
- continuous or semi-continuous casting and cold rolling;
- rolling of wire bar or billets; or
- extrusion.

Annex A (informative) gives information on the relationships between electrical resistivity and conductivity (of copper).

Annex B (normative) describes the rapid elongation test method (AR-Test) for diameter 8 mm Cu-ETP1 wire rod.

## 1 Scope

This European Standard specifies the composition, mechanical, electrical and physical properties for high conductivity copper drawing stock (wire rod) suitable for fabrication into wire by cold drawing, principally for the manufacture of electrical conductors. This European Standard covers drawing stock (wire rod), in nine grades of copper and nine silver-bearing copper grades. Normally, the cross-section is approximately circular, in a range of diameters from 6 mm.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1655, *Copper and copper alloys — Declarations of conformity*

EN 10204, *Metallic products — Types of inspection documents*

EN 12893, *Copper and copper alloys — Determination of spiral elongation number*

EN ISO 2626, *Copper — Hydrogen embrittlement test (ISO 2626)*

EN ISO 6892-1:2009, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2009)*

IEC 60468, *Method of measurement of resistivity of metallic materials*

ISO 4746, *Oxygen-free copper — Scale adhesion test*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **drawing stock**

#### **wire rod**

intermediate solid wrought product, of uniform cross-section along its whole length, supplied in coils

## 4 Designations

### 4.1 Material

#### 4.1.1 General

The material is designated either by symbol or number (see Tables 1 to 4).

#### 4.1.2 Symbol

The material symbol designation is based on the designation system given in ISO 1190-1.

NOTE Although material symbol designations used in this standard might be the same as those in other standards using the designation system given in ISO 1190-1, the detailed composition requirements are not necessarily the same.

#### 4.1.3 Number

The material number designation is in accordance with the system given in EN 1412.

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