



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 12164:2016

**Copper and copper alloys - Rod for free
machining purposes**

Cuivre et alliages de cuivre - Barres pour
décolletage

Kupfer und Kupferlegierungen - Stangen
für die spanende Bearbeitung

07/2016



National Foreword

This European Standard EN 12164:2016 was adopted as Luxembourgish Standard ILNAS-EN 12164:2016.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

EUROPEAN STANDARD ^{ILNAS-EN 12164:2016} **EN 12164**
NORME EUROPÉENNE
EUROPÄISCHE NORM

July 2016

ICS 77.150.30

Supersedes EN 12164:2011

English Version

Copper and copper alloys - Rod for free machining purposes

Cuivre et alliages de cuivre - Barres pour décolletage

Kupfer und Kupferlegierungen - Stangen für die spanende Bearbeitung

This European Standard was approved by CEN on 9 April 2016.

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, 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

Contents

Page

European foreword.....	4
Introduction	6
1 Scope	7
2 Normative references	8
3 Terms and definitions	8
4 Designations.....	8
4.1 Material.....	8
4.1.1 General.....	8
4.1.2 Symbol.....	9
4.1.3 Number	9
4.2 Material condition	9
4.3 Product.....	9
5 Requirements	12
5.1 Composition	12
5.2 Mechanical properties.....	12
5.3 Resistance to dezincification	13
5.4 Residual stress level.....	13
5.5 Dimensions and tolerances	13
5.5.1 Diameter or width across-flats.....	13
5.5.2 Shape tolerances	13
5.5.3 Straightness.....	13
5.5.4 Length.....	13
5.5.5 Corner radii.....	14
5.5.6 Twist of polygonal rod.....	14
5.5.7 Shaped ends	14
5.6 Surface quality.....	16
6 Sampling.....	16
6.1 General.....	16
6.2 Analysis.....	16
6.3 Mechanical tests	16
6.4 Dezincification resistance and stress corrosion resistance tests.....	16
7 Test methods	17
7.1 Analysis.....	17
7.2 Tensile test	17
7.2.1 General.....	17
7.2.2 Location of test pieces	17
7.2.3 Shape and size of test pieces	17
7.2.4 Procedure for testing.....	17
7.2.5 Determination of results	17
7.3 Hardness test.....	18
7.4 Dezincification resistance test	18
7.5 Stress corrosion resistance test.....	18
7.6 Determination of the electrical conductivity	18

7.7	Retests	18
7.7.1	Analysis, tensile test, hardness test and dezincification resistance test, determination of the electrical conductivity	18
7.7.2	Stress corrosion resistance test	19
7.8	Rounding of results	19
8	Declaration of conformity and inspection documentation	19
8.1	Declaration of conformity	19
8.2	Inspection documentation	19
9	Marking, packaging, labelling	19
	Bibliography	39

Figures

Figure 1	— Measurement of twist of polygonal rod	14
Figure 2	— Shaped ends of rod, Types	15

Tables

Table 1	— Indicative shaped ends dimensions	15
Table 2	— Composition of low alloyed copper alloys	20
Table 3	— Composition of copper-nickel-zinc alloys	21
Table 4	— Composition of copper-tin alloys	21
Table 5	— Composition of copper-zinc alloys	22
Table 6	— Composition of copper-zinc-lead alloys	23
Table 7	— Composition of complex copper-zinc alloys	25
Table 8	— Mechanical properties of rod of low alloyed copper alloys	26
Table 9	— Mechanical properties of rod of copper-nickel-zinc alloys	27
Table 10	— Mechanical properties of rod of copper-tin alloys	29
Table 11	— Mechanical properties of rod of copper-zinc alloys	30
Table 12	— Mechanical properties of rod of copper-zinc-lead alloys	32
Table 13	— Mechanical properties of rod of complex copper-zinc alloys	34
Table 14	— Tolerances on diameter of round rod (including deviation from circular form)	36
Table 15	— Tolerances on width across-flats of regular polygonal rod	36
Table 16	— Tolerances on straightness of rod	37
Table 17	— Tolerances on length of nominal length rod	37
Table 18	— Corner radii for square, hexagonal and octagonal rod	37
Table 19	— Maximum twist of square, hexagonal and octagonal rod	38
Table 20	— Sampling rate	38

European foreword

This document (EN 12164:2016) 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 January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.

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

This document supersedes EN 12164:2011.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 4 “Extruded and drawn products, forgings and scrap” to revise the following standard:

— EN 12164:2011, *Copper and copper alloys — Rod for free machining purposes.*

This document is one of a series of European Standards for the copper and copper alloy products rod, wire, profile and forgings. Other products are specified as follows:

- EN 12163, *Copper and copper alloys — Rod for general purposes;*
- EN 12165, *Copper and copper alloys — Wrought and unwrought forging stock;*
- EN 12166, *Copper and copper alloys — Wire for general purposes;*
- EN 12167, *Copper and copper alloys — Profiles and bars for general purposes;*
- EN 12168, *Copper and copper alloys — Hollow rod for free machining purposes;*
- EN 13601, *Copper and copper alloys — Copper rod, bar and wire for general electrical purposes;*
- EN 13602, *Copper and copper alloys — Drawn, round copper wire for the manufacture of electrical conductors;*
- EN 13605, *Copper and copper alloys — Copper profiles and profiled wire for electrical purposes.*

In comparison with EN 12164:2011, the following significant technical changes were made:

- a) addition of four new materials: CuZn37Pb1 (CW605N), CuZn35Pb1,5AlAs (CW625N), CuZn33Pb1,5AlAs (CW626N) and CuZn33Pb1AlSiAs (CW725R) due to the market requirements on restriction of lead and modification of the chemical composition for CuZn39Pb1 (CW611N);
- b) introduction of an optional procedure how to refer to restrictions to the chemical composition imposed by the 4 MS Common Composition List for materials used for products accepted for contact with drinking water;
- c) requirements and test methods for resistance of dezincification modified;
- d) provisions for surface quality added;

e) mechanical properties for CuZn21Si3P (CW724R) modified.

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

The European Committee for Standardization (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning the alloy CuZn21Si3P (CW724R) and CuZn33Pb1AlSiAs (CW725R) given in 6.1.

CEN takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has ensured the CEN that he is willing to negotiate licenses either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with CEN.

— For CuZn21Si3P (CW724R) information may be obtained from:

Wieland-Werke AG
Graf Arco Straße 36
D-89079 Ulm
GERMANY

— For CuZn33Pb1AlSiAs (CW725R) information may be obtained from:

Diehl Metall Messing
Heinrich-Diehl-Straße 9
D-90552 Röthenbach/Pegnitz
GERMANY

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. CEN shall not be held responsible for identifying any or all such patent rights.

CEN and CENELEC maintain online lists of patents relevant to their standards. Users are encouraged to consult the lists for the most up to date information concerning patents (<ftp://ftp.cencenelec.eu/EN/IPR/Patents/IPRdeclaration.pdf>).

Due to developing legislation, the composition of a material may be restricted to the composition specified in this European Standard with respect to individual uses (e.g. for the use in contact with drinking water in some Member States of the European Union). These individual restrictions are not part of this European Standard. Nevertheless, for materials for which traditional and major uses are affected, these restrictions are indicated. The absence of an indication, however, does not imply that the material can be used in any application without any legal restriction.