# SLOVENSKI STANDARD
# SIST EN 14640:2005

**01-julij-2005**

---

**Dodajni materiali za varjenje - Masivne žice in palice za talilno varjenje bakra in bakrovih zlitin – Razvrstitev**

Welding consumables - Solid wires and rods for fusion welding of copper and copper alloys - Classification

Schweißzusätze - Massivdrähte und -stäbe zum Schmelzschweißen von Kupfer und Kupferlegierungen - Einteilung



Produits consommables pour le soudage - Fils pleins et baguettes pleines pour le soudage par fusion du cuivre et des alliages de cuivre - Classification



**Ta slovenski standard je istoveten z: EN 14640:2005**

---

**ICS:**

| | | |
|---|---|---|
| 25.160.20 | Potrošni material pri varjenju | Welding consumables |
| 77.120.30 | Baker in bakrove zlitine | Copper and copper alloys |

**SIST EN 14640:2005** **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 14640

April 2005

ICS 25.160.20

English version

# Welding consumables - Solid wires and rods for fusion welding of copper and copper alloys - Classification

Produits consommables pour le soudage - Fils pleins et baguettes pleines pour le soudage par fusion du cuivre et des alliages de cuivre - Classification

Schweißzusätze - Massivdrähte und -stäbe zum Schmelzschweißen von Kupfer und Kupferlegierungen - Einteilung

This European Standard was approved by CEN on 15 March 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.



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



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**



Ref. No. EN 14640:2005: E

## Contents

## Foreword

This document (EN 14640:2005) has been prepared by Technical Committee CEN/TC 121 “Welding”, 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 October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

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

## Introduction

For copper welding consumables there is no unique relationship between the product form (solid wire or rod) and the welding process used (e.g. gas shielded metal arc welding, gas tungsten arc welding, plasma arc or other welding processes). For this reason the solid wires or rods may be classified on the basis of any of the above product forms and can be used as appropriate, for more than one of the above processes.

## 1 Scope

This document specifies requirements for classification of solid wires and rods for fusion welding of copper and copper alloys. The classification of the solid wires and rods is based on their chemical composition.

## 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 ISO 544, *Welding consumables — Technical delivery conditions for welding filler materials — Type of product, dimensions, tolerances and markings (ISO 544:2003).*

EN ISO 14344, *Welding and allied processes — Flux and gas shielded electrical welding processes — Procurement guidelines for consumables (ISO 14344:2002).*

ISO 31-0:1992, *Quantities and units — Part 0: General principles.*

## 3 Classification



The classification is divided into two parts:

a) the first part indicates the product form being solid wires or rods, see 4.1;

b) the second part gives a numerical symbol indicating the chemical composition of the solid wire or rod, see Table 1.



## 4 Symbols and requirements

### 4.1 Symbols for the product form

The symbol for the solid wire and rod shall be S.

NOTE One product form may be used for more than one welding process.

### 4.2 Symbol for the chemical composition

The numerical symbol in Table 1 indicates the chemical composition of a solid wire or rod, determined under conditions given in Clause 6.

NOTE 1 In addition the chemical symbol may be used.

## Table 1 — Symbol for the chemical composition of solid wires and rods

| Alloy symbols | | Chemical composition in % (m/m) [a] [b] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Numerical | Chemical | Cu | Al | Fe | Mn | Ni incl. Co | P | Pb | Si | Sn | Zn | As | C | Ti + Nb | S | Others total |
| COPPER-LOW ALLOYED | | | | | | | | | | | | | | | | |
| Cu 1897 | CuAg1 | min. 99,5 incl. Ag | 0,01 | 0,05 | 0,2 | 0,3 | 0,01-0,05[c] | 0,01 | 0,1 | - | - | 0,05 | - | - | - | Ag:0,8-1,2 |
| Cu 1898 | CuSn1 | bal. | 0,01 | 0,05 | 0,1-0,5 | 0,3 | 0,02 | 0,02 | 0,5 | 0,5-1,0 | - | 0,05 | - | - | - | 0,1 |
| COPPER-SILICON (SILICON BRONZE) | | | | | | | | | | | | | | | | |
| Cu 6511 | CuSi2Mn1 | bal. | - | - | 0,9-1,1 | - | 0,008-0,012 | - | 1,7-1,9 | 0,17-0,25 | - | - | - | - | - | 0,5 |
| Cu 6560 | CuSi3Mn1 | bal. | 0,01 | 0,5 | 0,5-1,5 | - | 0,02 | 0,02 | 2,8-4,0 | 0,2 | 0,2 | - | - | - | - | 0,4 |
| Cu 6561 | CuSi2Mn1Sn | bal. | - | 0,5 | 1,5 | - | - | 0,02 | 2,0-2,8 | 1,5 | 1,5 | - | - | - | - | 0,5 |
| COPPER-TIN (INCL. PHOSPHOR BRONZE) | | | | | | | | | | | | | | | | |
| Cu 5180 | CuSn6P | bal. | 0,01 | 0,1 | - | - | 0,1-0,4 | 0,02 | - | 4,0-7,0 | 0,1 | - | - | - | - | 0,4 |
| Cu 5210 | CuSn9P | bal. | - | 0,1 | - | - | 0,1-0,4 | 0,02 | - | 7,0-9,0 | 0,2 | - | - | - | - | 0,5 |
| Cu 5211 | CuSn10 | bal. | - | - | 0,2-0,35 | - | - | - | 0,2-0,3 | 9,0-10,0 | - | - | - | - | - | 0,5 |
| Cu 5410 | CuSn12P | bal. | 0,01 | 0,1 | - | - | 0,4 | 0,02 | - | 11,0-13,0 | 0,1 | - | - | - | - | 0,4 |
| COPPER-ZINC (BRASS) | | | | | | | | | | | | | | | | |
| Cu 4700 | CuZn40 | 57,0-61,0 | 0,01[d] | [d] | [d] | - | - | 0,05[d] | - | 0,25-1,0 | bal. | - | - | - | - | 0,5 |
| Cu 4701 | CuZn40SnSiMn | 58,5-61,5 | 0,01 | 0,25 | 0,05-0,25 | - | - | 0,02 | 0,15-0,4 | 0,2-0,5 | bal. | - | - | - | - | 0,2 |
| Cu 6800 | CuZn40Ni | 56,0-60,0 | 0,01 | 0,2-1,2 | 0,5 | 0,2-0,8 | - | 0,03 | 0,2 | 0,8-1,1 | bal. | - | - | - | - | 0,2 |
| Cu 6810 | CuZn40SnSi | 58,0-62,0 | 0,01 | 0,2 | 0,3 | - | - | 0,03 | 0,1-0,5 | 1,0 | bal. | - | - | - | - | 0,2 |
| Cu 7730 | CuZn40Ni10 | 46,0-50,0 | - | - | - | 9,0-11,0 | - | 0,03 | 0,2 | 0,8-1,1 | bal. | - | - | - | - | 0,5 |
| COPPER-ALUMINIUM (ALUMINIUM BRONZE) | | | | | | | | | | | | | | | | |
| Cu 6061 | CuAl5Mn1Ni1 | bal. | 4,5-5,0 | | 0,5-1,0 | 0,5-1,0 | - | - | - | - | | - | - | - | - | 0,5 |
| Cu 6100 | CuAl8 | bal. | 6,0-9,5 | 0,5 | 0,5 | 0,8 | - | 0,02 | 0,2 | - | 0,2 | - | - | - | - | 0,4 |
| Cu 6180 | CuAl10 | bal. | 8,5-11,0 | 0,5-1,5 | 1,0 | 1,0 | - | 0,02 | 0,1 | - | 0,02 | - | - | - | - | 0,4 |
| Cu 6240 | CuAl11Fe | bal. | 10,0-11,5 | 2,0-4,5 | - | - | - | 0,02 | - | - | 0,1 | - | - | - | - | 0,5 |
| Cu 6325 | CuAl8Fe4Ni2 | bal. | 7,0-9,0 | 2,0-5,0 | 0,5-3,0 | 0,5-3,0 | - | 0,02 | 0,1 | - | 0,1 | - | - | - | - | 0,4 |
| Cu 6327 | CuAl8Ni2 | bal. | 7,0-9,5 | 0,5-2,5 | 0,5-2,5 | 0,5-3,0 | - | 0,02 | 0,2 | - | 0,2 | - | - | - | - | 0,4 |
| Cu 6328 | CuAl9Ni5 | bal. | 8,5-9,5 | 3,0-5,0 | 0,6-3,5 | 4,0-6,0 | - | 0.02 | 0.2 | - | 0.1 | - | - | - | - | 0,4 |
| Cu 6329 | CuAl11Ni6 | bal. | 10,0-11,5 | 2,8-3,3 | 1,0-1,5 | 5,5-6,5 | - | 0,02 | 0,2 | - | 0,2 | - | - | - | - | 0,4 |
| COPPER-MANGANESE | | | | | | | | | | | | | | | | |
| Cu 6338 | CuMn13Al7 | bal. | 6,5-8,5 | 1,5-4,0 | 11,0-14,0 | 1,5-3,0 | - | 0,02 | 0,1 | - | 0,15 | - | - | - | - | 0,5 |
| COPPER-NICKEL | | | | | | | | | | | | | | | | |
| Cu 7061 | CuNi10 | bal. | - | 0,5-2,0 | 0,5-1,5 | 9,0-11,0 | 0,02 | 0,02 | 0,2 | - | - | - | 0,05 | 0,1-0,5 | 0,02 | 0,4 |
| Cu 7158 | CuNi30 | bal. | - | 0,4-1,0 | 0,5-1,5 | 29,0-32,0 | 0,02 | 0,02 | 0,25 | - | - | - | 0,05 | 0,2-0,5 | 0,02 | 0,4 |

[a] Analysis shall be made for the elements for which specific values are shown in this table. If, however, the presence of other elements is indicated in the course of routine analysis, further analysis shall be made to determine that the total of these other elements does not exceed given maximum level.

[b] Single values shown are maximum, unless otherwise noted.

[c] For gas welding: min. P = 0,02%, for shield gas welding max. P = 0,05%

[d] Sum Al+Fe+Mn+Pb max. 0,5%

NOTE Consumables not listed in the table can be symbolised by Cu Z. Chemical symbol established by the manufacturer may be added in brackets.

NOTE 2 Corresponding national classifications are shown in Annex A.

## 5 Mechanical properties of the weld metal

Mechanical properties of the weld metal are not part of the classification.

## 6 Chemical analysis

Chemical analysis shall be performed on specimens of the product or the stock from which it is made. Any analytical technique can be used, but in case of dispute reference shall be made to established published methods, agreed between the contracting parties.

## 7 Rounding off procedure

For purposes of determining compliance with the requirements of this document, the actual test values obtained shall be subjected to the rounding-off rules of Annex B, Rule A of ISO 31-0:1992. If the measured values are obtained by equipment calibrated in units other than those of this document, the measured values shall be converted to the units of this document before rounding off. If an average value is to be compared to the requirements of this document, rounding off shall be done only after calculating the average. In the case where the testing standard cited in the normative references of this document contains instructions for rounding off that conflict with the instructions of this document, the rounding off requirements of the testing standard shall apply. The rounded-off results shall fulfil the requirements of the appropriate table for the classification under test.



## 8 Retest

If any test fails to meet the requirement, that test shall be repeated twice. The results of both retests shall meet the requirement. Specimens for the retest may be taken from the original test sample or from a new test sample. For chemical analysis, retests need only be for those specific elements that failed to meet their test requirement. If the results of one or both retests fail to meet the requirement, the material under test shall be considered as not meeting the requirements of this specification for that classification.



In the event that, during preparation or after completion of any test, it is clearly determined that prescribed or proper procedures were not followed in preparing the sample or test specimen(s), or in conducting the tests, the test shall be considered invalid, without regard to whether the test was actually completed, or whether the test results met, or failed to meet, the requirement. That test shall be repeated, following proper prescribed procedures. In this case, the requirement for doubling the number of test specimens does not apply.

## 9 Technical delivery conditions

Technical delivery conditions shall meet the requirements in EN ISO 544 and EN ISO 14344.

## 10 Designation

The designation of solid wires and rods shall follow the principle given in the example below.

EXAMPLE A solid wire (S) for fusion welding has a chemical composition within the limits for the alloy symbol Cu 6560 (CuSi3Mn1) of Table 1, is designated:

**Solid wire EN 14640 – S Cu 6560**

or alternatively

**Solid wire EN 14640 – S Cu 6560 (CuSi3Mn1)**