



**SLOVENSKI STANDARD**  
**SIST EN 13148:2011**

**01-maj-2011**

**Nadomešča:**  
**SIST EN 13148:2004**

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**Baker in bakrove zlitine - Vroče pokositreni trakovi**

Copper and copper alloys - Hot-dip tinned strip

Kupfer und Kupferlegierungen - Feuerverzinnte Bänder

Cuivres et alliages de cuivre - Bandes étamées à chaud

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**Ta slovenski standard je istoveten z: ~~SIST EN 13148:2011~~ EN 13148:2010**

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EUROPEAN STANDARD

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## Copper and copper alloys - Hot-dip tinned strip

Cuivres et alliages de cuivre - Bandes étamées à chaud

Kupfer und Kupferlegierungen - Feuerverzinnnte Bänder

This European Standard was approved by CEN on 21 August 2010.

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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 Management Centre has the same status as the official versions.

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**EN 13148:2010 (E)****Foreword**

This document (EN 13148:2010) 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of an identical text or by endorsement, at the latest by March 2011, and conflicting national standards shall be withdrawn at the latest by March 2011.

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 13148:2001.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 2 “Rolled flat products” to revise the following standard:

EN 13148, *Copper and copper alloys — Hot-dip tinned strip*

This is one of a series of European Standards for copper and copper alloy rolled flat products. Other products are, or will be, specified as follows:

- EN 1172, *Copper and copper alloys — Sheet and strip for building purposes;*
- EN 1652, *Copper and copper alloys — Plate, sheet, strip and circles for general purposes;*
- EN 1653, *Copper and copper alloys — Plate, sheet and circles for boilers, pressure vessels and hot water storage units;*
- EN 1654, *Copper and copper alloys — Strip for springs and connectors;*
- EN 1758, *Copper and copper alloys — Strip for lead frames;*
- EN 13599, *Copper and copper alloys — Copper plate, sheet and strip for electrical purposes;*
- EN 14436, *Copper and copper alloys — Electrolytically tinned strip.*

In comparison with EN 13148:2001, the following significant technical changes were made:

a) Table 3:

- 1) composition of Sn, increasing of the upper limits: Cu from 0,030 % to 2,0 %, Pb from 0,03 % to 0,1 % and Zn from 0,0010 % to 0,7 %;
- 2) column “Material designation” and reference to “EN 610 and EN 29453” are deleted;

b) Table 4: column 0,2 % proof strength, at the 1<sup>st</sup> line (R220), the value “(min. 140)” where corrected in “(max. 140)”.

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.

## Introduction

Hot-dip tinned strip is manufactured by passing strip through a molten bath of tin, tin-lead alloy or other tin alloys. By this process a solid bond is created between the metallic coating and the strip by formation of a layer of an intermetallic phase and a diffusion zone.

The base metal is hot-dip tinned to protect it against corrosion, to facilitate soldering operations, to improve insertion and withdrawal forces of connectors, to reduce contact resistance at electrical junctions and to avoid whisker growth on components. The properties of coatings can be modified by mechanical and/or thermal treatments.

When the strip is emerging from the bath the thickness of the coating is adjusted by partially wiping off the molten film, either by stationary wiping devices or by a flat air jet. The thickness of the coating can be continuously measured and regulated on both sides of the strip during or after the tinning process. Usually strips are tinned in larger widths and slit to narrower width specified by the customer. In this case, the final slit product has untinned edges.

## 1 Scope

This European Standard specifies:

- the composition and tolerances on dimensions of strip produced by rolling in the thickness range from 0,10 mm up to and including 1,50 mm of copper and copper alloys to be tinned, with tin, a tin-lead alloy or other tin alloys;
- the composition of material normally used for the melt;
- the properties of strip before tinning;
- the properties of hot-dip tinned strip;
- the preferred thicknesses (mean values) and thickness ranges of coatings;
- the edgewise curvature of hot-dip tinned strip;
- the sampling procedure;
- the methods of test to be used for verification of conformity to the requirements of this European Standard;
- the delivery conditions.

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

EN 1976, *Copper and copper alloys — Cast unwrought copper products*

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

EN ISO 2624, *Copper and copper alloys — Estimation of average grain size (ISO 2624:1990)*

EN ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods (ISO 3497:2000)*

EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method (ISO 6507-1:2005)*

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

EN ISO 7438:2005, *Metallic materials — Bend test (ISO 7438:2005)*

ISO 1811-2, *Copper and copper alloys — Selection and preparation of samples for chemical analysis — Part 2: Sampling of wrought products and castings*

ISO 80000-1, *Quantities and units — Part 1: General*

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### 3 Terms and definitions

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

#### 3.1 strip

flat rolled product of rectangular cross-section with uniform thickness manufactured in coils and supplied in as sheared coils or traverse wound coils, usually with slit edges

NOTE The thickness does not exceed one tenth of the width.

#### 3.2 hot-dip tinned strip

strip which is tinned with coatings on each face of equal thickness by drawing in an appropriate manner through a bath of any molten tin or tin-lead alloy or other tin alloy

#### 3.3 differentially hot-dip tinned strip

hot-dip tinned strip with coatings on each face of different thicknesses

#### 3.4 partially hot-dip tinned strip

hot-dip tinned strip with coatings on each face of equal thickness, but covering only part of the strip in the longitudinal direction

#### 3.5 base material (of a tinned strip)

part of the strip which, after the tinning process, belongs neither to the metallic coating nor to an intermetallic phase and diffusion zone

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### 4 Designations

#### 4.1 Material of the strip to be tinned

##### 4.1.1 General

The material is designated either by symbol or number (see Tables 1 and 2).

##### 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 European 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.

#### 4.2 Material for the coating

The coating is designated by the coating type (see Table 3) or for non-standardized coatings, by the supplier's designation.

NOTE Due to solution and/or diffusion processes the composition of the coating can differ from that of the melt.

**EN 13148:2010 (E)****4.3 Material condition of the hot-dip tinned strip**

For the purposes of this European Standard, the following designations, which are in accordance with the system given in EN 1173, apply to the hot-dip tinned strip but are actually the material condition designations of the strip before tinning.

- R... Material condition designated by the minimum value of tensile strength requirement for the product with mandatory tensile strength and elongation requirements;
- H... Material condition designated by the minimum value of hardness requirement for the product with mandatory hardness requirements;
- G... Material condition designated by the mid-range value of grain size requirement for the product with mandatory grain size and hardness requirements.

Exact conversion between material conditions designated R..., H... and G... is not possible.

Material condition is designated by only one of the above designations.

**4.4 Product**

The product designation provides a standardized pattern of designation from which a rapid and unequivocal description of a product is communicated. It provides mutual comprehension at the international level with regard to products which meet the requirements of the relevant European Standard.

The product designation is no substitute for the full content of the standard.

The product designation for products to this European Standard shall consist of:

- denomination (hot-dip tinned strip or differentially hot-dip tinned strip or partially hot-dip tinned strip);
- number of this European Standard (EN 13148);
- material designation of the strip to be tinned, either symbol or number (see Tables 1 and 2);
- material condition designation of the hot-dip tinned strip (see Table 4);
- nominal dimensions of the strip before tinning (thickness × width);
- tolerance class for the thickness of the strip before tinning (see Table 6);
- coating type, Sn or Sn60Pb (see Table 3) or for non-standardized coatings the supplier's designation;
- for hot-dip tinned strip, the preferred thickness or thickness range of the coating (see Table 5);
- for differentially hot-dip tinned strip, the preferred thicknesses or the thickness ranges of the coatings on each face (see Table 5), which shall be identified by marking one face A and the other B;
- for partially hot-dip tinned strip, the number of a dimensioned drawing including the preferred thicknesses or the thickness ranges of the coating (see Table 5).

The derivation of a product designation is shown in the following examples:

**EXAMPLE 1** Hot-dip tinned strip conforming to this European Standard, in material of the strip to be tinned designated either CuSn6 or CW452K, in material condition H180, nominal thickness 0,50 mm, tolerance Class A, nominal width 200,00 mm, coating type Sn60Pb, thickness range 2 μm to 5 μm, is designated as follows:

Hot-dip tinned strip EN 13148 — CuSn6 — H180 — 0,50A × 200,00 — Sn60Pb — 2-5

or

Hot-dip tinned strip EN 13148 — CW452K — H180 — 0,50A × 200,00 — Sn60Pb — 2-5

Denomination

Number of this European Standard

Material designation of the strip to be tinned

Material condition designation

Nominal dimensions in millimetres and tolerance class for thickness

Material designation of the coating

Thickness range of the coating in micrometres

EXAMPLE 2 Differentially hot-dip tinned strip conforming to this European Standard, in material of the strip to be tinned designated either CuZn30 or CW505L, in material condition R350, nominal thickness 1,20 mm, tolerance Class B, nominal width 125,00 mm, coating type Sn, thickness (mean value) surface A 1,45 µm, thickness (mean value) surface B 3,5 µm, is designated as follows:

Differentially

hot dip

tinned strip EN 13148 — CuZn30 — R350 — 1,20B × 125,00 — Sn — A1,45 — B3,5

or

Differentially

hot-dip

tinned strip EN 13148 — CW505L — R350 — 1,20B × 125,00 — Sn — A1,45 — B3,5

Denomination

Number of this European Standard

Material designation of the strip to be tinned

Material condition designation

Nominal dimensions in millimetres and tolerance class for thickness

Material designation of the coating

Thickness of the coating surface A in micrometres

Thickness of the coating surface B in micrometres

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EXAMPLE 3 Partially hot-dip tinned strip, conforming to this European Standard, in material of the strip to be tinned designated either CuSn4 or CW450K, in material condition R610, nominal thickness 0,60 mm, tolerance Class A, nominal width 54,00 mm, coating type Sn60Pb, drawing number W38501, is designated as follows:

Partially  
hot dip  
tinned strip EN 13148 — CuSn4 — R610 — 0,60A × 54,00 — Sn60Pb — W38501

or

Partially  
hot dip  
tinned strip EN 13148 — CW450K — R610 — 0,60A × 54,00 — Sn60Pb — W38501

**5 Ordering information**

In order to facilitate the enquiry, order and confirmation of order procedures between the purchaser and the supplier, the purchaser shall state on his enquiry and order the following information:

- a) quantity of product required (mass);
- b) denomination (hot-dip tinned strip or differentially hot-dip tinned strip or partially hot-dip tinned strip);
- c) number of this European Standard (EN 13148);
- d) material designation of the strip to be tinned (see Tables 1 and 2);
- e) material condition designation of the hot-dip tinned strip (see 4.3 and Table 4);
- f) nominal thickness of the strip before tinning. If nominal thickness of the tinned strip is required, it shall be subject to agreement between the purchaser and the supplier;
- g) tolerance class for the thickness of the strip before tinning (see Table 6);
- h) nominal width of the hot-dip tinned strip;
- i) coating type, Sn or Sn60Pb (see Table 3) or for non-standardized coatings the supplier's designation;
- j) thickness of the coating:
  - 1) hot-dip tinned strip (see 3.2): mean value of coating thickness or thickness range (see Table 5);
  - 2) differentially hot-dip tinned strip (see 3.3): mean value of coating thickness or thickness range (see Table 5) of each face, identified A and B, and the positions of those faces relative to the coil or spool;
  - 3) partially hot-dip tinned strip (see 3.4): the number of a fully dimensioned and toleranced drawing which shall accompany the order.

NOTE 1 It is recommended that the product designation, as described in 4.4, is used for items b) to j).

In addition, the purchaser shall also state on the enquiry and order any of the following, if required:

- k) whether tinned edges are required (see 6.3.2) and if so, tolerances on width shall be agreed between the purchaser and the supplier;
- l) whether the strip shall meet edgewise curvature requirements (see 6.4 and Table 8);

- m) whether special requirements for appearance of the surface shall be met (bright, dull) (see 6.5.2);
- n) whether requirements for solderability shall be met (see 6.5.3) and if so, the acceptance criteria shall be agreed between the purchaser and the supplier;
- o) whether special requirements for adhesion of the coating shall be met (see 6.5.4) and if so, the acceptance criteria shall be agreed between the purchaser and the supplier;
- p) coil size requirements: nominal inside diameter in millimetres and maximum outside diameter in millimetres and either maximum mass in kilograms or approximate specific coil mass (mass per width) in kilogram per millimetre;
- q) spool size: type or dimensions;
- r) whether a declaration of conformity is required (see 9.1);
- s) whether an inspection document is required, and if so, which type (see 9.2);
- t) whether there are any special requirements for marking, packaging or labelling (see Clause 10).

NOTE 2 To facilitate recycling it is recommended to use coating type Sn for the coating.

EXAMPLE Ordering details for 1 200 kg hot-dip tinned strip conforming to EN 13148, in material of the strip to be tinned designated either CuZn37 or CW508L, in material condition R480, nominal thickness 0,40 mm, tolerance Class C, nominal width 160,00 mm, coating type Sn, mean value of thickness of the coating 1,45  $\mu\text{m}$ , untinned edges, nominal inside diameter of coil 400 mm, maximum outside diameter of coil 950 mm, approximate specific coil mass (mass per width) 4,5 kg/mm:

**1 200 kg Hot-dip tinned strip EN 13148 — CuZn37 — R480 — 0,40C × 160,00 — Sn — 1,45**  
**— nominal inside diameter of coil 400 mm**  
**— maximum outside diameter of coil 950 mm**  
**— approximate specific coil mass 4,5 kg/mm**

or

**1 200 kg Hot-dip tinned strip EN 13148 — CW508L — R480 — 0,40C × 160,00 — Sn — 1,45**  
**— nominal inside diameter of coil 400 mm**  
**— maximum outside diameter of coil 950 mm**  
**— approximate specific coil mass 4,5 kg/mm**

## 6 Requirements

### 6.1 Composition

#### 6.1.1 Strip to be tinned

The composition of the strip shall conform to the requirements for the appropriate material given in Tables 1 and 2.

Percentage content of the elements shown as "remainder" (Rem.) is usually calculated by difference from 100 %.

#### 6.1.2 Material for the coating

Unless otherwise specified, the composition of the material for the coating shall conform to the requirements for the appropriate material given in Table 3. Other material for the coating shall conform to the requirements agreed between the purchaser and the supplier [see 5 i)].