



SLOVENSKI STANDARD
SIST EN 12420:1999

01-november-1999

Baker in bakrove zlitine - Izkovki

Copper and copper alloys - Forgings

Kupfer und Kupferlegierungen Schmiedestücke

Cuivre et alliages de cuivre - Pièces forgées

Ta slovenski standard je istoveten z: EN 12420:1999

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ICS:

77.150.30 Bakreni izdelki Copper products

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EUROPEAN STANDARD

EN 12420

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 1999

ICS 77.150.30

Descriptors: copper, copper alloys, forgings, die forgings, definitions, orders : sales documents, specifications, chemical composition, mechanical properties, tensile strength, electrical properties, dimensional tolerances, form tolerances, sampling, tests, conformity tests, marking

English version

Copper and copper alloys - Forgings

Cuivre et alliages de cuivre - Pièces forgées

Kupfer und Kupferlegierungen - Schmiedestücke

This European Standard was approved by CEN on 13 December 1998.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard 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 1999, and conflicting national standards shall be withdrawn at the latest by July 1999.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 6 "Forgings" to prepare the following standard:

EN 12420 Copper and copper alloys - Forgings

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

Forging stock is specified in the following standard:

EN 12165 Copper and copper alloys - Wrought and unwrought forging stock

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

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1 Scope

This European Standard specifies the composition, the property requirements and tolerances on dimensions and form for copper and copper alloy die and hand forgings.

The sampling procedures, the methods of test for verification of conformity to the requirements of this standard, and the delivery conditions are also specified.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- EN 1655
Copper and copper alloys – Declarations of conformity
- EN 1976
Copper and copper alloys – Cast unwrought copper products
- EN 10002-1
Metallic materials – Tensile testing – Part 1: Method of test (at ambient temperature)
- EN 10003-1
Metallic materials – Brinell hardness test – Part 1: Test method
- EN 10204
Metallic products – Types of inspection documents
- EN ISO 196
Wrought copper and copper alloys – Detection of residual stress – Mercury(I) nitrate test (ISO 196 : 1978)
- EN ISO 6509 : 1995
Corrosion of metals and alloys – Determination of dezincification resistance of brass (ISO 6509 : 1981)
- ISO 1101
Technical drawings – Geometrical tolerancing – Tolerancing of form, orientation, location and run-out – Generalities, definitions, symbols, indications on drawings
- ISO 1811-2
Copper and copper alloys – Selection and preparation of samples for chemical analysis – Part 2: Sampling of wrought products and castings
- ISO 6507-1
Metallic materials – Hardness test – Vickers test – Part 1: HV 5 to HV 100
- ISO 6957
Copper alloys – Ammonia test for stress corrosion resistance

NOTE: Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex A.

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 forgings

Wrought products, hot formed by hammering or pressing.

3.1.1 die forgings

Forgings produced between closed dies.

3.1.2 hand forgings

Forgings produced between open dies.

3.1.3 cored forgings

Forgings produced between closed dies including cores.

3.2 inspection lot

Definite quantity of products of the same form, the same grade or alloy and material condition and the same thickness or cross-section, collected together for inspection (testing).

4 Designations

4.1 Material

4.1.1 General

The material is designated either by symbol or number (see tables 1 to 8).

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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4.2 Material condition

For the purposes of this standard, the following designations, which are in accordance with the system given in EN 1173, apply for the material condition: [SIST EN 12420:1999](https://standards.iteh.ai/catalog/standards/sist/4a9095dd-7d8a-4fea-9a32-c4fc2d95aed2/sist-en-12420-1999)

<https://standards.iteh.ai/catalog/standards/sist/4a9095dd-7d8a-4fea-9a32-c4fc2d95aed2/sist-en-12420-1999>

M Material condition for the product as manufactured without specified mechanical properties;

H... Material condition designated by the minimum value of hardness requirement for the product with mandatory hardness requirements;

NOTE 1: Products in the H... condition may be specified to Vickers or Brinell hardness. The condition designation H... is the same for both hardness test methods.

S (suffix) Material condition for a product which is stress relieved.

NOTE 2: Products in the M or H... condition may be specially processed (i.e. mechanically or thermally stress relieved) in order to lower the residual stress level to improve the resistance to stress corrosion and the dimensional stability on machining [see 5 g), 5 h) and 8.4].

Except when the suffix S is used, material condition is designated by only one of the above designations.

4.3 Product

The product designation provides a standardized pattern of designation from which a rapid and unequivocal description of a product is conveyed in communication. 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.

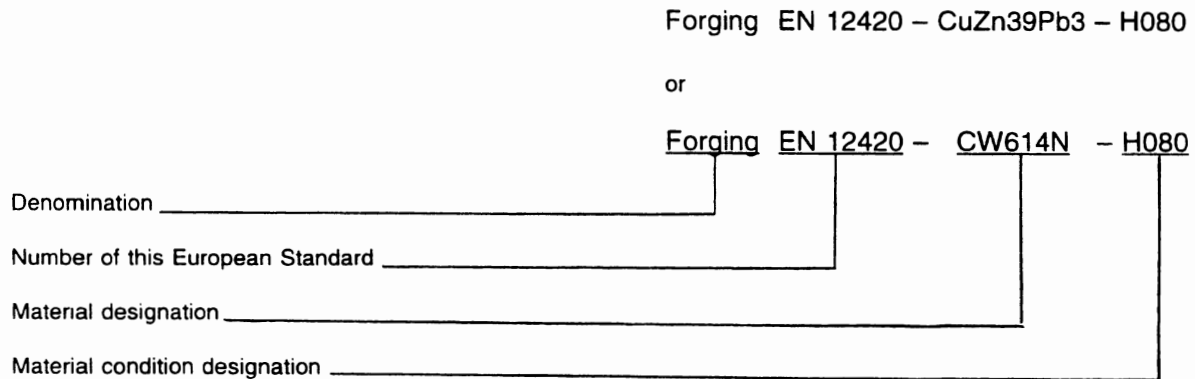
The product designation for products to this standard shall consist of:

- denomination (Forging);
- number of this European Standard (EN 12420);
- material designation, either symbol or number (see tables 1 to 8);
- material condition designation (see tables 10 to 12).

The derivation of a product designation is shown in the following example.

EXAMPLE:

Forging conforming to this standard, in material designated either CuZn39Pb3 or CW614N, in material condition H080, shall be designated as follows:



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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 or number of pieces);
- b) denomination (Forging);
- c) number of this European Standard (EN 12420);
- d) material designation (see tables 1 to 8);
- e) material condition designation (see 4.2 and tables 10 to 12) if it is other than M;
- f) nominal dimensions and/or toleranced drawing of the forging or finished part including the number of the drawing (see 6.6).

NOTE 1: It is recommended that the product designation, as described in 4.3, is used for items b) to e).

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

g) whether the products are required to pass a stress corrosion resistance test. If so, which test method is to be used (see 8.6) if the choice is not to be left to the discretion of the supplier. If the purchaser chooses ISO 6957, the pH value for the test solution is to be selected;

h) whether the products are to be supplied in a thermally stress relieved condition;

i) for products in alloy CuZn36Pb2As (CW602N), whether the dezincification resistance acceptance criterion required is other than grade A (see 6.4);

j) test method to be used for measurement of hardness, i.e. Brinell or Vickers (see 8.2) unless the test method is left to the discretion of the supplier;

k) whether in special cases tensile testing is required (see 6.2.2).

NOTE 2 The property requirements and details of testing should be agreed between the purchaser and the supplier.

l) whether a declaration of conformity is required (see 9.1);

m) whether an inspection document is required, and if so, which type (see 9.2);

n) whether there are any special requirements for marking, labelling or packaging (see clause 10).

EXAMPLE:

Ordering details for 200 forgings conforming to EN 12420, in material designated either CuZn39Pb3 or CW614N, in material condition H080, according to drawing number XY000:

**200 pieces Forging EN 12420 – CuZn39Pb3 – H080
– drawing number XY000**

or

**200 pieces Forging EN 12420 – CW614N – H080
– drawing number XY000**

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Table 1: Composition of copper

Material designation		Composition in % (m/m)										Density ²⁾ g/cm ³ approx.
		Element	Cu ¹⁾	Bi	O	P	Pb	Other elements (see note)				
Symbol	Number							total	excluding			
Cu-ETP	CW004A	min. max.	99,90 -	0,000 5 -	0,040 ³⁾ -	- -	0,005 -	- 0,03	- Ag, O	- -	8,9	
	Cu-OF	min. max.	99,95 -	0,000 5 -	- - ⁴⁾	- -	0,005 -	- 0,03	- Ag	- -	8,9	
Cu-HCP	CW021A	min. max.	99,95 -	0,000 5 -	- -	0,002 0,007	0,005 -	- 0,03	- Ag, P	- -	8,9	
	Cu-DHP	min. max.	99,90 -	- -	- -	0,015 0,040	- -	- -	- -	- -	8,9	

1) Including silver, up to a maximum of 0,015 %
2) For information only
3) Oxygen content up to 0,060 % is permitted, subject to agreement between the purchaser and the supplier.
4) The oxygen content shall be such that the material conforms to the hydrogen embrittlement requirements of EN 1976.

NOTE: The total of other elements (than copper) is defined as the sum of Ag, As, Bi, Cd, Co, Cr, Fe, Mn, Ni, O, P, Pb, S, Sb, Se, Si, Sn, Te and Zn, subject to the exclusion of any individual elements indicated.

Table 2: Composition of low alloyed copper alloys

Material designation		Composition in % (m/m)													Density ¹⁾ g/cm ³ approx.			
		Element	Cu	Be	Co	Cr	Fe	Mn	Ni	Pb	Si	Zr	Others total					
CuBe2	Number																	
	CW101C	min.	Rem.	1,8	-	-	-	-	-	-	-	-	-	-	-	-	-	8,3
		max.	-	2,1	0,3	-	0,2	-	0,3	-	-	-	-	-	-	-	-	8,8
CuCo1Ni1Be	Number																	
	CW103C	min.	Rem.	0,4	0,8	-	-	-	0,8	-	-	-	-	-	-	-	-	8,8
		max.	-	0,7	1,3	-	0,2	-	1,3	-	-	-	-	-	-	-	-	8,8
CuCo2Be	Number																	
	CW104C	min.	Rem.	0,4	2,0	-	-	-	-	-	-	-	-	-	-	-	-	8,8
		max.	-	0,7	2,8	-	0,2	-	0,3	-	-	-	-	-	-	-	-	8,8
CuCr1	Number																	
	CW105C	min.	Rem.	-	-	0,5	-	-	-	-	-	-	-	-	-	-	-	8,9
		max.	-	-	-	1,2	0,08	-	-	-	0,1	-	0,2	-	-	-	-	8,9
CuCr1Zr	Number																	
	CW106C	min.	Rem.	-	-	0,5	-	-	-	-	-	0,03	-	-	-	-	-	8,9
		max.	-	-	-	1,2	0,08	-	-	-	0,3	0,1	0,2	-	-	-	-	8,9
CuNi1Si	Number																	
	CW109C	min.	Rem.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,8
		max.	-	-	-	-	0,2	0,1	1,0	0,1	0,4	-	-	-	-	-	-	8,8
CuNi2Be	Number																	
	CW110C	min.	Rem.	0,2	-	-	-	-	-	-	-	-	-	-	-	-	-	8,8
		max.	-	0,6	0,3	-	0,2	-	1,4	-	0,7	-	-	-	-	-	-	8,8
CuNi2Si	Number																	
	CW111C	min.	Rem.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,8
		max.	-	-	-	-	0,2	0,1	1,6	0,1	0,4	-	-	-	-	-	-	8,8
CuNi3Si1	Number																	
	CW112C	min.	Rem.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,8
		max.	-	-	-	-	0,2	0,1	2,5	0,1	0,8	-	-	-	-	-	-	8,8
CuZr	Number																	
	CW120C	min.	Rem.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,9
		max.	-	-	-	-	-	-	-	-	-	0,1	0,1	0,5	0,2	0,1	-	8,9

¹⁾ For information only

Table 3: Composition of copper-aluminium alloys

Material designation		Composition in % (m/m)													Density ¹⁾ g/cm ³ approx.
Symbol	Number	Element	Cu	Al	Fe	Mn	Ni	Pb	Si	Sn	Zn	Others total			
CuAl6Si2Fe	min.	Rem.	6,0	0,5	—	—	—	—	2,0	—	—	—	7,7		
	max.	—	6,4	0,7	0,1	0,1	0,05	—	2,4	0,1	0,4	0,2			
CuAl7Si2	min.	Rem.	6,3	—	—	—	—	—	1,5	—	—	—	7,7		
	max.	—	7,6	0,3	0,2	0,2	0,05	—	2,2	0,2	0,5	0,2			
CuAl8Fe3	min.	Rem.	6,5	1,5	—	—	—	—	—	—	—	—	7,7		
	max.	—	8,5	3,5	1,0	1,0	0,05	—	0,2	0,1	0,5	0,2			
CuAl9Ni3Fe2	min.	Rem.	8,0	1,0	—	—	2,0	—	—	—	—	—	7,4		
	max.	—	9,5	3,0	2,5	4,0	0,05	—	0,1	0,1	0,2	0,3			
CuAl10Fe1	min.	Rem.	9,0	0,5	—	—	—	—	—	—	—	—	7,6		
	max.	—	10,0	1,5	0,5	1,0	0,02	—	0,2	0,1	0,5	0,2			
CuAl10Fe3Mn2	min.	Rem.	9,0	2,0	—	—	—	—	—	—	—	—	7,6		
	max.	—	11,0	4,0	3,5	1,0	0,05	—	0,2	0,1	0,5	0,2			
CuAl10Ni5Fe4	min.	Rem.	8,5	3,0	—	—	4,0	—	—	—	—	—	7,6		
	max.	—	11,0	5,0	1,0	6,0	0,05	—	0,2	0,1	0,4	0,2			
CuAl11Fe6Ni6	min.	Rem.	10,5	5,0	—	—	5,0	—	—	—	—	—	7,4		
	max.	—	12,5	7,0	1,5	7,0	0,05	—	0,2	0,1	0,5	0,2			

¹⁾ For information only

Table 4: Composition of copper-nickel alloys

Material designation		Composition in % (m/m)													Density ¹⁾ g/cm ³ approx.		
		Element	Cu	C	Co	Fe	Mn	Ni	P	Pb	S	Sn	Zn	Others total			
CuNi10Fe1Mn	Number																
	CW352H	min. max.	Rem. -	0,05 -	0,1 ²⁾ -	1,0 2,0	0,5 1,0	9,0 11,0	- 0,02	0,02 -	0,05 -	0,03 -	0,5 -	- 0,2	8,9		
CuNi30Mn1Fe	Number																
	CW354H	min. max.	Rem. -	0,05 -	0,1 ²⁾ -	0,4 1,0	0,5 1,5	30,0 32,0	- 0,02	0,02 -	0,05 -	0,05 -	0,5 0,2	- 0,2	8,9		

¹⁾ For information only
²⁾ Co max. 0,1 % is counted as Ni.

Table 5: Composition of copper-nickel-zinc alloys

Material designation		Composition in % (m/m)													Density ¹⁾ g/cm ³ approx.		
		Element	Cu	Fe	Mn	Ni	Pb	Sn	Zn	Others total							
CuNi7Zn39Pb3Mn2	Number																
	CW400J	min. max.	47,0 50,0	- 0,3	1,5 3,0	6,0 8,0	2,3 3,3	- 0,2	Rem. -	Rem. -	0,2 -	0,2 -	0,2 -	- 0,2	8,5		
CuNi10Zn42Pb2	Number																
	CW402J	min. max.	45,0 48,0	- 0,3	- 0,5	9,0 11,0	1,0 2,5	- 0,2	Rem. -	Rem. -	0,2 -	0,2 -	0,2 -	- 0,2	8,4		

¹⁾ For information only

Table 6: Composition of copper-zinc alloys

Material designation		Composition in % (m/m)										Density ¹⁾ g/cm ³ approx.
		Element	Cu	Al	Fe	Ni	Pb	Sn	Zn	Others total		
CuZn37	min.	62,0	—	—	—	—	—	—	Rem.	—	—	8,4
	max.	64,0	0,05	0,1	0,3	0,1	0,1	—	—	0,1	—	8,4
CuZn40	min.	59,5	—	—	—	—	—	—	Rem.	—	—	8,4
	max.	61,5	0,05	0,2	0,3	0,3	0,3	0,2	—	0,2	—	8,4

¹⁾ For information only

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Table 7: Composition of copper-zinc-lead alloys

Material designation		Composition in % (m/m)													Density ¹⁾ g/cm ³ approx.
Symbol	Number	Element	Cu	Al	As	Fe	Mn	Ni	Pb	Sn	Zn	Others total			
CuZn36Pb2As	CW602N	min.	61,0	—	0,02	—	—	—	1,7	—	Rem.	—	8,4		
		max.	63,0	0,05	0,15	0,1	0,3	—	2,8	0,1	—	0,2			
CuZn38Pb2	CW608N	min.	60,0	—	—	—	—	—	1,6	—	Rem.	—	8,4		
		max.	61,0	0,05	—	0,2	0,3	—	2,5	0,2	—	0,2			
CuZn39Pb0,5	CW610N	min.	59,0	—	—	—	—	—	0,2	—	Rem.	—	8,4		
		max.	60,5	0,05	—	0,2	0,3	—	0,8	0,2	—	0,2			
CuZn39Pb1	CW611N	min.	59,0	—	—	—	—	—	0,8	—	Rem.	—	8,4		
		max.	60,0	0,05	—	0,2	0,3	—	1,6	0,2	—	0,2			
CuZn39Pb2	CW612N	min.	59,0	—	—	—	—	—	1,6	—	Rem.	—	8,4		
		max.	60,0	0,05	—	0,3	0,3	—	2,5	0,3	—	0,2			
CuZn39Pb2Sn	CW613N	min.	59,0	—	—	—	—	—	1,6	0,2	Rem.	—	8,4		
		max.	60,0	0,1	—	0,4	0,3	—	2,5	0,5	—	0,2			
CuZn39Pb3	CW614N	min.	57,0	—	—	—	—	—	2,5	—	Rem.	—	8,4		
		max.	59,0	0,05	—	0,3	0,3	—	3,5	0,3	—	0,2			
CuZn39Pb3Sn	CW615N	min.	57,0	—	—	—	—	—	2,5	0,2	Rem.	—	8,4		
		max.	59,0	0,1	—	0,4	0,3	—	3,5	0,5	—	0,2			
CuZn40Pb1Al	CW616N	min.	57,0	0,05	—	—	—	—	1,0	—	Rem.	—	8,3		
		max.	59,0	0,30	—	0,2	0,2	—	2,0	0,2	—	0,2			
CuZn40Pb2	CW617N	min.	57,0	—	—	—	—	—	1,6	—	Rem.	—	8,4		
		max.	59,0	0,05	—	0,3	0,3	—	2,5	0,3	—	0,2			
CuZn40Pb2Sn	CW619N	min.	57,0	—	—	—	—	—	1,6	0,2	Rem.	—	8,4		
		max.	59,0	0,1	—	0,4	0,3	—	2,5	0,5	—	0,2			

¹⁾ For information only