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# International Standard



# 428

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Wrought copper-aluminium alloys — Chemical composition and forms of wrought products

*Alliages cuivre-aluminium corroyés — Composition chimique et formes des produits corroyés*

Second edition — 1983-10-15

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UDC 669.35.71-13

Ref. No. ISO 428-1983 (E)

**Descriptors** : copper alloys, aluminium-containing alloys, aluminium bronzes, chemical composition, wrought products.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 428 was developed by Technical Committee ISO/TC 26, *Copper and copper alloys*, and was circulated to the member bodies in November 1981.

It has been approved by the member bodies of the following countries:

Austria	France	Romania
Belgium	Germany, F.R.	South Africa, Rep. of
Brazil	Hungary	Spain
Bulgaria	Italy	Sweden
Canada	Japan	Switzerland
China	Korea, Dem. P. Rep. of	Turkey
Czechoslovakia	Netherlands	United Kingdom
Egypt, Arab Rep. of	Norway	USA
Finland	Poland	USSR

No member body expressed disapproval of the document.

This second edition cancels and replaces the first edition (i.e. ISO 428-1973).

# Wrought copper-aluminium alloys — Chemical composition and forms of wrought products

## 1 Scope and field of application

This International Standard specifies the chemical composition of wrought copper-aluminium alloys and lists the forms of wrought products in which they are currently available in commercial quantities.

## 2 References

ISO 197, *Copper and copper alloys — Terms and definitions*  
*Part 1: Materials.*

*Part 3: Wrought products.*

ISO 1190/1, *Copper and copper alloys — Code of designation — Part 1: Designation of materials.*

ISO 1634, *Wrought copper and copper alloys — Mechanical properties*

*Part 1: Plate, sheet and strip for general purposes.*<sup>1)</sup>

*Part 2: Plate and sheet for boilers, pressure vessels and condensers.*<sup>1)</sup>

ISO 1635, *Wrought copper and copper alloys — Round tubes for general purposes — Mechanical properties.*<sup>1)</sup>

ISO 1637, *Wrought copper and copper alloys — Rod and bar — Mechanical properties.*<sup>2)</sup>

ISO 1640, *Wrought copper alloys — Forgings — Mechanical properties.*<sup>2)</sup>

1) At present at the stage of draft.

2) Under revision.

ISO 4382/2, *Plain bearings — Copper alloys — Part 2: Wrought copper alloys for solid plain bearings.*

## 3 Definitions

For the purpose of this International Standard, the definitions given in ISO 197/1 and ISO 197/3 apply.

## 4 Chemical composition

The chemical composition of the copper alloys is given in tables 1 and 2. The composition limits do not preclude the possible presence of other elements not specified. If the purchaser's requirements necessitate limits for any other element not specified, these shall be agreed upon between the supplier and the purchaser. Percentage content of elements shown as "remainder" is usually calculated by difference from 100 %.

The designations used are in accordance with the principles laid down in ISO 1190/1.

## 5 Forms of wrought products and mechanical properties

The forms of wrought products in which these copper alloys are available are given in table 3. The mechanical properties for all forms of wrought products for which the symbol X is given, are defined in the following International Standards :

ISO 1634/1, ISO 1634/2, ISO 1635, ISO 1637, ISO 1639, ISO 1640.

Table 1 – Copper-aluminium alloys

Designation	Element	Chemical composition by mass, %								Average density kg/dm <sup>3</sup>	
		Cu	Al	As	Fe	Mn	Ni	Pb	Zn <sup>1)</sup>		
CuAl5	min.	Rem.	4,0	—	—	—	—	—	—	0,5	8,2
	max.		6,5	0,4	0,5	0,5	0,8	0,1			
CuAl7	min.	Rem.	6,5	—	—	—	—	—	—	0,5	7,9
	max.		7,5	—	0,5	0,5	0,8	0,1			
CuAl8	min.	Rem.	7,5	—	—	—	—	—	—	0,5	7,8
	max.		9,0	—	0,5	0,5	0,8	0,1			

1) When the product is for subsequent welding applications and so specified by the purchaser, the Zn content is max. 0,2 %.

Table 2 – Special copper-aluminium alloys

NOTE — For certain applications, tighter limits than shown in the table may be agreed upon between supplier and purchaser.

Designation	Element	Chemical composition by mass, %										Average density kg/dm <sup>3</sup>	
		Cu	Al	Fe	Mg	Mn	Ni	Pb	Si	Sn	Zn <sup>1)</sup>		
CuAl7Fe3Sn	min.	Rem.	6,0	1,5	—	—	—	—	—	—	0,15	—	7,7
	max.		8,0	3,5	—	1,0	1,0	0,05	—	—	0,50	0,5	
CuAl7Si2	min.	Rem.	6,0	—	—	—	—	—	1,5	—	—	—	7,7
	max.		7,6	0,80	—	0,10	0,25	0,05	2,4	0,20	0,50		
CuAl8Fe3	min.	Rem.	6,5	1,5	—	—	—	—	—	—	—	—	7,7
	max.		8,5	3,5	—	1,0	1,0	0,05	—	—	0,5		
CuAl9Fe4Ni4 <sup>3)</sup>	min.	Rem.	8,0	2,5	—	—	2,5	—	—	—	—	—	7,6
	max.		11,0	4,5	—	3,0	5,0	0,1	0,1	0,2	0,5		
CuAl9Mn2	min.	Rem.	8,0	—	—	—	1,5	—	—	—	—	—	7,5
	max.		10,0	1,5	—	3,0	0,8	0,05	—	—	0,5		
CuAl9Ni3Fe2	min.	Rem.	8,0	1,0	—	—	1,5	—	—	—	—	—	7,5
	max.		9,5	3,0	0,05	2,5	4,0	0,05	0,10	0,20	0,20		
CuAl10Fe3	min.	Rem.	8,5	2,0	—	—	—	—	—	—	—	—	7,6
	max.		11,0	4,0	—	3,5	1,0	0,05	—	—	0,5		
CuAl10Ni5Fe4	min.	Rem.	8,5	2,0	—	—	4,0	—	—	—	—	—	7,6
	max.		11,0 <sup>2)</sup>	5,0	—	1,5	6,0	0,05	—	—	0,5		

1) When the product is for subsequent welding applications and so specified by the purchaser, the Zn content is max. 0,2 %.

2) Al content to be less than 8,5 plus half the Ni content.

3) Mainly for wear resistance applications, e.g. plain bearings according to ISO 4382/2.

Table 3 – Forms of wrought products

KEY :

X – main manufactured forms.

(X) – forms manufactured in smaller quantities, for example in certain countries only or for special purposes.

NOTE – Where no symbol is given, the form is not considered of importance for that type of copper alloy, but it does not necessarily indicate that such a product cannot be manufactured.

Designation	Plate, sheet		Strip		Tubes		Rod, bar	Wire	Extruded profiles <sup>1)</sup>	Forgings
	General purpose	Boilers	General purpose	Springs	General purpose	Condenser				
<b>Copper-aluminium alloys</b>										
CuAl5		X	X		X	(X)	(X)	(X)		
CuAl7	X	X			(X)		X	(X)		(X)
CuAl8	X	X			(X)			(X)		(X)
<b>Special copper-aluminium alloys</b>										
CuAl7Fe3Sn		X			(X)		(X)	(X)		
CuAl7Si2	X						X			
CuAl8Fe3		X					X			
CuAl9Fe4Ni4			(X) <sup>2)</sup>				(X) <sup>2)</sup>			
CuAl9Mn2							X			X
CuAl9Ni3Fe2		X					(X)			
CuAl10Fe3							X		(X)	X
CuAl10Ni5Fe4		X			(X)		X		(X)	X

1) Made by extruding or a combination of extruding and drawing.

2) Mainly for wear resistance applications, e.g. plain bearings according to ISO 4382/2.

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