International Standard 427

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

Alliages cuivre-étain corroyés — Composition chimique et formes des produits corroyés

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Foreword

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

The member body of the following country expressed disapproval of the document on technical grounds:

France

This second edition cancels and replaces the first edition (i.e. ISO 427-1973).

Printed in Switzerland

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

1 Scope and field of application

This International Standard specifies the chemical composition of wrought copper-tin 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 1634/1, *Wrought copper and copper alloys — Mechanical properties — Part 1: Plate, sheet and strip for general purposes.* [1]

ISO 1635, *Wrought copper and copper alloys — Round tubes for general purposes — Mechanical properties.* [1]

ISO 1637, *Wrought copper and copper alloys — Rod and bar — Mechanical properties.* [2]

ISO 1638, *Wrought copper and copper alloys — Wire — Mechanical properties.* [2]

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

ISO 6957, *Wrought copper alloys — Strip for springs.* [1]

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 1635, ISO 1637, ISO 1638, ISO 6957.

1) At present at the stage of draft.

2) Under revision.

Table 1 — Copper-tin alloys

Designation	Element	Chemical composition by mass, %							Average density kg/dm³
		Cu	Fe	Ni	P	Pb	Sn	Zn	
CuSn2	min. max.	Rem.	— 0,1	— 0,3	0,01 0,3	— 0,05	1,0 2,5	— 0,3	8,9
CuSn4	min. max.	Rem.	— 0,1	— 0,3	0,01 0,4	— 0,05	3,5 4,5	— 0,3	8,9
CuSn5	min. max.	Rem.	— 0,1	— 0,3	0,01 0,4	— 0,05	4,5 5,5	— 0,3	8,9
CuSn6	min. max.	Rem.	— 0,1	— 0,3	0,01 0,4	— 0,05	5,5 7,5	— 0,3	8,8
CuSn8	min. max.	Rem.	— 0,1	— 0,3	0,01 0,4	— 0,05	7,5 9,0	— 0,3	8,8
CuSn8P[1]	min. max.	Rem.	— 0,1	— 0,3	0,1 0,4	— 0,05	7,5 9,0	— 0,3	8,8

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

Table 2 — Special copper-tin alloys

Designation	Element	Chemical composition by mass, %							Average density kg/dm³
		Cu	Fe	Ni	P	Pb	Sn	Zn	
CuSn4Zn2	min. max.	Rem.	— 0,1	— 0,3	—	— 0,05	3,0 5,0	1,0 3,0	8,9
CuSn4Pb4Zn3	min. max.	Rem.	— 0,10	—	0,01 0,50	3,5 4,5	3,5 4,5	1,5 4,5	8,9

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[1]	Forgings
	General purpose	Boilers	General purpose	Springs	General purpose	Condenser				
Copper-tin alloys										
CuSn2			(X)		(X)		(X)	(X)		
CuSn4	(X)		X	X	(X)		(X)	(X)		
CuSn5	(X)		X	X	(X)		X	X		
CuSn6	X		X	X	(X)		X	X		
CuSn8	X		X	X	X		X	X		
CuSn8P			(X)[2]		(X)[2]		(X)[2]			
Special copper-tin alloys										
CuSn4Zn2	X[3]		X[3]							
CuSn4Pb4Zn3	X[3]		X[3]		X[3]		(X)			

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

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

3) Mechanical properties to be defined later, i.e. in course of revision of ISO 1634/1 and ISO 1635.