International Standard 1187

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Special wrought copper alloys — Chemical composition and forms of wrought products

Alliages de cuivre spéciaux corroyés — Composition chimique et formes des produits corroyés

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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 1187 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	Poland
Belgium	Germany, F.R.	Romania
Brazil	Hungary	South Africa, Rep. of
Bulgaria	India	Spain
Canada	Italy	Sweden
China	Japan	Switzerland
Czechoslovakia	Korea, Dem. P. Rep. of	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
Finland	Norway	USA

No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation R 1187-1971, of which it constitutes a technical revision.

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Special wrought copper alloys — Chemical composition and forms of wrought products

1 Scope and field of application

This International Standard specifies the chemical composition of special wrought copper alloys and lists their electrical properties and 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. [1]

Part 2 : Plate and sheet for boilers, pressure vessels and condensers. [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 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 table 1. 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 Electrical properties

The electrical properties of these alloys, in the annealed temper at 20 °C, are given in table 2.

6 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 1638, ISO 6957.

1) At present at the stage of draft.

2) Under revision.

Table 1 — Chemical composition

Designation	Element	Chemical composition by mass, %									Average density kg/dm³
		Cu	Be	Co	Fe	Mn	Ni	Pb	Si	Zn	
CuBe1,7	min. max.	Rem.	1,6 1,80[1]	—[2] —	—[2] —	— —	—[2] —	— —	— —	— —	8,4
CuBe2	min. max.	Rem.	1,80 2,1	—[2] —	—[2] —	— —	—[2] —	— —	— —	— —	8,3
CuBe2Pb	min. max.	Rem.	1,8 2,0	—[3] —	—[3] —	— —	—[3] —	0,2 0,6	— —	— —	8,3
CuCo2Be	min. max.	Rem.	0,4 0,7	2,0 2,8	—[4] —	— —	—[4] —	— —	— —	— —	8,8
CuNi2Be	min. max.	Rem.	0,20 0,6	— —	— —	— —	1,4 2,0	— —	— —	— —	8,8
CuNi1Si	min. max.	Rem.	— —	— —	— —	— —	1,0 1,6	— —	0,4 0,7	— —	8,8
CuNi2Si	min. max.	Rem.	— —	— —	— —	— —	1,6 2,5	— —	0,5 0,8	— —	8,8
CuPb1	min. max.	Rem.	— —	— —	— —	— —	— —	0,8 1,5	— —	— —	8,9
CuSi1	min. max.	Rem.	— —	— —	— 0,8	— 0,7	— —	— 0,05	0,8 2,0	— 1,5	8,8
CuSi3Mn1	min. max.	Rem.	— —	— —	— 0,3	0,7 1,5	— 0,3	— 0,03[5]	2,7 3,5	— 0,5[5]	8,6

1) Up to but not including 1,80 % (actual analysis).

2) Co + Ni : 0,20 — 0,60 %
Co + Ni + Fe : 0,20 — 0,60 %.

3) Co + Ni max. 0,40 %
Co + Ni + Fe max. 0,6 %.

4) Ni + Fe max. 0,5 %.

5) When the product is either for subsequent welding applications and so specified by the purchaser or to be used as welding filler, zinc shall be max. 0,2 % and lead max. 0,02 %.

Table 2 — Electrical properties at 20 °C

NOTE — For specification purposes, maximum mass resistivity shall be quoted. Except for alloy CuCo2Be, for which the specified value is stated to five significant figures, all values are approximate, rounded to three significant figures, and for information only.

The equivalent values are for guidance only and are rounded, except for the maximum volume resistivity of alloy CuCo2Be, which is given to six significant figures.

Designation	Maximum mass resistivity $\frac{\Omega \cdot g}{m^2}$	Equivalent values (for guidance only)		
		Maximum volume resistivity $\frac{\Omega \cdot mm^2}{m}$	Minimum conductivity	
			$\frac{m}{\Omega \cdot mm^2}$	% IACS
CuBe1,7[1] CuBe2[1] CuBe2Pb[1] CuCo2Be[1]	0,70 0,69 0,69 0,337 16	0,083 0,083 0,083 0,038 314	12 12 12 26,10	21 21 21 45,0
CuNi2Be[1] CuNi1Si[1] CuNi2Si[1]	0,337 0,44 0,519	0,038 0,005 0,059	26 20 17	45 35 29
CuPb1[2] CuSi1[2] CuSi3Mn[2]	0,160 0,968 2,82	0,018 0,11 0,33	55 9 3	95 16 5

1) For the temper fully heat treated.

2) For the annealed temper.

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				
CuBe1,7	(X)		X	X	(X)		(X)	X		
CuBe2	(X)			X	(X)		(X)	(X)		(X)
CuBe2Pb							(X)			
CuCo2Be			X				X	X	(X)	
CuNi2Be			X				X	X	(X)	
CuNi1Si			X				(X)	X		
CuNi2Si			X				(X)	X		
CuPb1							X			
CuSi1		(X)			(X)		X	X		
CuSi3Mn1		X	(X)		(X)		X	(X)		(X)

1) Profiles made by extruding or by a combination of extruding and drawing.

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