International Standard 1336

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

Wrought coppers (having minimum copper contents of 97,5 %) — Chemical composition and forms of wrought products

Cuivres corroyés (de teneur en cuivre minimale de 97,5 %) — Composition chimique et formes des produits corroyés

First edition — 1980-06-15

UDC 669.35-13 **Ref. No. ISO 1336-1980 (E)**

Descriptors : copper, rolled products, metal bars, wire, metal sheet, metal plates, plates, metal strip, metal tubes, forgings, profiles, chemical composition, electrical properties, mechanical properties, designation.

Price based on 2 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (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 set up 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 1336 was developed by Technical Committee ISO/TC 26, *Copper and copper alloys*, and was circulated to the member bodies in January 1979.

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

Australia	France	Norway
Austria	Germany, F. R.	Poland
Belgium	Hungary	Romania
Bulgaria	India	South Africa, Rep. of
Canada	Italy	Spain
Chile	Japan	Sweden
China	Korea, Dem. P. Rep. of	Switzerland
Czechoslovakia	Korea, Rep. of	Turkey
Finland	Netherlands	USA

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

United Kingdom

This International Standard cancels and replaces ISO Recommendation R 1336-1971, of which it constitutes a technical revision.

Printed in Switzerland

Wrought coppers (having minimum copper contents of 97,5 %) — Chemical composition and forms of wrought products

1 Scope and field of application

This International Standard specifies the chemical composition of wrought coppers, having minimum copper contents of 97,5 %, and lists their electrical properties and the forms of wrought products in which they are currently available in commercial quantities.

2 References

ISO/TR 197/1, *Copper and copper alloys — Terms and definitions — Part 1 : Materials.*[1)]

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

3 Definitions

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

4 Chemical composition

The chemical compositions given in table 1 show the principal alloying elements and usual impurities. It is the responsibility of the supplier to ensure that any element not specifically limited by this International Standard is not present in an amount such as is generally accepted as having an adverse effect on the product. If the purchaser's requirements necessitate limits for any element not specified, these should be agreed upon between the supplier and the purchaser.

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

5 Electrical properties

The electrical properties of these coppers, 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 coppers 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, *Wrought copper and copper alloys — Rolled flat products (plate, sheet, strip) — Mechanical properties.*

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

— ISO 1637, *Wrought copper and copper alloys — Solid products supplied in straight lengths — Mechanical properties.*

— ISO 1638, *Wrought copper and copper alloys — Drawn solid products supplied in coils or on reels — Mechanical properties.*

— ISO 1639, *Wrought copper alloys — Extruded sections — Mechanical properties.*

— ISO 1640, *Wrought copper alloys — Forgings — Mechanical properties.*

1) Under revision.

Table 1 — Chemical composition

Designation	Chemical composition %			Average density
	Cu	Alloying elements	Other elements	kg/dm³
CuAg0,05	The remainder	Ag 0,02 to 0,08	Oxygen max. 0,06 Total max. 0,1	8,9
CuAg0,1		Ag 0,08 to 0,12		
CuAg0,05 (OF)		Ag 0,02 to 0,08	Total max. 0,1	8,9
CuAg0,1 (OF)		Ag 0,08 to 0,12		
CuAg0,05 (P)		Ag 0,02 to 0,08	P 0,001 to 0,005 Total max. 0,1	8,9
CuAg0,1 (P)		Ag 0,08 to 0,12		
CuCd1		Cd 0,7 to 1,3	Total max. 0,3	8,9
CuCr1		Cr 0,3 to 1,2	Total max. 0,3	8,9
CuCr1Zr		Cr 0,5 to 1,4 Zr 0,02 to 0,2	Total max. 0,2	8,9
CuS(P0,01)		S 0,20 to 0,70	P 0,004 to 0,012 Total max. 0,1	8,9
CuS(P0,03)			P 0,013 to 0,050 Total max. 0,1	
CuTe		Te 0,3 to 0,8	Oxygen-free Total max. 0,2	8,9
CuTe(P)			P 0,004 to 0,012 Total max. 0,2	

Table 2 — Electrical properties in the annealed temper at 20 °C

NOTE — For specification purposes, maximum mass resistivity shall be quoted. The values given to five significant figures are specification values. Approximate rounded values are for information only.

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
CuAg0,05	0,15 596	0,017 544	57,00	98,28
CuAg0,1				
CuAg0,05(OF)	0,15 596	0,017 544	57,00	98,28
CuAg0,1 (OF)				
CuAg0,05 (P)	0,15 640	0,017 593	56,84	98,0
CuAg0,1 (P)				
CuCd1[1]	0,19 753	0,022 222	45,00	77,59
CuCr1[2]	0,21 166	0,023 809	42,00	72,41
CuCr1Zr[2]				
CuS(P0,01)	≈0,178	≈0,020	≈ 50	≈ 86
CuS(P0,03)	≈ 0,197	≈ 0,022	≈ 45	≈ 78
CuTe	≈ 0,178	≈ 0,020	≈ 50	≈ 86
CuTe(P)	≈ 0,178	≈ 0,020	≈ 50	≈ 86

1) For the strain hardened temper, H.

2) For the fully heat treated temper.

Table 3 — Forms of wrought products

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

KEY :

X — main manufactured forms.

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

Designation	Plate Sheet	Strip	Rod Bar	Extruded profiles[1]	Tube[2]	Wire	Forgings
CuAg0,05		X	X			X	
CuAg0,1							
CuAg0,05(OF)		X	X			X	
CuAg0,1(OF)							
CuAg0,05(P)		X	X			X	
CuAg0,1(P)							
CuCd1			X			X	
CuCr1	(X)	(X)	X	(X)	(X)	(X)	X
CuCr1Zr	(X)	(X)	X	(X)	(X)	(X)	X
CuS(P0,01)			X				
CuS(P0,03)			X				
CuTe			X				
CuTe(P)			X				

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

2) Tubes for general purposes.