

Specification for

Copper for electrical purposes: high conductivity copper rectangular conductors with drawn or rolled edges

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- British Non-ferrous Metals Federation
- Copper Development Association
- London Metal Exchange
- Non-ferrous Metal Stockists
- Society of British Aerospace Companies Ltd
- Coopted members

The following bodies were also represented in the drafting of the standard, through sub-committees and panels:

- Association of Supervisory and Executive Engineers
- British Railways Board
- British Telecommunications plc
- Copper Smelters' and Refiners' Association
- London Regional Transport
- Rotating Electrical Machines Association (BEAMA Ltd)
- Telecommunication Engineering and Manufacturing Association (TEMA)
- Transmission and Distribution Association (BEAMA Ltd)

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Foreword

This British Standard has been prepared under the direction of the Non-ferrous Metals Standards Committee. It is the fourth revision of BS 1432, which was originally published in 1948 and revised in 1953, 1961 and 1970. It supersedes the 1970 edition which is withdrawn. It is one of a series of standards for copper in various wrought forms for electrical purposes, the others in the series being BS 1433, BS 1434, BS 1977, BS 4109 and BS 4608.

In this revision, due regard has been given to the work of the International Organization for Standardization (ISO), and in particular to Technical Committee ISO/TC 26 Copper and copper alloys, when reviewing the testing requirements, properties and dimensional tolerances. Wherever possible and appropriate the requirements of this British Standard have been aligned with those of corresponding International Standards.

The scope of this revision has been extended to include requirements for conductors manufactured from higher purity copper (C 100) and electronic grade oxygen free copper (C 110). Four grades of tough pitch copper silver are also included for the first time.

One of the controlled proof stress conditions, designated CPR 4 in the previous edition of this standard, has been deleted.

In this revision, the term “rectangular conductor” has been used throughout instead of the previously used term “strip”. This is because the size range for material covered by this revision does not coincide with the current ISO definition for strip.

Earlier editions of this standard included clauses entitled “Inspection” and “Facilities for testing”. As these clauses are contractual in nature, and not relevant to a product standard, they have been omitted from this revision.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies requirements for high conductivity copper conductors of rectangular cross section with drawn or rolled edges. It applies to conductors supplied:

- in the grades of copper listed in Table 1;
- in the annealed, half-hard, hard and controlled proof stress conditions, the dimensions, and the corner and edge conditions given in Table 2;
- in coils, or in cut lengths up to and including 6 m.

NOTE 1 Information to be supplied by the purchaser is given in Appendix A.

NOTE 2 Recommended dimensions and areas of bare rectangular copper conductors for various electrical applications are given in Table 9 and Table 10 in Appendix B.

NOTE 3 The titles of the publications referred to in this British Standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1

drawn edges

the edges produced on a wrought rectangular product as a result of drawing it through a die

2.2

rolled edges

the edges produced on a wrought rectangular product as a result of edge (or side) rolling

2.3

batch

a consignment of material either in one or more bundles of straight lengths, or in one or more coils or reels, of the same grade, thickness, width, length (for cut lengths), material condition (i.e. temper), corner and edge condition

Table 1 — Grades of copper

Copper grade	Refinery designation (BS 6017)	Wrought designation ^a (BS 1432)
Cathode copper (higher grade)	Cu-CATH-1	C 100
Electrolytically refined tough pitch copper (standard grade)	Cu-ETP-2	C 101
Oxygen free electrolytically refined copper	Cu-OF	C 103
Oxygen free refined copper electronic grade	Cu-OFE	C 110
Tough pitch copper-silver (Minimum 0.01 % <i>m/m</i> silver)	Cu-Ag-1	C 101
Tough pitch copper-silver (Minimum 0.06 % <i>m/m</i> silver)	Cu-Ag-3	C 101
Tough pitch copper-silver (Minimum 0.09 % <i>m/m</i> silver)	Cu-Ag-4	C 101
Tough pitch copper-silver (Minimum 0.14 % <i>m/m</i> silver)	Cu-Ag-5	C 101

^a These wrought designations are used in all British Standards covering wrought copper and copper alloys.

Table 2 — Material conditions, dimensions, and corner and edge conditions

Material condition		Range of dimensions				Corner and edge conditions		
		Thickness		Width		Square corners	Radiused corners	Semi-circular edges
Description	Designation	min.	max.	min.	max.			
Annealed	0	mm 0.50	mm 10.0	mm 0.50	mm 160	b	a	b
Half-hard	½ H	0.50	10.0	0.50	160	b	a	b
Hard	H	0.50	10.0	0.50	160	b	a	b
Controlled proof stress ^c	CPR1, CPR2 or CPR3	0.80	10.0	0.80	160	b	a	b

^a The normal condition of supply.
^b Available subject to agreement between supplier and purchaser.
^c See note to Table 4.

3 Material conditions, dimensions, and corner and edge conditions

3.1 The material condition of the conductor shall be one of those given in Table 2.

3.2 The dimensions of the conductor shall be within one of the ranges given in Table 2.

3.3 The conductor shall have either square or radiused corners or semi-circular edges, as shown in Figure 1.

4 Chemical composition and material

The conductors shall be manufactured from copper refinery shapes complying with BS 6017, for the grades listed in Table 1. The chemical composition shall comply with BS 6017 for the appropriate copper grade.

NOTE The conductors should be clean, smooth and free from harmful defects.

5 Mechanical properties

5.1 Tensile properties

For conductors supplied in the annealed, half-hard and hard conditions the tensile properties shall be as given in Table 3 when tested in accordance with Appendix E.

NOTE 1 If specifically requested by the purchaser, conductors up to 5.6 mm thick when less than 20 mm wide, in the “O” condition, are tested using a gauge length of 200 mm or 250 mm. The minimum elongation is then 30 %.

NOTE 2 Table 11 in Appendix C gives conversion factors for stress values in SI, metric and imperial units. Throughout this standard, values for tensile strength and proof stress requirements are given in N/mm², this unit now being in common use in the industry.

Elongation requirements are not applicable to material thinner than 0.80 mm when less than 12.5 mm wide.

For conductors supplied in the controlled proof stress conditions the proof stress shall be as given in Table 4.

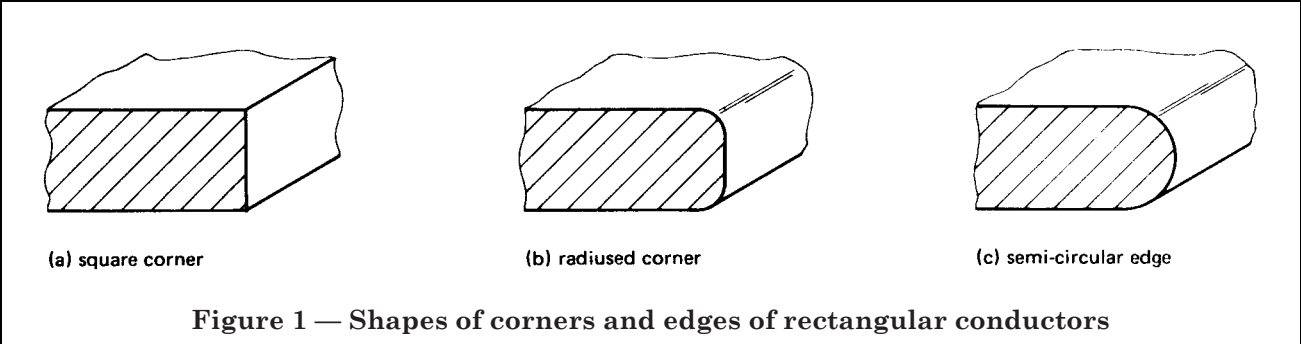


Table 3 — Mechanical properties of copper conductors supplied in the annealed, half-hard and hard conditions

Designation	Thickness		Tensile strength, R _m		Elongation ^a , A	Longitudinal bend test	
	Over	Up to and including	Min.	Max.	Min.	Angle of bend	Radius
	mm	mm	N/mm ²	N/mm ²	%	degrees	
0	0.50	10.0	210	250	35	180	Close
½H	0.50	1.6	250	—	10	} 180	<i>t</i> ^b
	1.6	10.0	250	—	15		
H	0.50	2.5	310	—	—	} 180	<i>t</i> ^b
	2.50	8.0	290	—	4		
	8.0	10.0	270	—	8		

^a Determined on a gauge length of 50 mm, or 5.65 √S₀, whichever is greater (see Appendix E), where S₀ is the original cross-sectional area of the gauge length.

^b Where *t* is the thickness of the conductor.