

Specification for

Cotton-covered copper conductors —

Part 2: Rectangular Conductors

Co-operating organizations

The Electrical Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- Admiralty*
- Air Ministry
- Associated Offices' Technical Committee
- Association of Consulting Engineers (Incorporated)
- Association of Supervising Electrical Engineers
- British Electrical and Allied Industries Research Association*
- British Electrical and Allied Manufacturers' Association*
- British Electrical Development Association
- British Railways, The British Transport Commission
- Cable Makers' Association*
- Central Electricity Authority and Area Boards
- Crown agents for Oversea Governments and Administrations
- Electric Lamp Industry Council
- Electric Light Fittings Association
- Electrical Contractors Association (Incorporated)
- Electrical Contractors' Association of Scotland
- Engineering Equipment Users' Association
- Independent Cable Makers' Association
- Institution of Electrical Engineers
- Ministry of Labour and National Service (Factory Inspectorate)
- Ministry of Power
- Ministry of Supply*
- Ministry of Works
- National Inspection Council for Electrical Installation Contracting
- National Physical Laboratory (D.S.I.R.)*
- Oil Companies Materials Committee
- Post Office*
- Public Transport Association (Incorporated)
- Radio Industry Council*
- South of Scotland Electricity Board
- War Office

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of the standard:

- British Refrigeration Association
- Copper Development Association
- Covered Conductors Association
- High Conductivity Copper Association
- Radio and Electronic Component Manufacturers' Federation
- Telecommunication Engineering and Manufacturing Association
- Telephone Manufacturers' Technical Development Committee

This British Standard, having been approved by the Electrical Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 30 December 1957

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Foreword

This standard makes reference to the following British Standards:

BS 350, *Conversion factors and tables*.

BS 1036, *Electrolytic tough pitch high conductivity copper*.

BS 1037, *Fire refined tough pitch high conductivity copper*.

BS 1432, *Copper for electrical purposes. Strip with drawn or rolled edges*.

BS 2565, *Drums for covered winding wires and strips for electrical purposes for use in the United Kingdom*.

When BS 1791 was published in 1951 it dealt only with round wire. This new part deals with rectangular conductors, so that the standard now gives requirements for cotton-covered copper conductors of both round and rectangular sections. The original publication is now designated BS 1791-1.

It will be noted that while Part 1 provides for both single and double cotton coverings on round wire, Part 2 specifies only double cotton coverings, in two standard thicknesses, for rectangular conductors.

This British Standard is one of a series for winding wires with various types of covering. Other standards in this series are listed below:

BS 156, *Enamelled round copper wire (oleo-resinous enamel)*.

BS 1497, *Impregnated-asbestos-covered copper conductors*.

BS 1497-1, *Round wire*.

BS 1497-2, *Rectangular conductors*.

BS 1815, *Enamel (oleo-resinous) and cotton-covered round copper wire*.

BS 1844, *Enamelled round copper wire (enamel with vinyl acetal base)*.

BS 1933, *Varnish-bonded glass-covered round copper wire*.

BS 1961, *Enamelled round copper wire (oleo-resinous enamel). Metric units*.

BS 2039, *Enamelled round copper wire (enamel with vinyl acetal base). Metric units*.

BS 2084, *Cotton-covered round copper wires. (Metric units.)*

BS 2479, *Enamel (oleo-resinous) and silk or rayon-covered round copper wire*.

BS 2480, *Silk or rayon-covered round copper wire*.

BS 2776, *Paper-covered rectangular copper conductors for transformer windings*.

NOTE Metric equivalents of British units are not given in this standard. Metric conversions, if required, may be calculated by reference to BS 350, "Conversion factors and tables".

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 8, 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

a) *General.* This part of BS 1791 applies to solid copper conductors of rectangular section, primarily intended for winding coils for electrical machinery and apparatus, having a covering of cotton consisting of two layers, in which the cotton is applied by winding the yarns helically round the conductor. This standard does not apply to conductors with other kinds of cotton covering, such as braiding.

b) *Sizes.* The requirements of the standard are applicable to conductors having thicknesses between 0.035 in. and 0.240 in. and widths up to 0.500 in. A schedule of preferred sizes of rectangular conductors is given in Appendix A.

c) *Classes of covering.* This standard deals with the following classes of cotton covering:

Double cotton covering, ordinary.

Double cotton covering, fine.

The difference between the “ordinary” and “fine” coverings is in the thickness of the cotton covering.

NOTE *Edgewise bending.* Covered conductors to this British Standard are not necessarily suitable for severe edgewise bending. Any special test requirements should be agreed between the purchaser and the supplier.

2 Definitions

For the purposes of this British Standard, the following definitions apply:

2.1 strip

a solid copper conductor of rectangular cross section

2.2

increase in dimensions due to the covering

the difference between the measurement over the cotton insulation on the smaller dimension and the corresponding measurement of the bare strip

2.3

tolerance

the permissible divergence of an actual magnitude from that prescribed

3 Test conditions

The tests shall be made at a temperature between 15 °C and 35 °C and at a relative humidity not exceeding 75 per cent, unless otherwise specified in the following clauses.

4 Conductor

a) *Material.* The strip shall be manufactured from high conductivity copper complying with the requirements of either BS 1036, “*Electrolytic tough pitch high conductivity copper*” or BS 1037, “*Fire refined tough pitch high conductivity copper*”.

Before covering, the strip shall comply with the requirements of BS 1432¹⁾ for annealed copper strip.

b) *Tolerances on dimensions.* The tolerances on the dimensions of strips are given in Table 1.

Table 1 — Tolerances on dimensions

Width or thickness of bare strip		Tolerance (Plus or minus)
Over	Up to and including	
in.	in.	in.
0.130	0.130	0.0015
0.250	0.250	0.002
0.250	0.500	0.003

c) *Radius on corners.* Unless otherwise specified by the purchaser, the strip shall have radiused corners, the radius of curvature being in accordance with Table 2.

Table 2 — Radius on corners

Thickness of bare strip		Radius on corners	Tolerance (Plus or minus)
Over	Up to and including		
in.	in.	in.	in.
0.060	0.060	0.015	0.003
0.080	0.080	0.020	0.004
0.100	0.100	0.025	0.005
0.100	0.240	0.030	0.005

d) *Resistivity.* The resistivity shall not exceed 0.017 37 ohm square millimetre per metre at 20 °C. This value is equivalent to a conductivity of 99.25 per cent of that of “standard annealed copper” as fixed by the International Electrotechnical Commission²⁾.

Constants for converting resistances at various temperatures to the standard reference temperature of 20 °C and reciprocals of the constants for converting resistance at 20 °C to other temperatures are given in Table 3.

¹⁾ BS 1432, “*Copper for electrical purposes. Strip with drawn or rolled edges*”.

²⁾ IEC Publication 28, “*International Standard of resistance for copper*”.