

Specification for

Copper for electrical purposes: high conductivity copper wire rod

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Non-ferrous Metals Standards Committee (NFM/-) to Technical Committee NFM/34, upon which the following bodies were represented:

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

The following bodies were also represented in the drafting of the standard, through subcommittees 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. The standard has been prepared to satisfy the need of the copper producing and user industries for a standard defining the quality of copper wire rod, suitable for conversion by drawing, rolling, etc., to finished sizes capable of meeting the requirements of specifications for electrical conductors. This standard is one of a series for copper for electrical purposes, the others in the series being as follows.

BS 1432, *Specification for copper for electrical purposes: high conductivity copper rectangular conductors with drawn or rolled edges.*

BS 1433, *Specification for copper for electrical purposes. Rod and bar.*

BS 1434, *Specification for copper for electrical purposes: copper sections in bars, blanks and segments for commutators.*

BS 1977, *Specification for high conductivity copper tubes for electrical purposes.*

BS 4109, *Specification for copper for electrical purposes. Wire for general electrical purposes and for insulated cables and flexible cords.*

BS 4608, *Specification for copper for electrical purposes. Rolled sheet, strip and foil.*

In this standard, due regard has been given to the work of the International Organization for Standardization (ISO), and in particular to ISO 4738 prepared by ISO/TC 26, on testing requirements, properties, etc., and wherever possible and appropriate, their recommendations have been followed.

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

This British Standard specifies requirements for chemical composition, elongation properties, electrical resistivity, dimensional tolerances, selection of test samples and test methods for seven grades of high conductivity copper wire rod intended for further fabrication into electrical conductors. Requirements for annealability, scale adhesion and susceptibility to hydrogen embrittlement are specified for certain of the grades. The standard applies to wire rod supplied in coil:

- a) in the grades of copper given in Table 1;
- b) in the “as manufactured” or in the “cleaned” condition;
- c) in the range of rod diameters over 6 mm.

The wire rod specified in this British Standard may be manufactured by:

- 1) continuous casting and hot rolling in tandem;
- 2) semi-continuous casting and cold rolling;
- 3) rolling of wire bar or billets; or
- 4) extrusion.

Wire rod to the designation C 100, however, is normally manufactured by the techniques given in 1) or 2).

NOTE 1 Information to be supplied by the purchaser in any enquiry or order is given in Appendix A.

NOTE 2 The titles of the publications referred to in this British Standard are listed on the inside back cover.

2 Definition

For the purposes of this British Standard the following definition applies.

2.1

wire rod

an intermediate solid wrought product, of uniform circular cross section along its whole length, supplied in coils

3 Material surface condition

The wire rod shall be supplied in one of the following surface conditions:

- a) as manufactured; or
- b) cleaned (with, or without, a protective coating).

Cleaned wire rod shall have been treated prior to delivery to remove any surface oxide resulting from the production process and shall have a surface suitable for cold drawing without the need for preliminary cleaning.

4 General requirements

The wire rod shall comply with the requirements specified in clauses 5 to 11 and 14.

When tests are carried out to verify that the wire rod complies with the appropriate requirements for chemical composition (see clause 5), elongation properties (see clause 6), electrical resistivity (see clause 7), annealability (see clause 8), susceptibility to hydrogen embrittlement (see clause 9) or scale adhesion properties (see clause 10), the sampling and test methods shall be in accordance with clauses 12 and 13.

5 Chemical composition

The chemical composition of the wire rod shall be as given in Table 1 for the appropriate copper grade. Tests for chemical composition shall be carried out in accordance with 13.2.