

CONFIRMED
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Specification for

Copper refinery shapes

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- Association of Bronze and Brass Founders
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- British Lead Manufacturers' Association
- British Non-ferrous Metals Federation*
- Copper Development Association*
- Electric Cable Makers' Confederation
- Institute of British Foundrymen
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- Royal Institute of British Architects
- Society of Motor Manufacturers and Traders Limited
- Zinc Development Association

Those marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- BOF Metals Technology Centre
- The Copper Smelters and Refiners Association
- Individual experts

This British Standard, having been prepared under the direction of the Non-ferrous Metals Standards Committee, was published under the authority of the Executive Board and comes into effect on 30 October 1981

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Foreword

This British Standard, which has been prepared under the direction of the Non-ferrous Metals Standards Committee, supersedes the standards on raw copper, BS 1035-40, BS 1172-74, BS 1861 and BS 1954:1964 which were published under one cover and are withdrawn on publication of this standard.

This standard is closely related to the draft for the revision of ISO 431 “Electrolytic tough pitch copper — Refinery shapes”, published in 1972 by the International Organization for Standardization (ISO) and the ISO designations for the various grades of copper replace the former British Standard designations. In order to facilitate the use of the ISO designations, a table of cross references with the previous British Standard numbers and the designations used in the British Standards for wrought coppers has been included as Appendix A.

In contrast to the requirements of the draft for the revision of ISO 431, which are based principally on the assessment of coppers by physical properties, this standard specifies copper refinery shapes in terms of detailed requirements for both chemical composition and physical properties.

The grades of copper specified in this standard differ from those in the superseded standards, reflecting the current availability and usages of coppers. The changes are as follows.

- a) Two types of silver bearing copper (oxygen free and tough pitch) are now included in the standard as grades in their own right, instead of as derivatives of the coppers specified in BS 1036 and BS 1037.
- b) The two lower grades of tough pitch copper specified in BS 1039 and BS 1040, together with the arsenical coppers specified in BS 1173 and BS 1174, have been omitted since demand for these materials is now at a very low level.

The higher purity grade of copper cathode designated Cu-CATH-1, included in this standard, was previously the subject of DD 78.

Any user of this standard who encounters an element present in Cu-CATH-1, not listed in groups 1 to 6 of Table 2 a), and which is found to be deleterious, is requested to notify BSI without delay in order that the technical committee responsible for the standard may study the behaviour of this element with a view to possible amendment of this standard.

In contrast to the superseded British Standards, test methods for the resistivity, hydrogen embrittlement and scale adhesion tests have been omitted from this standard; these test methods are now specified in BS 5714, BS 5899 and BS 5909 respectively.

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 10, 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 the chemical compositions and physical properties of copper in the form of refinery shapes and in the grades shown in Table 1. The refinery shapes included are cathodes; horizontally, vertically and continuously cast wire bars; cakes and billets; ingots and ingot bars.

NOTE Wire bars, cakes and billets are intended for fabricating into wrought products; ingots and ingot bars are intended for alloying in wrought and cast copper alloys.

Cathode is primarily for melting, chiefly for the production of high conductivity copper. The chemical composition of Cu-CATH-1 (cathode copper, higher purity grade) makes it suitable for the manufacture, including by the processes of continuous casting and tandem hot rolling, of copper wire rod, such as that designated C100 in BS 6926. It is also suitable for all the applications of Cu-CATH-2.

Cu-CATH-2 (cathode copper, standard grade) is suitable for the manufacture of Cu-ETP-2 (electrolytically refined tough pitch copper, standard grade), and for most wrought forms of high conductivity copper. It is also used for alloying in wrought and cast copper alloys.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Designations

The designations and terms of grades of copper shall be as given in Table 1.

4 Chemical composition and physical properties

The copper in each refinery shape shall comply with the requirements for chemical composition and physical properties given in Table 2 a), Table 2 b), and Table 3, respectively, as determined by the methods given in 10.1 and 10.2.

NOTE 1 The values for nominal volume resistivity and nominal conductivity are given for guidance only.

NOTE 2 The shapes in which each grade is available are shown in Table 3.

5 Shape, dimensions, mass and tolerances on dimensions and mass

5.1 Cathodes. Cathodes shall be either whole cathodes or cathodes cut to sizes agreed between supplier and purchaser at the time of ordering.

5.2 Horizontally cast wire bars. The nominal masses, dimensions and tolerances on dimensions for horizontally cast wire bars shall be as shown in Table 4 and Figure 1.

5.3 Billets

5.3.1 Shape. Billets shall be in one of the following forms:

Table 1 — Designation and terms of grades of copper^a

Designation ^b	Terms
Cu-CATH-1	Cathode copper (higher purity grade)
Cu-CATH-2	Cathode copper (standard grade)
Cu-ETP-2	Electrolytically refined tough pitch copper (standard grade)
Cu-FRHC	Fire refined high conductivity copper
Cu-FRTP	Fire refined tough pitch copper
Cu-DHP	Phosphorus deoxidized copper-high residual phosphorus
Cu-OF	Oxygen free electrolytically refined copper
Cu-OFE	Oxygen free refined copper, electronic grade
Cu-Ag-OF-2	Oxygen free copper-silver (0.03 % (m/m) min. silver)
Cu-Ag-OF-4	Oxygen free copper-silver (0.09 % (m/m) min. silver)
Cu-Ag-1	Tough pitch copper-silver (0.01 % (m/m) min. silver)
Cu-Ag-2	Tough pitch copper-silver (0.03 % (m/m) min. silver)
Cu-Ag-3	Tough pitch copper-silver (0.06 % (m/m) min. silver)
Cu-Ag-4	Tough pitch copper-silver (0.09 % (m/m) min. silver)
Cu-Ag-5	Tough pitch copper-silver (0.14 % (m/m) min. silver)

^a Adopted from ISO 431.

^b See Appendix A for cross-references between these designations, the superseded British Standards and the designations used in British Standards for wrought coppers.

- a) in a cylindrical shape with both ends flat;
- b) in a cylindrical shape with both ends cupped;
- c) in a cylindrical shape with one end sheared and the other end flat for billets of phosphorus deoxidised copper of diameter less than or equal to 100 mm.

Billets shall be in the form described in a), unless the purchaser specifies the forms described in b) or c) at the time of ordering.

Billets shall not deviate from straightness by more than 4 mm per metre length.

5.3.2 Diameter. For billets less than or equal to 200 mm in diameter, the tolerance on diameter shall not exceed ± 3 mm.

NOTE 1 Closer tolerances may be agreed between the supplier and the purchaser at the time of ordering.

NOTE 2 For billets exceeding 200 mm in diameter, the tolerances on diameter should be agreed between supplier and purchaser at the time of ordering.