BRITISH STANDARD

BS 1400:1985

Incorporating Amendment No. 1

Specification for

Copper alloy ingots and copper alloy and high conductivity copper castings

UDC 669.3 – 412

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
Inco Europe Limited
London Metal Exchange
Non-Ferrous Metal Stockists
Coopted members

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

Association of Bronze and Brass Founders
Association of Supervisory and Executive Engineers
BEAMA Transmission & Distribution Association
BNF Metals Technology Centre
British Bronze & Brass Ingot Manufacturers
British Malleable Tube Fittings Association
British Valve Manufacturers' Association Ltd.
Copper Smelters' and Refiners' Association
Institute of British Foundrymen
International Tin Research Institute
London Transport Executive
Rotating Electrical Machines Association (BEAMA Ltd)
Telecommunication Engineering & Manufacturing

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

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Contents

Foreword

This revision of this British Standard, which has been prepared under the direction of the Non-ferrous Metals Standards Committee, supersedes BS 1400:1973 which is withdrawn.

The general technical requirements of this edition differ from those of the previous edition only in minor respects. However, the range of alloys covered has been revised and the opportunity has been taken to align the chemical compositions and mechanical properties of individual alloys, where appropriate, with the corresponding alloys specified in ISO 1338:1977 "*Cast copper alloys — Compositions and mechanical properties*" published by the International Organization for Standardization (ISO).

Comparisons of the materials specified in the revised edition of BS 1400 with those specified in ISO 1338 are summarized in Appendix H.

Four alloys have been included for the first time, reflecting current interest: two high strength cupro-nickel alloys having high resistance to sea water, one containing chromium (CN1) and the other containing niobium (CN2); a nickel-containing tin bronze (CT2); and an aluminium silicon bronze (AB3).

Alloy CMA2, included in the previous edition, has been omitted from this edition.

The practice adopted in the previous edition of grouping the alloys into three categories has been retained, with some changes, as follows.

Group A. Alloys in common use (preferred for all general purposes): PB4, LPB1, LB2, LB4, LG1[(B)], LG2, SCB1, SCB3, SCB6, DCB1, DCB3, PCB1.

Group B. Special purpose alloys (for applications requiring their particular properties): HCC1, CC1-TF, PB1, PB2, CT1, LG4[(A)], AB1, AB2, CMA1, HTB1, HTB3.

Group C. Alloys in limited production: LB1, G1, G3, G3-TF, LB5[(B)], SCB4, CT2, AB3, CN1, CN2.

NOTE The superscripts (A), (B) have been used to indicate alloys that have been transferred from another group.

This general grouping has been maintained throughout this standard, and both tables quoting specification requirements and design information have been classified in this way.

This standard continues to specify inspection requirements for ingots and castings and lays down minimum requirements for the frequencies of chemical analyses and mechanical tests. In addition a series of optional inspection and test procedures for castings is incorporated as Appendix A which may be selected according to the requirements of the purchaser and specified according to a set form of coding. In most cases particular conditions will also need to be specified and these are to be laid down by the purchaser in a "purchaser's test schedule", as itemized in Appendix D, provided at the enquiry stage.

Appendix G gives design information, including guidance on alloy selection. It is emphasized that this section is for information only and does not form part of the main specification.

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 to iv, pages 1 to 32, 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.

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1 Scope

This British Standard specifies requirements for the chemical compositions, mechanical properties and other characteristics for the following two types of product:

a) copper alloy ingots intended to be remelted for the production of castings; *and*

b) copper alloy and high conductivity copper castings.

NOTE 1 This standard is intended to apply to castings made by any metal casting process. However, in the case of mechanical properties, requirements are specified (see **6.2** and **8.1**) only for castings made by the sand, chill, continuous and centrifugal processes. The information on casting processes given in **G.3** includes shell moulding.

Methods for verifying that ingots and castings comply with the requirements of this British Standard are also specified.

NOTE 2 Optional supplementary inspection and test procedures, that enable castings to be ordered according to particular inspection and test requirements appropriate to the application of the castings, are given in Appendix A.
A system of inspection coding is described (**A.1**) that enables the additional inspection and test procedures to be specified readily at the design stage, for quotation purposes and for order.
It is emphasized that over-inspection will lead to unnecessarily high costs and longer delivery times with no compensating advantages. For these reasons it is essential to select only those supplementary procedures that are necessary for the design and the product concerned.
NOTE 3 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

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

2.1
cast (non-continuous melting)

the product of:

a) one furnace melt; *or*

b) one crucible melt; *or*

c) a number of furnace or crucible melts where such are aggregated and mixed prior to sampling.

2.2
cast (continuous melting)

in continuous melting for the production of castings, when the contents of a melting/holding furnace or crucible are supplemented from time to time by the addition of metal to maintain an adequate bulk of liquid metal, a cast is 250 kg or fraction thereof of metal poured

2.3
"TF" condition

the symbols "TF", added to the material designations for copper chromium (CC1-TF) and nickel gunmetal (G3-TF), indicate castings supplied in the solution treated and precipitation hardened condition

NOTE Details of such treatments, applied in order to achieve the specified mechanical properties (see Table 8), are not specified.

3 Information to be supplied by the purchaser

The following information shall be supplied by the purchaser in the enquiry and order to assist the manufacturer in supplying the correct ingots or castings:

a) whether ingots or castings are required and, if castings are required, the casting process to be used (see note 1 to clause **1**, Table 8 and Table 15);

b) the designation of the material (see Table 1 to Table 3 for ingot materials and Table 5 to Table 7 for casting materials);

c) if centrifugal castings are required, whether the tensile test samples are to be either taken from the castings or separately cast [see item d) of **8.1.3**].

NOTE The purchaser should also be aware of the importance of including, in his enquiry and order, the following information as appropriate:

1) for both ingots and castings, whether it is the purchaser's intention to inspect the material at the supplier's works (see note 3 to **7.1**);

2) for castings only:

i) a fully detailed and fully dimensioned drawing of the casting(s) required;

ii) details of the actual pattern equipment if this is to be supplied by the purchaser;

iii) full details of any of the optional supplementary inspection and test procedures required (see Appendix A and Appendix F), including the inspection coding (see **A.1**) and a test schedule in accordance with the recommendation given in Appendix D;

iv) if castings in alloys AB1, AB2 and AB3 are not to be repaired (see clause **4**);

v) if inspection and testing are to be carried out by the purchaser and the samples and test pieces are to be retained by the purchaser (see note 3 to **7.1**);

vi) details of the tensile test samples to be taken for continuous castings and the results to be achieved [see item c) of **8.1.3**];