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BRITISH STANDARD 6360 : 1969

UDC 621.315.5 : 669.3

METRIC UNITS

SPECIFICATION FOR

COPPER CONDUCTORS IN INSULATED CABLES AND CORDS

BRITISH STANDARDS INSTITUTION

SPECIFICATION FOR

COPPER CONDUCTORS IN INSULATED CABLES AND CORDS

BS 6360 : 1969

Price 10/- net

BRITISH STANDARDS INSTITUTION

INCORPORATED BY ROYAL CHARTER

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This British Standard, having been approved by the Electrical Industry Standards Committee was published under the authority of the Executive Board on 17 January, 1969.

SBN: 580 00465 1

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 5000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, price 15s. The BS Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 18. Methods for tensile testing of metals.
BS 205. Glossary of terms used in electrical engineering.
BS 4109. Copper for electrical purposes: wire for general electrical purposes and for insulated cables and flexible cords. Metric units.
BS 6791. Aluminium conductors in insulated cables.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard: Committee reference ELE 3 ELE 3 32 Draft for comment 67/24774

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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:

Associated Offices' Technical Committee
*Association of Consulting Engineers
Association of Mining Electrical and Mechanical Engineers
*Association of Supervising Electrical Engineers
*British Electrical and Allied Manufacturers' Association
British Radio Equipment Manufacturers' Association
*British Railways Board
*Crown Agents for Oversea Governments and Administrations
Department of Employment and Productivity (H.M. Factory Inspectorate)
*Electric Cable Makers' Confederation
Electric Lamp Industry Council
Electric Light Fittings Association
*Electrical Contractors' Association (Incorporated)
Electrical Contractors' Association of Scotland
*Electrical Research Association
*Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales
Electronic Engineering Association
*Engineering Equipment Users' Association
*Institution of Electrical Engineers
*Ministry of Technology
Ministry of Defence
Ministry of Defence, Army Department
*Ministry of Defence, Navy Department
*Ministry of Power
*Ministry of Public Building and Works
*Municipal Passenger Transport Association (Incorporated)
National Inspection Council for Electrical Installation Contracting
*National Physical Laboratory (Ministry of Technology)
Oil Companies Materials Association
*Post Office
Public Transport Association (Incorporated)
South of Scotland Electricity Board

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 this British Standard:

Aluminium Federation
British Non-Ferrous Metals Federation, High Conductivity Copper Group
Copper Development Association
National Coal Board
British Plastics Federation
Institute of Iron and Steel Wire Manufacturers
London Transport Board

BRITISH STANDARD SPECIFICATION FOR

COPPER CONDUCTORS IN INSULATED CABLES AND CORDS

FOREWORD

This British Standard is published in advance of the date on which the cables become available, to enable manufacturers and users to be forewarned of impending changes arising from this revision.

The cable industry intends that conductors complying with this standard shall be available from the 1st January, 1970, when BS 3360 : 1961 (inch version) will be withdrawn.

This specification has been prepared to cover the requirements for copper conductors appearing in various British Standards for electric cables and cords in metric units. It is based on I.E.C. Publication 228, first edition 1966, ' Nominal cross-sectional areas and composition of conductors of insulated cables ', where applicable.

In addition to the quality of material used the important features of a conductor are its maximum resistance and degree of flexibility and in this standard control is effected by the following means:

Cables for fixed installations

Circular conductors. Specified number of wires and maximum resistance.

Shaped, stranded and compacted circular conductors. Minimum number of wires and maximum resistance.

Sector shaped solid conductors. Maximum resistance.

Flexible cables and flexible cords. Maximum diameter of wires in conductor and maximum resistance.

NOTE. A standard for aluminium conductors in insulated cables in metric units is published as BS 6791.

SPECIFICATION

1. SCOPE

This British Standard gives requirements for plain or tinned annealed and plain or tinned hard drawn copper conductors in insulated cables and cords. It deals with solid, stranded, bunched and multiple stranded circular conductors, and solid and stranded shaped conductors of the sizes included in the various British Standards for electric cables in metric units, but it does not relate to the following:

(1) Conductors for use in coils of machines and apparatus.

(2) Conductors for aircraft cables.

(3) Conductors for telecommunication cables.

(4) Conductors for radio-frequency cables.

(5) Conductors for mineral insulated cables.

(6) Conductors of special design, for example hollow-core conductors.

NOTE. This British Standard is concerned only with the conductor in the finished cable. Reference should be made to BS 4109* for requirements for the wire used in the manufacture of the conductor, and to the appropriate British Standards (in metric units) for requirements for bare copper conductors for other electrical purposes.

2. DEFINITIONS

For the purpose of this British Standard the definitions relating to electric cables given in BS 205† apply.

3. MATERIAL

The conductor shall be made from high-conductivity copper wire complying with BS 4109*.

4. FORM OF CONDUCTOR

The conductor shall be circular, shaped, solid, stranded, bunched or multiple stranded as required by the cable specification; it shall be clean, reasonably uniform in size and shape, smooth and free from harmful defects.

5. JOINTS IN CONDUCTOR

Joints are permitted in the individual wires of which the conductor is formed but no joint shall be within 300 mm of any other joint in the same layer. Joints in wires larger than 0·2 mm diameter shall be brazed, silver-soldered or welded.

* BS 4109, "Copper for electrical purposes: wire for general electrical purposes and for insulated cables and flexible cords. Metric units".

† BS 205, "Glossary of terms used in electrical engineering".

6. CONSTRUCTION AND RESISTANCE OF CONDUCTORS

6.1 Solid circular conductors and stranded circular (non-compacted) conductors for non-flexible cables. The wires shall be plain or tinned, annealed or hard drawn copper as required by the cable specification.

Solid circular conductors shall be in accordance with Table 3.

All the wires in a stranded conductor shall have the same nominal diameter.

The number of wires in a circular stranded conductor shall be as given in Table 3.

The d.c. resistance of a conductor at 20 C measured in accordance with Appendix A shall not exceed the appropriate value given in Table 3.

6.2 Shaped stranded conductors and compacted circular conductors. The wires shall be plain or tinned annealed copper, as required by the cable specification.

The number of wires in a conductor shall be not less than that given in Table 4.

The ratio of the nominal diameters of the largest and smallest wires in a conductor shall not exceed 2·0.

The d.c. resistance of a conductor at 20 C measured in accordance with Appendix A shall not exceed the appropriate value given in Table 4.

6.3 Sector shaped solid conductors. The d.c. resistance at 20 C of a sector shaped solid conductor measured in accordance with Appendix A shall not exceed the appropriate value given in Table 5.

6.4 Milliken conductors. Milliken conductors shall consist of four stranded sections of plain annealed copper wires laid up, each section being lightly insulated from adjacent sections.

The individual quarter sections shall be of four core sector shape and shall comply with 6.2 above.

The d.c. resistance of the complete conductor at 20 C measured in accordance with Appendix A shall not exceed the appropriate value given in Table 4.

6.5 Flexible conductors. Conductors shall consist of plain or tinned annealed copper wires as required by the cable specification.

All the wires in a conductor shall have the same nominal diameter which shall not exceed the maximum value given in Tables 6 and 7.

The conductors may be stranded, bunched or multiple stranded unless the particular construction is prescribed in the cable specification.

The d.c. resistance of a conductor at 20 C measured in accordance with Appendix A shall not exceed the appropriate values given in Tables 6 and 7.

7. MECHANICAL PROPERTIES

7.1 Elongation. (Annealed solid and circular stranded (non-compacted) conductors only.) When a sample wire taken from a circular conductor made of plain or