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BRITISH STANDARD 480 : Part 1 : 1954

IMPREGNATED PAPER-INSULATED CABLES

FOR ELECTRICITY SUPPLY

Part 1: Lead or lead-alloy sheathed cables for working voltages up to and including 33kV

BRITISH STANDARDS INSTITUTION

BRITISH STANDARD SPECIFICATION

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Part 1 : Lead or lead-alloy sheathed cables for working voltages up to and including 33kV

B.S. 480 : Part 1 : 1954

Price 7/- net

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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 23rd July, 1954.

First published, March, 1933
First revision, May, 1942
Second revision, July, 1954

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 2000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook, price 12s. 6d.

This standard makes reference to the following British Standards :—

B.S. 77. Voltages for a.c. transmission and distribution systems of authorized undertakers.
B.S. 84. Screw threads of Whitworth form.
B.S. 205. Glossary of terms used in electrical engineering.
B.S. 350. Conversion factors and tables.
B.S. 443. Testing of zinc coating on galvanized wires.
B.S. 801. Lead and lead-alloys for cable sheathing.
B.S. 1442. Galvanized mild steel wire for armouring 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 B.S.I. references relate to the work on this Standard :—
Committee reference ELE/3/10 Draft for comment CR(ELE) 500

CONTENTS

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
*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 Electricity Authority and Area Boards
*British Railways. The British Transport Commission
*Cable Makers' Association
*Crown Agents for Oversea Governments and Administrations
Electric Lamp Manufacturers' Association
Electric Light Fittings Association
*Electrical Contractors' Association (Incorporated)
Electrical Contractors' Association of Scotland
Engineering Equipment Users' Association
*General Post Office
*Institution of Electrical Engineers
*Ministry of Fuel and Power
Ministry of Labour and National Service (Factory Dept.)
*Ministry of Supply
*Ministry of Works
*National Physical Laboratory
*North of Scotland Hydro-Electric Board
Oil Companies Materials Committee
Public Transport Association (Incorporated)
Radio Industry Council
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 Plastics Federation
British Steel Wire Industries Association
Engineering Standards Co-ordinating Committee, Cables and Wires Panel
Independent Cable Makers' Association
London Transport Executive
Municipal Passenger Transport Association
National Coal Board

BRITISH STANDARD SPECIFICATION FOR

IMPREGNATED PAPER-INSULATED CABLES FOR ELECTRICITY SUPPLY

Part 1. Lead or lead-alloy sheathed cables for working voltages up to and including 33kV

FOREWORD

This revision of B.S. 480 includes requirements for lead or lead-alloy sheathed cables, and aluminium sheathed cables, which are dealt with in separate, self-contained parts as follows :—

Part 1. Lead or lead-alloy sheathed cables for working voltages up to and including 33kV.

Part 2. Aluminium sheathed cables for working voltages up to and including 22kV.

This British Standard now contains ' quality ' clauses dealing with the composition of the various components of the cable.

Part 1 of the standard now includes requirements for 33kV solid type power cables. These cables have an impulse strength greater than 194kV which is the impulse withstand voltage currently used in the United Kingdom.

The basic reference temperature for certain properties of ' standard annealed copper ' has been amended from 60°F. to 20°C.

The practice in B.S. 480 : 1942 of specifying minimum and maximum diameters over lead sheath and overall has been abandoned in favour of nominal diameters.

Cables which comply with the requirements for minimum insulation and sheath thickness will have the stated nominal diameters, which allow reasonable manufacturing tolerances.

When cable is to be installed in vertical (or steeply inclined) situations, and/or where compliance with the requirements of Clause 26*b* is required, this should be stated when asking for a quotation or placing an order.

For details of current ratings and maximum permissible operating conductor temperatures, reference should be made to the Regulations for the Electrical Equipment of Buildings issued by the Institution of Electrical Engineers, where applicable, and otherwise to Electrical Research Association Report F/T 183.*

The voltages applied after the bending test have been increased, for cables up to and including 11kV, and a physical examination of the test sample is now specified for all cables, with the intention of accumulating data for a revision of this standard in the future.

* This report supersedes E.R.A. Report F/T 128.

See amdt No 6.

SPECIFICATION

SECTION ONE : GENERAL

SCOPE

1. Part 1 of this British Standard relates to impregnated paper-insulated lead or lead-alloy sheathed cables for operating voltages up to and including 33kV.

The operating voltage mentioned at the head of Tables 8–15 and Table 17 is the system voltage, as defined in B.S. 77*, for which the cables are designed and it refers to :

a. the voltage between phases, in three-phase systems ;

b. the voltage between outer conductors, in three-wire a.c. or d.c. systems ;

c. the voltage between conductors, in two-wire a.c. or d.c. systems.

For the purposes of this standard a system may be considered to be an earthed system if :

(i) the neutral point is earthed in such a manner that the maximum voltage which can occur between any conductor and earth does not exceed 80 per cent of the system voltage, *or*

(ii) a device is installed which automatically and instantly cuts out any part of the system which becomes accidentally earthed, *or*

(iii) the neutral point is earthed through an arc suppression coil, with arrangements for isolation within an hour of the occurrence of a fault. For cables for 11kV and over, excluding belted cables, this period may be increased to eight hours per operation provided that the total period in any year does not exceed 125 hours.

DEFINITIONS

2. For the purposes of this British Standard the definitions relating to electric cables in B.S. 205, ' Glossary of terms used in electrical engineering,' shall apply.

INTERNATIONAL STANDARDS OF RESISTANCE FOR COPPER

3. The following values adopted by the International Electrotechnical Commission† for ' standard annealed copper,' have been taken as standard for annealed high-conductivity copper :—

a. At a temperature of 20°C. the volume resistivity of standard annealed copper is $1/58 = 0{\cdot}017\,241\ldots$ ohm square millimetre per metre, $\left(\frac{\text{ohm mm}^2}{\text{m}}\right)$. Copper which has this resistivity is said to have a conductivity of 100 per cent.

Amdt No 6

* B.S. 77, ' Voltages for a.c. transmission and distribution systems of authorized undertakers '.

† I.E.C. Publication No. 28.