

BS 7970:2012



BSI Standards Publication

**Electric cables – Metal foil
and longitudinally welded
aluminium sheath
constructions of power
cables having XLPE
insulation for rated voltages
from 66 kV ($U_m = 72.5$ kV)
to 132 kV ($U_m = 145$ kV)**

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 December 2012. It was prepared by Subcommittee GEL/20/16, *Medium/high voltage cables*, under the authority of Technical Committee GEL/20, *Electric cables*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7970:2005, which is withdrawn.

Relationship with other publications

This British Standard is intended to be read in conjunction with BS 7912 which, together with the additional tests in BS 7970, implements the nationally applicable parts (part 5, section H) of Harmonization Document HD 632 S2:2008 published by the European Committee for Electrotechnical Standardization (CENELEC) in accordance with the decision of the CENELEC Technical Board.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- alignment with the parallel revision of BS 7912, and removal of unnecessary duplication;
- introduction of requirements for designs with longitudinally welded aluminium sheaths.

Product certification/inspection/testing

Users of this British Standard are advised to consider the desirability of third-party certification/inspection/testing of product conformity with this British Standard. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This British Standard specifies requirements for construction and performance, and gives methods of test, for metal wire and foil sheath, or metal wire and longitudinally welded aluminium, or longitudinally welded aluminium constructions of power cables having XLPE insulation for rated voltages from 66 kV ($U_m = 72.5$ kV) to 132 kV ($U_m = 145$ kV). The tests and requirements in this British Standard are additional to the tests and requirements for cables and their accessories specified in BS 7912.

NOTE 1 In exceptional cases, with very low fault currents, foil sheath designs without metal wires may also be used.

NOTE 2 Tests described in BS 7912:2012, 15.2, 15.3 and 15.4 are not required in this standard.

This British Standard is applicable to single-core cables for usual conditions of installation and operation, but not to special cables, such as those designed for submarine applications.

NOTE 3 Annex A gives requirements for a die penetrant test for weld integrity. Annex B lists a test for peel strength of overlapped metal foil. Annex C lists test requirements for adhesion strength of metal foil. Annex D covers the test for impact and Annex E the test for sidewall loading. Annex F covers the test for corrosion.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 7870-2:2011, *LV and MV polymeric insulated cables for use by distribution and generation utilities – Part 2: Methods of test*

BS 7912:2012, *Power cables with XLPE insulation and metal sheath, and their accessories, for rated voltages from 66 kV ($U_m = 72.5$ kV) to 132 kV ($U_m = 145$ kV) (Implementation of HD 632)*

BS EN 60228, *Conductors of insulated cables*

IEC 60050-461, *International Electrotechnical Vocabulary – Part 461 – Electric cables*

IEC 60840, *Power cables with extruded insulation and their accessories for rated voltages above 30 kV ($U_m = 36$ kV) up to 150 kV ($U_m = 170$ kV) – Test methods and requirements*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in IEC 60050-461 and BS 7912 apply.

4 Construction of metal wire and foil sheaths

4.1 Metal wires

For foil sheath constructions, and where required for longitudinally welded aluminium, a layer of metal wires shall be applied over the semi-conducting insulation screen in a single helical layer.

NOTE In exceptional cases, with very low fault currents, foil sheath designs without metal wires may also be used.

The wires shall be spaced with an average gap not greater than 4 mm and no gap shall exceed 8 mm. No wires shall cross other wires.

A metal tape or wires shall be applied helically over, and in contact with, the layer of metal wires in order to equalize the current flowing in the individual wires forming the layer of wires.

4.2 Water blocking

The requirements of BS 7912:2012, 4.6, shall apply.

4.3 Metal sheath

4.3.1 General

The metal sheath shall conform to 4.3.2 or to 4.3.3, as appropriate.

4.3.2 Metal foil sheath

A continuous metal foil sheath shall be longitudinally applied over the water blocking tapes with a minimum overlap of 7 mm. The foil shall either be a metal foil or a metal foil/polymer laminate. Joins in the foil shall have the same electrical performance as a continuous piece of foil. The metal foil overlap shall be sealed to prevent ingress of moisture.

4.3.3 Longitudinally welded aluminium sheath

A continuous metal strip sheath shall be longitudinally applied over the water blocking tapes and the edges of the strip shall be welded to form a join with the same thickness as the strip material. If the strip material is joined to another strip then the join shall have the same electrical performance as the unjoined strip. The weld shall be continuous and without porosity. The integrity of the weld shall be monitored continuously during manufacture.

4.4 Earth fault capability

The earth fault capability in current (kA) and duration (seconds) shall be as specified by the purchaser. The cross-sectional area, approximate number and approximate diameter of the metal wires shall be as specified by the manufacturer.

4.5 Oversheath

The oversheath shall be an extruded layer of black medium density polyethylene (MDPE) conforming to the requirements specified for ST₃ or ST₇ as given in BS 7912:2012, Table 5 and Table 9, unless otherwise agreed.

NOTE Alternative materials to ST₃ and ST₇ may be provided by agreement between the manufacturer and the purchaser.

The thickness of the oversheath shall be as agreed between the manufacturer and the purchaser.

The oversheath shall be bonded to metal foil or longitudinally welded sheath.

An outer semi-conducting coating shall be applied to serve as an electrode for a voltage test on the oversheath.