

LV and MV polymeric insulated cables for use by distribution and generation utilities —

Part 8: Specification for multicore and multipair cables for installation above and below ground —

Section 8.2: Single wire armoured and PVC sheathed multipair cable with copper conductors

(Implementation of part of HD 627)

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- British Approval Service for Cables
- British Cables Association
- British Plastics Association
- Electricity Association
- ERA Technology
- Co-opted members

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Foreword

This section of BS 7870 has been prepared by Subcommittee GEL/20/16, under the direction of Technical Committee GEL/20.

BS 7870 implements the nationally applicable parts of Harmonization Documents HD 603, HD 604, HD 605, HD 620, HD 622, HD 626 and HD 627 published by the European Committee for Electrotechnical Standardization (CENELEC) in accordance with the decision of the CENELEC Technical Board.

BS 7870 applies to cables for fixed installations having a rated voltage U_0/U up to and including 19/33 kV, and is published as a series of separate parts and sections, as listed in the table in the foreword of BS 7870-1.

BS 7870-8.2 implements HD 627-3A2 and is to be read in conjunction with BS 7870-1 and BS 7870-2.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

WARNING. This British Standard calls for procedures that may 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.

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 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 19 and a back cover.

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1 Scope

This section of BS 7870 specifies requirements for the construction, dimensions and mechanical and physical properties of multipair polyethylene insulated, PVC sheathed cables. It specifies requirements for multipair cables (4 pairs to 61 pairs) having copper conductors with filled and unfilled interstices, normal and increased insulation and bedding thicknesses and either steel or aluminium wire armour.

This section of BS 7870 is applicable to cables for use underground in wet conditions and also for withstanding high levels of induced voltage.

NOTE A “guide to use” is given in Annex A.

2 Normative references

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

BS 6360, *Specification for conductors in insulated cables and cords*.

BS EN 60811-4-2:2000, *Insulating and sheathing materials of electric and optical fibre cables — Common test methods — Part 4-2: Methods specific to polyethylene and polypropylene compounds — Tensile strength and elongation at break after pre-conditioning — Wrapping test after thermal ageing in air — Measurement of mass increase — Long-term stability test — Test method for copper-catalysed oxidative degradation*.

BS 7655-4.1, *Specification for insulating and sheathing materials for cables — Part 4: PVC sheathing compounds — Section 4.1: Harmonized types*.

BS 7870-1, *LV and MV polymeric insulated cables for use by distribution and generation utilities — Part 1: General*.

BS 7870-2:1999, *LV and MV polymeric insulated cables for use by distribution and generation utilities — Part 2: Methods of test*.

BS EN 60811-1-1:1995, *Insulating and sheathing materials of electric cables — Common test methods — Part 1-1: General application — Measurement of thickness and overall dimensions — Tests for determining the mechanical properties*.

BS EN 60811-1-3:1995, *Insulating and sheathing materials of electric cables — Common test methods — Part 1-3: General application — Methods for determining the density — Water absorption tests — Shrinkage test*.

BS EN 60811-4-1:1995, *Insulating and sheathing materials for electric cables — Common test methods — Part 4-1: Methods specific to polyethylene and polypropylene compounds — Resistance to environmental stress cracking — Wrapping test after thermal ageing in air — Measurement of the flow index — Carbon black and/or mineral content measurement in PE*.

IEC 60189-1:1986, *Low-frequency cables and wires with p.v.c. insulation and p.v.c. sheath — Part 1: General test and measuring methods*.

3 Rated voltage

The rated voltage of cables in this standard is 100 V a.c. or 150 V d.c.

4 Conductors

Conductors shall be of plain copper wire consisting of a single strand of 0.8 mm nominal diameter, conforming to the requirements of BS 6360.

Conformity shall be checked by visual examination as specified in 15.2.

5 Insulation

The insulation shall be polyethylene type TI Y conforming to the requirements specified in Table 7.

The insulation shall be applied so that it fits closely on the conductor and it shall be possible to remove it without damage to the insulation itself or to the conductor.

The insulation shall be applied by a suitable extrusion process and shall form a compact and homogenous body.

The thickness of the insulation shall conform to the requirements specified in Table 1, Table 2 and Table 3.

Conformity shall be checked by the test methods specified in **15.3**.

6 Identification of pairs

The pairs shall be identified by colours in the following sequence.

- a) 4-pair cable:
 - black/violet;
 - red/yellow;
 - green/brown;
 - blue/white;
- b) 7-pair cable:
 - 1) centre pair: red/yellow;
 - 2) outer layer:
 - black/violet;
 - orange/grey¹⁾;
 - green/brown;
 - orange/blue¹⁾;
 - green/brown;
 - orange/white¹⁾;
- c) 19-pair cable:
 - 1) centre pair and first layer: as 7-pair above;
 - 2) outer layer:
 - black/violet;
 - odd pairs: red/yellow;
 - even pairs: green/brown;
 - blue/white;
- d) 37-pair cable:
 - 1) centre pair, first and second layers: as 19-pair above;
 - 2) outer layer:
 - black/violet;
 - odd pairs: red/yellow;
 - even pairs: green/brown;
 - blue/white;
- e) 61-pair cable:
 - 1) centre pair, first, second and third layers: as 37-pair above;
 - 2) outer layers:
 - black/violet;
 - odd pairs: red/yellow;
 - even pairs: green/brown;
 - blue/white.

Conformity shall be checked by visual examination as specified in **15.5**.

¹⁾ Nominated pairs designed for use at carrier frequencies in the range 12 kHz to 108 kHz.

7 Assembly of pairs, fillers and binders

Cables shall be twinned with a maximum lay length of 150 mm. The lengths of lay of adjacent pairs shall meet all the electrical requirements.

All laid-up assemblies shall be bound with a suitable tape or tapes applied with an overlap. Where cables are required to be filled, a suitable compound having a nominal drop point of not less than 55 °C shall be used.

8 Bedding layer

The bedding shall be an extruded layer of polyethylene compounds type TM Y, conforming to the requirements specified in Table 1, Table 2 and Table 3.

9 Armouring

The armouring shall consist of a single layer of galvanized steel or aluminium wires, conforming to the requirements specified in Table 1, Table 2 and Table 3, applied in the opposite direction to the outer layer of pairs.

Joints in aluminium wire armour shall be cold pressure or fusion welded.

Joints in steel wire armour shall be brazed or welded and any surface irregularity shall be removed. Any joint in any wire shall be not less than 1 m from the nearest joint in any other armour wire in the complete cable.

NOTE A layer of waterproof compound may be applied over the wires by agreement between the manufacturer and the purchaser.

10 Oversheath

The oversheath shall be an extruded layer of black PVC compound type TM 1, conforming to the requirements of BS 7655-4.1.

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

11 Marking

11.1 External marking

The external surface of the cable shall be legibly marked with the following elements:

Element	Example of marking
a) Electric cable	ELECTRIC CABLE
b) Voltage designation	
1) For unfilled cables	TELE
2) For filled cables	TELE F
c) British Standard number ²⁾	BS 7870-8.2
d) Manufacturer's identification	XYZ

The marking shall be by indenting or embossing on the oversheath.

For cables with tabulated³⁾ approximate overall diameters greater than 15 mm, elements a), b) and c) shall appear, in any sequence that is deemed neither to confuse nor to conflict, on two or more primary lines along the axis of the cable, approximately equally spaced around the circumference of the cable. Element d) shall appear upon at least one line, which may be one of the primary lines or a secondary line.

For cables with tabulated³⁾ approximate overall diameters of 15 mm or less, the elements shall be arranged as for cables of greater than 15 mm diameter, except that the marking for elements a), b) and c) shall appear on one or more primary lines.

The letters and figures shall consist of upright block characters. The characters shall have a minimum height of 3 mm.

The distance between the end of one element of marking and the beginning of the next identical element shall be not greater than 550 mm for elements a), b) and c) and not greater than 1 100 mm for element d).

Conformity shall be checked by visual examination and measurement as specified in 14.7.

11.2 Identification of year of manufacture

A means of identifying the year of manufacture of the cable shall be provided throughout the length of the cable, either internally or by use of an identification thread or externally by marking on the surface of the cable.

If the identification is internal, the distance between the end of one mark and the beginning of the next mark shall be not greater than 550 mm.

If the identification is by marking on the external surface, the distance between the end of one element of marking and the beginning of the next identical element shall be not greater than 1 100 mm.

Conformity shall be checked by visual examination and measurement as specified in 14.7.

11.3 Mark of an approval organization

If the mark of an approval organization is used, it shall be provided throughout the length of the cable, either as an identification thread or by marking on the external surface of the cable, as specified by the approval organization.

If the mark is on the external surface of the cable, it shall be in the form of the symbol(s) specified by the approval organization, and the distance between the end of one element of marking and the beginning of the next identical element shall be not greater than 1 100 mm.

Conformity shall be checked by visual examination and measurement as specified in 14.7.

²⁾ Marking BS 7870-8.2:2003 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

³⁾ See Table 1.