

**BS 7870-1:2011+A1:2022**

Incorporating corrigendum No. 1



**BSI Standards Publication**

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

Part 1: General (Implementation of HD 603, 605, 620,  
626 and 627)

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| 30 November 2022 | A1: see Foreword             |
| 30 April 2023    | C1: Corrections to Table B.2 |

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## Summary of pages

This document comprises a front cover, an inside front cover, pages I to IV, pages 1 to 16, an inside back cover and a back cover.

# Foreword

## Publishing information

This part of [BS 7870](#) is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 November 2022. 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 these committees can be obtained on request to the committee manager.

## Supersession

BS 7870-1:2011+A1:2022 supersedes BS 7870-1:2011, which is withdrawn.

## Relationship with other publications

[BS 7870](#) implements the nationally applicable elements of Harmonization Documents HD 603, 605, 620, 626 and 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. [Table 1](#) lists the parts and sections which have been published.

**Table 1** — *Parts and sections of BS 7870*

| Part and section | Title                                                                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Part 1           | General                                                                                                                                                                             |
| Part 2           | Methods of test                                                                                                                                                                     |
| Part 3           | Specification for distribution cables of rated voltage 0.6/1 kV                                                                                                                     |
| 3.10             | PVC insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors                                                                          |
| 3.11             | XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors                                                                         |
| 3.12             | XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors, having low emission of smoke and corrosive gases when affected by fire |
| 3.20             | PVC insulated split concentric cables with copper or aluminium conductors                                                                                                           |
| 3.21             | XLPE insulated split concentric cables with copper or aluminium conductors                                                                                                          |
| 3.22             | XLPE insulated split concentric cables with copper or aluminium conductors, having low emission of smoke and corrosive gases when affected by fire                                  |
| 3.40             | XLPE insulated copper wire waveform concentric cables with solid aluminium conductors                                                                                               |
| 3.50             | XLPE insulated, copper wire waveform or helical concentric cables with solid aluminium conductors, having low emission of smoke and corrosive gases when affected by fire           |

**Table 1** — *Parts and sections of BS 7870 (continued)*

| Part and section | Title                                                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Part 4           | Specification for distribution cables with extruded insulation of rated voltages of 11 kV to 33 kV                                             |
| 4.10             | Single-core 11 kV and 33 kV cables                                                                                                             |
| 4.11             | Single-core 33 kV lead sheathed cables                                                                                                         |
| 4.20             | Three core 11 kV cables                                                                                                                        |
| Part 5           | Polymeric insulated aerial bundled conductors (ABC) of rated voltage 0.6/1 kV for overhead distribution                                        |
| Part 8           | Specification for multicore and multipair cables for installation above and below ground                                                       |
| 8.1              | Single wire armoured and PVC sheathed multicore cable with copper conductors                                                                   |
| 8.2              | Single wire armoured and PVC sheathed multipair cable with copper conductors                                                                   |
| 8.3              | Single wire armoured and PVC sheathed multicore cable with copper conductors, having reduced fire propagation performance                      |
| 8.4              | Single wire or double steel tape armoured and PVC sheathed multipair cable with copper conductors, having reduced fire propagation performance |
| 8.5              | Single wire armoured and unarmoured multicore cables with copper conductors and non-halogenated sheath                                         |
| 8.6              | Single wire or double steel tape armoured and non-halogenated sheathed multipair cable with copper conductors                                  |

### Information about this document

Text introduced or altered by Corrigendum No. 1 is indicated in the text by tags **C1** **C1**. Minor editorial corrections are not tagged.

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

Text introduced or altered by Amendment No. 1 is indicated in the text by tags **A1** **A1**. Minor editorial changes are not tagged.

Amendment A1 introduces the following principal changes:

- updates of BS EN 60811 (series); and
- updates of [BS 7870-2](#) clauses.

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## Use of this document

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.

## 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.*

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

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## 1 Scope

This British Standard gives generic definitions and specifies the frequency of sample tests applicable to the BS 7870 series.

*NOTE* Guidance on the selection and use of the cables specified in [BS 7870](#) is given in [Annex A](#). Requirements for insulation and oversheath materials are specified in [Annex B](#).

## 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 7870-2](#), *LV and MV polymeric insulated cables for use by distribution and generation utilities – Part 2: Test methods*

 BS EN 60811-401, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 401: Miscellaneous tests – Thermal ageing methods – Ageing in an air oven*

BS EN 60811-402, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 402: Miscellaneous tests – Water absorption tests*

BS EN 60811-403, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 403: Miscellaneous tests – Ozone resistance test on cross-linked compounds*

BS EN 60811-409, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 409: Miscellaneous tests – Loss of mass test for thermoplastic insulations and sheaths*

BS EN 60811-412, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 412: Miscellaneous tests – Thermal ageing methods – Ageing in an air bomb*

BS EN 60811-501, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 501: Mechanical tests – Tests for determining the mechanical properties of insulating and sheathing compounds*

BS EN 60811-504, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 504: Mechanical tests – Bending tests at low temperature for insulation and sheaths*

BS EN 60811-505, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 505: Mechanical tests – Elongation at low temperature for insulations and sheaths*

BS EN 60811-506, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 509: Mechanical tests – Test for resistance of insulations and sheaths to cracking (heat shock test)*

BS EN 60811-507, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 507: Mechanical tests – Hot set test for cross-linked materials*

BS EN 60811-508, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 508: Mechanical tests – Pressure test at high temperature for insulation and sheaths*

BS EN 60811-509, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 509: Mechanical tests – Test for resistance of insulations and sheaths to cracking (heat shock test)*

BS EN 60811-605, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 605: Physical tests – Measurement of carbon black and/or mineral filler in polyethylene compounds* 

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

### 3 Terms and definitions

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

*NOTE These terms and definitions are applicable for the whole of the BS 7870 series of standards.*

#### 3.1 rated voltage

reference voltage for which the cable is designed

*NOTE This is expressed as a combination of the values  $U_0$ ,  $U$  and  $U_m$ .*

#### 3.2 rated voltage $U_0$

nominal power-frequency voltage between any conductor and armour or earth, for which the cable is suitable

#### 3.3 rated voltage $U$

nominal power-frequency voltage between phase conductors, for which the cable is suitable

#### 3.4 maximum voltage $U_m$

maximum sustained power-frequency voltage between phase conductors, for which the cable is suitable

#### 3.5 type of compound

category in which a compound is placed according to its properties, determined by specified tests

*NOTE The type designation is not directly related to the composition of the compound.*

#### 3.6 cross-linked polyethylene (XLPE)

thermosetting material formed by the cross-linking of thermoplastic polyethylene compound, either by chemical or by irradiation methods

#### 3.7 ethylene propylene rubber (EPR)

cross-linked compound in which the elastomer is ethylene propylene, ethylene propylene diene monomer (EPDM) or an equivalent synthetic elastomer

#### 3.8 thermoplastic polyvinyl chloride compound (PVC)

thermoplastic material comprising a combination of materials of which the characteristic constituent is polyvinyl chloride and/or one of its copolymers

#### 3.9 thermoplastic polyethylene compound (PE)

thermoplastic material comprising a combination of materials of which the characteristic constituent is polyethylene and/or one of its copolymers

#### 3.10 polyolefin (PO)

thermoplastic or cross-linked material in which the characteristic constituent is a copolymer of ethylene, such as ethylene vinyl acetate (EVA), ethylene ethyl acrylate (EEA) or ethylene methyl acrylate EMA