BRITISH STANDARD

BS 7870-8.1:2003

# 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 8.1: Single wire armoured and PVC sheathed multicore cable with copper conductors

## (Implementation of part of HD 627)



ICS 29.060.20



BSI British Standards

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee GEL/20, Cables, to Subcommittee GEL/20/16, Medium/high voltage cables, upon which the following bodies were represented:

British Approval Service for Cables

British Cables Association

British Plastics Association

Electricity Association

ERA Technology

Co-opted members



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# Contents

# 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 7870-8.1 implements HD 627-3A1 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 13 and a back cover.

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## 1 Scope

This section of BS 7870 specifies requirements for the construction, dimensions and mechanical and electrical properties of multicore PVC insulated and PVC sheathed cables. It specifies requirements for steel wire armoured multicore cables (2-core to 37-core) with copper conductors.

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 7655-3.1, *Specification for insulating and sheathing materials for cables — Part 3: PVC insulating compounds — Section 3.1: Harmonized types.*

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.*

## 3 Voltage designation

Cables shall be designated by the voltages $U_0$, $U$ and $U_m$, expressed in the form $U_0/U$ ($U_m$).

The voltage designation of cables in this standard is 0.6/1 (1.2) kV.



## 4 Conductors

Conductors shall be 2.5 $mm^2$ plain copper stranded circular class 2, conforming to the requirements of BS 6360.

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

NOTE A separator tape may be applied over the conductor.

## 5 Insulation

The insulation shall be PVC compound type TI 1, conforming to the requirements of BS 7655-3.1.

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.

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

## 6 Identification of cores

The cores shall be black or white with printed numbers in a contrasting colour.

The cores shall be numbered in sequence from 1 to 37 as follows:

a) 2-core: 1 and 2;

b) 3-core: 1, 2 and 3;

c) 4-core: 1, 2, 3 and 4;

d) 7-core: centre core numbered 1; six cores around numbered 2 to 7;

e) 12-core: centre three cores numbered 1, 2 and 3; nine cores around numbered 4 to 12;

f) 19-core: centre cores as for 7-core; 12 cores around numbered 8 to 19;

g) 27-core: centre cores as for 12-core; 15 cores around numbered 13 to 27;

h) 37-core: centre cores as for 19-core; 18 cores around numbered 20 to 37.

Cores shall be clearly identifiable and the printing shall be durable.

Conformity shall be checked by visual examination as specified in **15.4**.

## 7 Assembly of cores, fillers and binders

The direction of lay shall alternate for each successive layer. Up to seven cores shall be laid up with either a right- or left-hand direction of lay or an alternating right- and left-hand direction of lay.

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

NOTE 1 Where necessary, fillers of suitable synthetic material may be used.

NOTE 2 At the discretion of the manufacturer, a synthetic binder tape may be applied over the laid-up cores.

## 8 Bedding layer

The bedding shall be an extruded layer of polymer compound, conforming to the requirements specified in Table 1.

NOTE Tapes may be applied over the bedding.



## 9 Armouring

The armouring shall consist of a single layer of galvanized steel wires applied in the opposite direction to the outer layer of cores.

Joints in the 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 | 600/1 000 V AUX |
| c) British Standard number[1)] | BS 7870-8.1 |
| d) Manufacturer's identification | XYZ |

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

For cables with tabulated[2)] 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 tabulated[2)] 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**.

[1)] Marking BS 7870-8.1:2003 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.
[2)] See Table 1.

### 11.4 Additional marking

Where additional marking is made, it shall be throughout the length of the cable, and on the external surface of the cable, or by means of a tape or thread within the cable, or by a combination of these methods. If the additional marking is applied to the surface of the cable it shall not render illegible the marking specified in **11.1**, **11.2** and **11.3**.

The additional marking, however made, shall be repeated at intervals not exceeding 1 100 mm.

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

## 12 Dimensions

The dimensions of the component layers shall be as specified in Table 1.

**Table 1 — Cable construction**

Dimensions in millimetres

| Cable type | Conductor | | Mean thickness of insulation | Thickness of bedding | Approximate diameter | | Armour wire diameter | Thickness of oversheath | | Approximate overall diameter | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of wires | Nominal diameter of wires | | | Under bedding | Over bedding | | Without semi-conducting coating | With semi-conducting coating | Without semi-conducting coating | With semi-conducting coating |
| 2-core | 7 | 0.67 | 0.7 | 0.8 | 7.3 | 8.9 | 0.9 | 1.4 | 1.8 | 13.6 | 14.4 |
| 3-core | 7 | 0.67 | 0.7 | 0.8 | 7.8 | 9.4 | 0.9 | 1.4 | 1.8 | 14.1 | 14.9 |
| 4-core | 7 | 0.67 | 0.7 | 0.8 | 8.7 | 10.3 | 0.9 | 1.4 | 1.8 | 15.0 | 15.8 |
| 7-core | 7 | 0.67 | 0.7 | 0.8 | 10.8 | 12.4 | 1.25 | 1.5 | 1.8 | 18.0 | 18.6 |
| 12-core | 7 | 0.67 | 0.7 | 0.8 | 14.8 | 16.4 | 1.25 | 1.6 | 1.8 | 22.3 | 22.7 |
| 19-core | 7 | 0.67 | 0.7 | 1.0 | 17.8 | 19.8 | 1.6 | 1.7 | 1.8 | 26.6 | 26.8 |
| 27-core | 7 | 0.67 | 0.7 | 1.0 | 21.8 | 23.9 | 1.6 | 1.8 | 1.9 | 30.7 | 30.9 |
| 37-core | 7 | 0.67 | 0.7 | 1.0 | 24.8 | 26.8 | 1.6 | 1.9 | 2.0 | 34.0 | 34.2 |

## 13 Tests

Testing shall be performed in accordance with the schedule of tests specified in Table 2.

**Table 2 — Schedule of tests**

| Test | Category of test | Test method described in | Requirements given in |
|---|---|---|---|
| **Electrical tests** | | | |
| Conductor resistance | R | BS 7870-2:1999, **3.1.1** | **14.2** |
| Insulation resistance at 20 °C | R | BS 7870-2:1999, **3.3.2** | **14.3** |
| Voltage test | R | BS 7870-2:1999, **3.2.1.2** | **14.4** |
| Star capacitance | T | **16.3** | **16.3** |
| Spark test on oversheath | R | BS 7870-2:1999, **3.6.1** | **14.5** |
| Voltage test on oversheath | R | BS 7870-2:1999, **3.2.3.1** | **14.6** |
| **Provisions covering constructional and dimensional characteristics** | | | |
| Conductor material and construction | S | Visual examination | **15.2** |
| Insulation: | | | |
| — application | S | Visual examination | **15.3** |
| — thickness | S | BS 7870-2:1999, **2.1.1** | **15.3** |
| Core identification | S | Visual examination and BS 7870-2:1999, **2.5.4** | **15.4** |
| Laid-up cores | S | Visual examination | **15.5** |
| Bedding layer | S | BS 7870-2:1999, **2.1.2** | **15.6** |
| Armour wire: | | | |
| — wire diameter | S | BS 7870-2:1999, **2.1.4.3**a) | **15.7** |
| — mass of zinc coating | T | BS 7870-2:1999, **2.5.1.1** | **16.5** |
| — wrapping test | T | BS 7870-2:1999, **2.3.2** | **16.6** |
| Oversheath thickness | S | BS 7870-2:1999, **2.1.2** | **15.8** |
| Cable markings | R | Visual examination | **14.7** |
| **Non-electrical tests on materials** | | | |
| Insulation | T | BS 7655-3.1 | **16.2** |
| Extruded bedding | T | BS EN 60811-1-1 | **16.4** |
| Oversheath | T | BS 7655-4.1 | **16.7** |
| Compatibility test | T | BS 7870-2:1999, **2.4.12.2** | **16.8** |

## 14 Routine tests

### 14.1 General

Routine tests shall be performed in accordance with the schedule of tests in Table 2 and **14.2** to **14.7**.

### 14.2 Conductor resistance

When measured in accordance with BS 7870-2:1999, **3.1.1**, the resistance of each conductor at 20 °C shall be in accordance with the requirements of BS 6360 for the given class of conductor.

### 14.3 Insulation resistance

When measured in accordance with BS 7870-2:1999, **3.3.2**, the insulation resistance shall be not less than 9 MΩ/km.

### 14.4 Voltage test

When the voltage test is carried out in accordance with BS 7870-2:1999, **3.2**, using either 5 kV a.c. or 7.5 kV d.c. for 1 min between each conductor and the remaining conductors connected to the armour and earthed, no breakdown of the insulation shall occur.

### 14.5 Spark test on oversheath

Spark testing of the oversheath shall be carried out in accordance with BS 7870-2:1999, **3.6.1**. No failures shall occur.

### 14.6 Voltage test on oversheath

When the oversheath has a semi-conducting coating, a d.c. voltage shall be applied between the armour and the semi-conducting coating for 1 min in accordance with BS 7870-2:1999, **3.2.3.1**.

The oversheath shall withstand a voltage equal to 8 kV/mm of tabulated oversheath thickness as given in Table 1.

### 14.7 Cable markings

The cable markings shall be checked by visual examination and measurement and shall conform to the requirements of Clause **11**.

## 15 Sample tests

### 15.1 General

Sample tests shall be performed in accordance with the schedule of tests in Table 2 and **15.2** to **15.8**.

### 15.2 Conductor material and construction

The conductor material and construction shall be checked by visual examination and shall conform to the requirements of Clause **4**.

### 15.3 Insulation

The application of the insulation shall be checked by visual examination and shall conform to the requirements of Clause **5**.

The thickness of the insulation shall be measured using a sample that has been taken from one end of each drum length of cable selected for the test, and from which any portion that may have suffered damage has been discarded.

When this sample is measured in accordance with BS 7870-2:1999, **2.1.1**, the mean thickness of the insulation shall conform to the value specified in Table 1, and the minimum thickness at any point shall not fall below the value specified in Table 1 by more than 0.1 mm + 10 % of the specified value.

If any of the thicknesses measured does not conform to the requirements specified in Table 1, then two further samples shall be checked for the non-conforming factors. If both the further samples meet the specified requirements, the cable shall be deemed to conform, but if either does not meet the specified requirements, the cable shall be deemed not to conform.

### 15.4 Core identification

The cable cores shall be checked by visual examination and shall conform to the requirements of Clause **6**.

Durability of marking shall be checked by the test given in BS 7870-2:1999, **2.5.4**.

### 15.5 Laid-up cores

The laid-up cores shall be checked by visual examination and shall conform to the requirements of Clause **7**.

### 15.6 Bedding layer

The thickness of the bedding layer shall be measured using a sample that has been taken from one end of each drum length of cable selected for the test, and from which any portion that may have suffered damage has been discarded.

When this sample is measured in accordance with BS 7870-2:1999, **2.1.2**, the minimum thickness of the bedding layer at any point shall not fall below the value specified in Table 1 by more than 0.1 mm + 15 % of the specified value.

If any of the thicknesses measured does not conform to the requirements specified in Table 1, then two further samples shall be checked for the non-conforming factors. If both the further samples meet the specified requirements, the cable shall be deemed to conform, but if either does not meet the specified requirements, the cable shall be deemed not to conform.

### 15.7 Armour wire

When measured in accordance with BS 7870-2:1999, **2.1.4.3**a), the diameter of round armour wire shall fall within the minimum and maximum diameters specified in Table 3.

**Table 3 — Diameter of armour wire**

Dimensions in millimetres

| Nominal wire diameter | Wire diameter | |
|---|---|---|
| | Minimum | Maximum |
| 0.9 | 0.85 | 0.95 |
| 1.25 | 1.18 | 1.32 |
| 1.6 | 1.51 | 1.69 |

### 15.8 Oversheath

The thickness of the oversheath shall be measured using a sample that has been taken from one end of each drum length of cable selected for the test, and from which any portion that may have suffered damage has been discarded.

When this sample is measured in accordance with BS 7870-2:1999, **2.1.2**, the minimum thickness of the oversheath at any point shall not fall below the value specified in Table 1 by more than 0.2 mm + 20 % of the specified value.

If any of the thicknesses measured does not conform to the requirements specified in Table 1, then two further samples shall be checked for the non-conforming factors. If both the further samples meet the specified requirements, the cable shall be deemed to conform, but if either does not meet the specified requirements, the cable shall be deemed not to conform.

## 16 Type tests

### 16.1 General

Type tests shall be performed in accordance with the schedule of tests in Table 2 and **16.2** to **16.8**.

### 16.2 Insulation

The insulation shall be tested in accordance with BS 7655-3.1 and shall conform to the requirements for type TI 1.

### 16.3 Star capacitance

This test shall be undertaken on a complete drum length. The capacitance shall be measured between one core in each layer and all the other cores connected to the armouring, which shall be earthed. The average of these results shall be corrected to 1 km, multiplied by a factor of 1.2 and expressed in nanofarads (nF). The star capacitance shall have a maximum value of 440 nF for 1 km.

### 16.4 Bedding

The bedding shall be tested in accordance with BS EN 60811-1-1:1995, Clause **9**, and shall have a tensile strength of not less than 4 $N/mm^2$ and an elongation at break not less than 50 %.

### 16.5 Mass of zinc coating of galvanized steel armour wires

When measured in accordance with BS 7870-2:1999, **2.5.1.1**, the mass of zinc coating of galvanized steel armour wires shall be not less than that specified in Table 4.

**Table 4 — Mass of zinc coating**

| Nominal wire diameter<br>mm | Minimum mass of zinc coating<br>g/m$^2$ |
|---|---|
| 0.9 | 112 |
| 1.25 | 150 |
| 1.6 | 172 |

### 16.6 Wrapping test for galvanized steel armour wires

The wires shall be subjected to the wrapping test specified in BS 7870-2:1999, **2.3.2**. The mechanical characteristics of the galvanized steel armour wires shall be such that none of the wires break.

### 16.7 Oversheath

The oversheath shall be tested in accordance with BS 7655-4.1 and shall conform to the requirements for type TM 1.

### 16.8 Compatibility test

When tested in accordance with BS 7870-2:1999, **2.4.12.2**, the sample being aged for 7 days at (80 ± 2) °C, the materials shall conform to the requirements specified in Table 5.

**Table 5 — Requirements for compatibility of insulation and oversheath**

| Component | Test | Requirement |
|---|---|---|
| Insulation | Minimum tensile strength | 12.5 N/mm$^2$ |
| | Minimum elongation at break | 125 % |
| | Maximum variation[a] of tensile strength | 20 % |
| | Maximum variation[a] of elongation at break | 20 % |
| Oversheath | Minimum tensile strength | 12.5 N/mm$^2$ |
| | Minimum elongation at break | 125 % |
| | Maximum variation[a] of tensile strength | 20 % |
| | Maximum variation[a] of elongation at break | 20 % |

[a] The variation is the difference between the respective values obtained prior to and after heat treatment, expressed as a percentage of the former.

# Annex A (informative)
# Guide to use

## A.1 General

This annex gives guidance on the selection, storage, transportation, installation and disposal of the cables specified in this section of BS 7870.

## A.2 Recommendations for selection

### A.2.1 *Permissible application*

These cables are primarily intended for use underground in wet conditions and alongside high voltage cables. They are suitable for operation in an environmental temperature not exceeding 70 °C, taking into account any heat generated by adjacent power cables.

These cables may be used indoors but they should not be installed where fire propagation is a risk or where the emission of corrosive fumes and excessive smoke in the event of a fire is forbidden.

### A.2.2 *Maximum permissible voltage*

These cables may be used on category A, B and C systems as defined in IEC 60183.

## A.3 Recommendations for storage, transport and disposal

### A.3.1 *Storage*

Cable drums should be regularly inspected to assess their physical condition.

Battens, when supplied, should not be removed until the cable is required for installation.

### A.3.2 *Transport*

Cable drums having a flange diameter exceeding 1 m and weighing more than 250 kg gross should be transported in an upright condition. The drums should be protected against movement. Loading and unloading should be facilitated by suitable devices to avoid damage to both cable and drum. When moving drums, due regard should be paid to the weight, method and direction of rolling, protruding nails and wood splinters.

### A.3.3 *Incineration of scrap cable*

The incineration of scrap cable should be undertaken only by a licensed contractor. For further information, the Environment Agency should be contacted.

### A.3.4 *Cable and sealing*

Both ends of every length of cable should be sealed in such a manner as to include the oversheath and to inhibit the ingress of moisture during storage, delivery and up to the time of jointing.

## A.4 Recommendations for cable laying and installation

### A.4.1 *General*

The choice of cable should take into account the cable route, method of laying and service conditions. The latter should include:

a) the adjacency of other cables and their mutual heating effect and any induced voltage likely to arise in the event of a fault upon the adjacent cable;

b) the leakage of stray currents and attack from solvent substances;

c) soil subsidence and other forms of violent vibrations;

d) protection against mechanical damage during and after installation.

### A.4.2 *Environmental conditions*

The lowest recommended temperature for installation is 0 °C, but care should be taken to ensure that the cable temperature has been above 0 °C for the preceding 24 h.

### A.4.3 *Pulling tensions*

The maximum pulling load should not normally exceed 50 N/mm$^2$ of copper cross-sectional area but for armoured cables, particularly small sizes, higher rates are permitted, subject to the recommended side wall pressures not being exceeded and pulling on both armouring and conductors. Advice should be sought from the cable manufacturer.

### A.4.4 *Bending radii*

During installation, no cable should be bent to a smaller radius than 12 times the cable overall diameter. A single bend executed around a template may be undertaken at a radius of 8 times the cable overall diameter.

### A.4.5 *Cable installation*

There should be compatibility between jointing materials and components of the cable. The insulation level of the joint and terminations should take into account any induced voltage.

## A.5 Tests after installation (before jointing)

When required, the following tests should be carried out.

a) Confirm continuity of all conductors.

b) Measure the insulation resistance of each length after applying 500 V d.c. for 1 min and confirm that it is not lower than 9 MΩ/km.

c) Apply a d.c. voltage of 4 kV/mm of nominal oversheath thickness for 1 min without failure between the armour and the outer conducting surface.

## A.6 Tests after installation (after jointing)

When required, the following tests should be carried out.

a) Subject each jointed length to a d.c. voltage of 5 kV for 1 min between each conductor and the remaining conductors connected to the armour and earthed.

b) Measure and record the conductor resistance.

c) Measure the insulation resistance between each conductor and the other conductors and armour after application of 500 V d.c. for 1 min and confirm that it is not lower than 9 MΩ/km.

d) Apply a d.c. voltage equal to 4 kV/mm of nominal sheath thickness for 1 min without failure between the armour and the outer conducting surface.

# Bibliography

**Standards publications**

HD 603 S1:1994, *Distribution cables of rated voltage 0.6/1 kV.*

HD 604 S1:1994, *0.6/1 kV and 1.9/3.3 power cables with special fire performance for use in power stations.*

HD 605 S1:1994, *Electric cables — Additional test methods.*

HD 620 S1:1996, *Distribution cables with extruded insulation for rated voltages from 3.6/6 (7.2) kV to 20.8/36 (42) kV.*

HD 622 S1:1996, *Power cables having rated voltages from 3.6/6 (7.2) kV up to and including 20.8/36 (42) kV with special fire performance for use in power stations.*

HD 626 S1:1996, *Overhead distribution cables of rated voltage $U_0/U$ ($U_m$): 0.6/1 (1.2) kV.*

HD 627 S1:1996, *Multicore and multipair cable for installation above and below ground.*

IEC 60183, *Guide to the selection of high-voltage cables.*

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