

Specification for cables with extruded cross-linked polyethylene or ethylene propylene rubber insulation for rated voltages from 3.8/6.6 kV up to 19/33 kV

ICS 29.060.20

Committees responsible for this British Standard

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- British Approvals Service for Cables
- British Cable Makers Confederation
- British Plastics Federation
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- London Underground Ltd.
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Foreword

This new edition of BS 6622 has been prepared by Subcommittee GEL/20/2. It supersedes BS 6622:1991 which is withdrawn.

This edition includes technical changes to bring the standard up to date and is a full review of the standard.

This standard specifies requirements for cables in the rated voltage range from 3.8/6.6 kV up to 19/33 kV which are insulated with cross-linked polyethylene (XLPE) or ethylene propylene rubber compound (EPR). Corresponding cables which, when assessed by appropriate tests, produce lower levels of smoke and corrosive products under exposure to fire, are specified in BS 7835.

Annex E, Annex F, Annex G and Annex H are normative. Annex A, Annex B, Annex C, Annex D and Annex J are informative.

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.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their 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 to iv, pages 1 to 48, an inside back cover and a back cover.

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1 Scope

This British Standard specifies requirements for the construction and testing of cables with thermosetting insulation for rated voltages from 3.8/6.6 (7.2) kV up to 19/33 (36) kV inclusive.

Cables specified in this standard are for use in fixed industrial installations and buildings. They are designed for a maximum continuous conductor operating temperature of 90 °C and for a maximum short circuit conductor temperature of 250 °C.

The cable types specified in this standard are armoured and unarmoured single-core and armoured three-core cables for voltages in the range 3.8/6.6 (7.2) kV up to 19/33 (36) kV and unarmoured three-core cables for voltages in the range 3.8/6.6 (7.2) kV up to and including 8.7/15 (17.5) kV, as follows:

- stranded copper, stranded aluminium or solid aluminium conductors;
- cross-linked polyethylene or cross-linked ethylene propylene rubber insulation;
- a range of metallic screening layers including copper wire, copper tape and/or metallic sheaths;
- PVC or MDPE oversheath.

Annex A gives guidance on the selection of cables of appropriate voltage designations for particular systems. Details of metallic coverings including a reference to metal sheaths is also included.

Annex B lists the information that should be provided by the purchaser with an enquiry/order for cables.

Annex C gives recommendations for the installation of cables.

Annex J gives guidance on the use of cables.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 358, *Method for the measurement of voltage with sphere-gaps (one sphere earthed)*.

BS 923-1, *Guide on high-voltage testing techniques — Part 1: General*.

BS 4727-2: Group 08, *Glossary of electrotechnical, power, telecommunications, electronics, lighting and colour terms — Part 2: Terms particular to power engineering — Group 08: Electric cable terminology*.

BS 4828:1985, *Guide for partial discharge measurements*.

BS 5099, *Specification for spark testing of electric cables*.

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

BS EN 10244-2:2001, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc alloy coatings*.

BS EN 50265-1, *Common test methods for cables under fire conditions — Test for resistance to vertical flame propagation for a single insulated conductor or cable — Part 1: Apparatus*.

BS EN 50265-2-1, *Common test methods for cables under fire conditions — Test for resistance to vertical flame propagation for a single insulated conductor or cable — Part 2-1: Procedures — 1 kW pre-mixed flame*.

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

BS EN 60811-1-2:1995, *Insulating and sheathing materials of electric cables — Common test methods — Part 1: General application — Thermal ageing methods*.

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

BS EN 60811-2-1:1998, *Insulating and sheathing materials of electric and optical cables — Common test methods — Part 2-1: Methods specific to elastomeric compounds — Ozone resistance, hot set and mineral oil immersion tests.*

BS 7655-4.2, *Specification for insulating and sheathing materials for cables — Part 4: PVC sheathing compounds — Section 2: General application.*

BS 7655-10.1, *Specification for insulating and sheathing materials for cables — Part 10: Polyethylene sheathing compounds — Section 1: Thermoplastic medium density polyethylene (MDPE) sheathing compound.*

BS EN 10002-1, *Tensile testing of metallic materials — Part 1: Method of test at ambient temperature.*

BS EN 60060-2, *High voltage test techniques — Part 1: Measuring systems.*

3 Definitions

For the purposes of this British Standard the definitions given in BS 4727-2-08 apply, together with the following.

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 earth or metallic screen 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

cross-linked polyethylene (XLPE)

thermosetting material formed by the cross-linking of thermoplastic polyethylene compound so as to conform to the requirements given in this standard

3.6

cross-linked ethylene propylene rubber (EPR)

compound based on ethylene propylene rubber or similar (EPM or EPDM) which when cross-linked conforms to the requirements given in this standard

3.7

thermoplastic polyvinyl chloride compound (PVC)

combinations of materials suitably selected, proportioned and treated, of which the characteristic constituent is polyvinyl chloride or one of its copolymers, so as to conform to the requirements given in this standard

NOTE The same term also designates compounds containing both polyvinyl chloride and certain of its copolymers.

3.8

medium density polyethylene (MDPE)

thermoplastic material compounded so as to conform to the requirements given in this standard

3.9

type of compound

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

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

3.10**nominal value**

value, often used in tables, by which a quantity is designated

NOTE In this standard, nominal values usually give rise to values to be checked by measurements taking into account specified tolerances.

3.11**approximate value**

value which is only indicative

NOTE In this standard, values described as “approximate” do not constitute requirements to be checked by measurements.

3.12**routine tests**

tests performed by the manufacturer on each manufactured length of cable to check that the whole of each length meets the specified requirements

3.13**sample tests**

tests performed by the manufacturer on samples of completed cable, or components taken from a completed cable, at a specified frequency, so as to verify that the finished product meets the specified requirements

3.14**type tests**

tests made before supplying, on a general commercial basis, a type of cable covered by this standard in order to demonstrate satisfactory performance characteristics to meet the intended application

NOTE Type tests are of such a nature that, after they have been performed, they need not be repeated unless changes are made in the cable materials or design or manufacturing process which might change the performance characteristics.

3.15**tests after installation**

tests intended to demonstrate the integrity of the cable and its accessories as installed

4 Voltage designation

Cables are designated by the voltage U_0 , U and U_m expressed in the form $U_0/U (U_m)$.

The voltage designations of cables in this standard are:

3.8/6.6 (7.2) kV;	6.35/11 (12) kV;
8.7/15 (17.5) kV;	12.7/22 (24) kV;
19/33 (36) kV.	

5 Conductors**5.1 General**

Conductors shall be either plain annealed copper or aluminium, circular or shaped, and shall conform to BS 6360. Copper conductors shall be stranded (class 2) and aluminium conductors shall be either solid (class 1) or stranded (class 2).

5.2 Circular conductors

Stranded circular conductors shall be compacted or uncompacted.

5.3 Shaped conductors

Shaped conductors, when used as an alternative to circular conductors for three-core cables of rated voltages 3.8/6.6 (7.2) kV and 6.35/11 (12) kV, shall have a conductor cross-sectional area not less than the following:

3.8/6.6(7.2) kV:	70 mm ² ;
6.35/11(12) kV:	95 mm ² .

The dimensions of shaped solid aluminium conductors shall be as given in Table 1.

Table 1 — Dimensions of shaped solid aluminium conductors

Nominal cross-sectional area of conductor mm ²	Approximate dimensions of conductor				Minimum corner radius of conductor mm
	Width mm	Depth mm	Back radius mm	Corner radius mm	
70	11.3	7.9	9.9	2.8	2.6
95	13.9	9.1	11.4	2.8	2.6
120	15.8	10.2	12.6	3.0	2.8
150	17.9	11.3	13.9	3.0	2.8
185	20.5	12.6	15.4	3.0	2.8
240	24.0	14.5	17.5	3.0	2.8
300	27.3	16.2	19.5	3.0	2.8

6 Conductor screen

A conductor screen consisting of an extruded layer of cross-linkable semi-conducting compound shall be applied over the conductor and cover the surface of the conductor completely.

NOTE A semi-conducting tape may be applied prior to the extruded layer at the discretion of the manufacturer.

The extruded conductor screen shall be applied in the same operation as the insulation and be fully bonded to the insulation.

7 Insulation

The insulation shall be either XLPE or EPR conforming to the requirements of 19.4.

The insulation shall be applied by extrusion and cross-linked to form a compact and homogeneous layer.

The colour of the insulation shall be such that it is easily distinguishable from the screening materials.

The minimum and minimum average thickness of insulation shall be as specified in Table 2 to Table 11.

8 Insulation screen

8.1 General

An insulation screen shall be applied to all cables and shall consist of a cross-linkable extruded semi-conducting layer in combination with a metallic layer.

8.2 Extruded semi-conducting layer

The extruded semi-conducting layer shall consist of a bonded or strippable semi-conducting compound capable of removal for jointing and terminating (see C.5). It shall be applied in the same operation as the insulation, directly over the insulation, and shall cover the surface of the core completely.

NOTE At the discretion of the manufacturer, semi-conducting tape or a semi-conducting extruded layer may be applied over the semi-conducting insulation screen as a bedding for the metallic layer.

8.3 Metallic layer

8.3.1 General

The metallic layer shall be applied either around each core and/or as a collective screen. For rated voltages above 8.7/15 (17.5) kV, a metallic screen shall be applied around each core.

8.3.2 Metallic screen on each core

A metallic screen applied directly over the core of single-core cables or each core in three-core cables, shall consist of either helically applied overlapped copper tape(s) or a concentric layer of copper wires applied helically or in a waveform.

The copper wires shall be spaced with an average gap not greater than 4 mm. No gap shall exceed 8 mm.

NOTE 1 At the discretion of the manufacturer, a copper equalizing tape may be applied.

NOTE 2 At the discretion of the manufacturer, a binder tape may be applied over the metallic screen of single-core cables.

8.3.3 Collective metallic screen

Three-core cables not having a metallic screen over each individual core shall have a collective screen applied after the cores have been laid up together and over the bedding layer (see 9.3).

NOTE 1 Three-core cables having a metallic screen over each individual core may also have a collective screen.

The collective screen shall consist of:

a) a concentric layer of copper wires applied helically or in a waveform. The average gap between adjacent wires shall not exceed 4 mm, and no gap shall exceed 8 mm; and/or

NOTE 2 At the discretion of the manufacturer, a copper equalizing tape may be applied.

b) metallic sheath (see annex A); and/or

c) wire armour (see clause 10).

NOTE 3 At the discretion of the manufacturer, a binder tape may be applied over the metallic screen.

9 Laying-up

9.1 General

For three-core cables, the cores shall be laid-up with a right hand direction of lay. Fillers shall be used to form a substantially compact and circular cable. The fillers shall be compatible with adjacent materials.

9.2 Cables with a metallic screen on each core

The metallic screens of the three cores shall be in contact with each other.

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

9.3 Cables with a collective metallic screen

An extruded or lapped bedding layer shall be applied around the laid-up cores.

NOTE If the bedding layer is extruded, the fillers may be applied integrally with the bedding layer.

For cables with a metallic screen on each core and a collective screen of dissimilar metal, the bedding layer shall be extruded, unless the collective screen is a lead sheath in which case the bedding layer may be extruded or lapped.

The thickness of a lapped bedding layer shall be approximately 0.6 mm. The thickness of an extruded bedding layer shall conform to the requirements for the separation layer specified in 10.1.

For cables not having a metallic screen on each core, the extruded or lapped bedding layer shall be semi-conducting. The shape of the fillers shall not prevent electrical contact between the insulation screen and the semi-conducting bedding layer.

The materials used for the bedding layer shall be suitable for the operating temperature of the cable and compatible with the other materials used in the cable construction.

10 Armour

10.1 Separation layer

When armour is to be applied to a cable having a screen of dissimilar metal, an extruded separation layer shall be applied between the two metallic layers. The material used shall conform to 11.1.

Nominal and minimum thicknesses of the separation layer shall be as specified in Table 2 to Table 11.

10.2 Metal layer

For the armouring of three-core cables, round galvanized steel wires shall be used.

NOTE 1 Where the purchaser requires a cable to operate at a higher system fault level, a number of galvanized steel wires may be replaced by tinned copper wires, subject to agreement between the purchaser and the manufacturer.

NOTE 2 When requested by the purchaser, galvanized steel tape armour may be used as an alternative to or in conjunction with the steel wire armour.

For the armouring of single-core cables either round aluminium wires or aluminium strips shall be used.

The nominal dimensions of the armour shall be as specified in Table 2 to Table 11.

Armour shall be applied helically in a single layer with a left-hand lay.

Joints in steel wire armour shall be brazed or welded and any surface irregularity removed.

Joints in aluminium wire or strip shall be made by cold pressure or fusion welding and all surface irregularities shall be removed.

A joint in any wire or strip shall be not less than 1 m from the nearest joint in any other armour wire or strip in the completed cable.

11 Oversheath

11.1 General

The material for the extruded oversheath shall be PVC or MDPE in accordance with BS 7655-4.2: Type 9 or -10.1: Type TS 2, respectively.

NOTE 1 Oversheaths are normally black but colours other than black may be provided by agreement between the manufacturer and the purchaser, subject to their suitability for the particular conditions under which the cables are to be used.

NOTE 2 Cables with MDPE oversheaths are not designed to satisfy the requirements of BS EN 50265-1 and BS EN 50265-2-1.

11.2 Thickness for unarmoured cables

For unarmoured cables, the minimum and minimum average thickness of oversheath shall be as specified in Table 2 to Table 11.

11.3 Thickness for armoured cables

For armoured cables, the nominal and the minimum thickness of oversheath shall be as specified in Table 2 to Table 11.

11.4 Semi-conducting layer

When the purchaser specifies that a d.c. voltage test is to be performed on the oversheath (see A.5), a semi-conducting layer shall be applied over its surface.

12 Marking

12.1 Marking of oversheath

The external surface of all cables shall be legibly marked with the following elements of marking, in any sequence that is deemed neither to confuse nor conflict.

Element	Example of marking
a) Electric cable	ELECTRIC CABLE
b) Voltage designation	
3.8/6.6 (7.2) kV	6 600 V
6.35/11 (12) kV	11 000 V
8.7/15 (17.5) kV	15 000 V
12.7/22 (24) kV	22 000 V
19/33 (36) kV	33 000 V
c) British Standard number ¹⁾	BS 6622
d) Manufacturer's identification	XYZ
e) The number of cores, type and nominal area of conductors, e.g.:	
1) copper conductor cables: 1 × 50 shall indicate a single-core cable with a 50 mm ² copper conductor;	
2) aluminium conductor cables: 3 × 50 AL shall indicate a three-core cable with 50 mm ² aluminium conductors.	

The marking of elements a) to d) shall be by embossing or indenting on the oversheath.

¹⁾ Marking BS 6622 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, which may also be desirable.

Elements a), b) and c) shall appear on two or more primary lines along the axis of the cable, approximately equally spaced around the circumference of the cable.

Elements d) and e) shall appear on at least one line.

NOTE They may be on one of the primary lines or a secondary line or lines and need not be on the same line.

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 items a), b) and c), and not greater than 1 100 mm for items d) and e).

12.2 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 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.

NOTE An identification thread may be used as an alternative to internal marking.

If the identification is by marking on the surface, the maximum distance between marks shall be 1 100 mm.

12.3 The 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 a mark on the surface of the cable, or as an identification thread, as specified by the approval organization.

If the mark is applied to the cable, it shall be on the surface in the form of the symbol(s) specified by the approval organization, and shall conform to 12.1d) and e) in respect of the maximum distance between marks.

12.4 Additional marking

Where additional marking is made, it shall be throughout the length of the cable, either on the external surface of the cable, or by means of a tape or thread within the cable, or by 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 12.1, 12.2 and 12.3.

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

13 Sealing and drumming

Before despatch, the manufacturer shall cap the ends of all cable in order to form a seal to prevent the ingress of water during transportation and storage.

Cable drums shall be lagged in order to protect the cable from damage and the end of the cable projecting from the drum shall also be protected from damage.

Each drum shall bear a distinguishing number on the outside of the flange and particulars of the cable, i.e. voltage, length, conductor size and cable type. The gross mass shall be shown and the direction for rolling shall be indicated by an arrow.

14 Dimensions

The dimensions of the component layers shall be as given in Table 2 to Table 11. In addition, the approximate overall diameters for the following designs of cable are given.

- a) Single-core unarmoured cables with 35 mm² copper wire screen.
- b) Single-core armoured cables with:
 - copper tape screen;
 - extruded separation layer;
 - aluminium round wire or strip armour.

c) Three-core unarmoured cables with:

- lapped bedding layer;
- 35 mm² collective copper wire screen only;
- rated voltages up to and including 8.7/15 (17.5) kV.

d) Three-core armoured cables with:

- copper tape screen on each core;
- extruded separation layer;
- galvanized round steel wire armour.

NOTE The approximate overall diameters given for cables with circular stranded conductors up to and including 630 mm² are based on the use of compacted conductors.

For designs other than those listed, the table specifying the most closely similar design shall be used to determine the thickness of the various component parts.

Table 2 — Single-core cables 3.8/6.6 (7.2) kV

Nominal cross-sectional area of conductor	Thickness of insulation		Thickness of separation layer of armoured cables		Nominal armour wire diameter	Armour strip dimensions		Thickness of oversheath				Approximate overall diameter			
								Unarmoured		Armoured		Solid aluminium conductors		Stranded conductors	
	Min. at a point	Min. average	Min. at a point	Nominal		Thickness	Width	Min. at a point	Min. average	Min at a point	Nominal	Unarmoured	Armoured	Unarmoured	Armoured
mm ²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
50	2.15	2.5	0.76	1.2	1.6	1.0	3.6	1.26	1.6	1.24	1.8	22.6	25.9	23.3	26.7
70	2.15	2.5	0.76	1.2	1.6	1.0	3.6	1.34	1.7	1.24	1.8	24.3	27.5	25.2	28.4
95	2.15	2.5	0.76	1.2	1.6	1.0	3.6	1.34	1.7	1.32	1.9	26.0	29.3	26.9	30.3
120	2.15	2.5	0.76	1.2	1.6	1.0	3.6	1.43	1.8	1.32	1.9	27.5	30.6	28.8	31.9
150	2.15	2.5	0.76	1.2	1.6	1.0	3.6	1.43	1.8	1.40	2.0	28.9	32.2	30.2	35.5
185	2.15	2.5	0.76	1.2	2.0	1.4	4.8	1.51	1.9	1.40	2.0	30.7	34.6	32.2	36.1
240	2.24	2.6	0.76	1.2	2.0	1.4	4.8	1.51	1.9	1.48	2.1	33.1	37.2	34.8	38.9
300	2.42	2.8	0.76	1.2	2.0	1.4	4.8	1.60	2.0	1.56	2.2	35.8	39.9	37.7	41.8
400	2.60	3.0	0.76	1.2	2.0	1.4	4.8	1.77	2.2	1.64	2.3	—	—	41.6	45.5
500	2.78	3.2	0.84	1.3	2.5	1.8	6.4	1.85	2.3	1.80	2.5	—	—	45.3	50.5
630	2.78	3.2	0.92	1.4	2.5	1.8	6.4	1.94	2.4	1.88	2.6	—	—	49.2	54.6
800	2.78	3.2	0.92	1.4	2.5	1.8	6.4	2.02	2.5	1.96	2.7	—	—	55.4	60.8
1 000	2.78	3.2	1.00	1.5	2.5	1.8	6.4	2.11	2.6	2.12	2.9	—	—	60.1	65.9

NOTE 1 The approximate overall diameters relate to cables with round wire armour and may be somewhat less for cables with strip armour.

NOTE 2 The overall diameters are approximate and are given for information only. If more precise values are required, the manufacturer should be consulted.

Table 3 — Three-core cables 3.8/6.6 (7.2) kV

Nominal cross-sectional area of conductor	Thickness of insulation		Thickness of separation layer of armoured cables		Nominal armour wire diameter	Thickness of oversheath				Approximate overall diameter							
						Unarmoured		Armoured		Circular conductors				Shaped conductors			
										Solid aluminium		Stranded		Solid aluminium		Stranded	
	Min. at a point	Min. average	Min. at a point	Nominal		Min. at a point	Min. average	Min. at a point	Nominal	Un-armoured	Armoured	Un-armoured	Armoured	Un-armoured	Armoured	Un-armoured	Armoured
mm ²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
10	2.15	2.5	0.76	1.2	2.0	1.51	1.9	1.48	2.1	33.9	37.9	34.4	38.7	—	—	—	—
16	2.15	2.5	0.76	1.2	2.0	1.60	2.0	1.56	2.2	36.1	40.1	36.8	40.7	—	—	—	—
25	2.15	2.5	0.76	1.2	2.0	1.68	2.1	1.56	2.2	38.7	42.4	39.6	43.3	—	—	—	—
35	2.15	2.5	0.76	1.2	2.0	1.77	2.2	1.64	2.3	41.1	44.8	42.4	46.1	—	—	—	—
50	2.15	2.5	0.84	1.2	2.5	1.85	2.3	1.80	2.5	43.6	48.7	45.2	50.3	—	—	—	—
70	2.15	2.5	0.84	1.2	2.5	1.94	2.4	1.88	2.6	47.2	52.2	49.1	54.2	44.9	50.0	45.8	50.8
95	2.15	2.5	0.92	1.4	2.5	2.02	2.5	1.96	2.7	51.3	56.2	53.4	58.3	48.2	53.1	49.5	54.3
120	2.15	2.5	1.00	1.5	2.5	2.11	2.6	2.04	2.8	54.5	59.5	57.1	62.1	50.7	55.8	52.4	57.4
150	2.15	2.5	1.00	1.5	2.5	2.19	2.7	2.12	2.9	57.5	62.5	60.3	65.3	53.2	58.2	55.3	60.3
185	2.15	2.5	1.08	1.6	2.5	2.28	2.8	2.20	3.0	61.2	66.4	64.4	69.6	56.1	61.3	58.6	63.8
240	2.24	2.6	1.16	1.7	2.5	2.45	3.0	2.36	3.2	66.9	72.2	70.5	75.8	60.7	66.1	63.8	69.1
300	2.42	2.8	1.24	1.8	3.15	2.62	3.2	2.60	3.5	72.7	79.7	76.8	83.8	65.7	72.8	69.2	76.3
400	2.60	3.0	1.40	2.0	3.15	2.87	3.5	2.76	3.7	—	—	85.0	92.1	—	—	—	—
NOTE The overall diameters are approximate and are given for information only. If more precise values are required, the manufacturer should be consulted.																	

Table 4 — Single-core cables 6.35/11 (12) kV

Thickness of insulation: minimum average: 3.4 mm minimum at a point: 2.96 mm													
Nominal cross-sectional area of conductor	Thickness of separation layer of armoured cables		Nominal armour wire diameter	Armour strip dimensions		Thickness of oversheath				Approximate overall diameter			
						Unarmoured		Armoured		Solid aluminium conductors		Stranded conductors	
	Min. at a point	Nominal		Thickness	Width	Min. at a point	Min. average	Min. at a point	Nominal	Unarmoured	Armoured	Unarmoured	Armoured
mm ²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
50	0.76	1.2	1.6	1.0	3.6	1.34	1.7	1.24	1.8	24.6	27.7	25.3	28.5
70	0.76	1.2	1.6	1.0	3.6	1.34	1.7	1.32	1.9	26.1	29.5	27.0	30.4
95	0.76	1.2	1.6	1.0	3.6	1.43	1.8	1.32	1.9	28.0	31.1	29.0	32.1
120	0.76	1.2	1.6	1.0	3.6	1.43	1.8	1.40	2.0	29.3	32.6	30.6	33.9
150	0.76	1.2	2.0	1.4	4.8	1.51	1.9	1.48	2.1	30.9	35.0	32.2	36.3
185	0.76	1.2	2.0	1.4	4.8	1.51	1.9	1.48	2.1	32.5	36.6	34.0	38.1
240	0.76	1.2	2.0	1.4	4.8	1.60	2.0	1.56	2.2	34.9	39.0	36.6	40.7
300	0.76	1.2	2.0	1.4	4.8	1.68	2.1	1.56	2.2	37.2	41.1	39.1	43.0
400	0.76	1.2	2.0	1.4	4.8	1.77	2.2	1.72	2.4	—	—	42.4	46.5
500	0.84	1.3	2.5	1.8	6.4	1.85	2.3	1.80	2.5	—	—	45.7	50.9
630	0.92	1.4	2.5	1.8	6.4	1.94	2.4	1.88	2.6	—	—	49.6	55.0
800	0.92	1.4	2.5	1.8	6.4	2.02	2.5	1.96	2.7	—	—	55.8	61.2
1 000	1.00	1.5	2.5	1.8	6.4	2.11	2.6	2.12	2.9	—	—	60.5	66.3
NOTE 1 The approximate overall diameters relate to cables with round wire armour and may be somewhat less for cables with strip armour.													
NOTE 2 The overall diameters are approximate and are given for information only. If more precise values are required, the manufacturer should be consulted.													