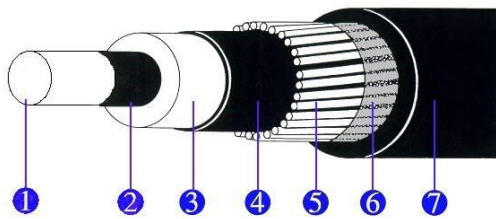
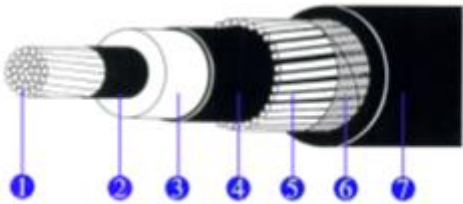


Product Guide – BS 7870-4.10

CABLE CONSTRUCTION



Conductor: Plain annealed copper stranded (Class 2) conductor BS EN 60228*

Plain aluminium stranded (Class 2) conductor BS EN 60228*

Plain Solid Aluminium Conductor (SAC – Class 1) BS EN 60228

*Stranded designs can be offered with water blocking.

Conductor Screen: Extruded layer of cross-linked semi-conducting compound.

Insulation: XLPE - Type DIX 3 to BS 7870-1 Annex B

EPR – Type DIE 5 to BS 7870-1 Annex B

Insulation Screen: Extruded layer of cross-linked semi-conducting compound.

This can be either Bonded (B) or Strippable (S). Bonded is most common.

Metallic Screen: Copper Wire Screen – typically 35 or 50mm², other sizes available on request.

Some customers specify a Copper Equalising Wire (CEW)

Binder Tape: Used to prevent encapsulation of the wire screen with the oversheath. Where a tape is applied under the CWS, this will be semi conducting.

For water blocked designs, water blocking tapes can be applied either over or, under and over the CWS.

Sheath: Type A – Type DMP 5 to BS 7870-1 Annex B, MDPE sheathing compound*

Type B – Type DMZ 4 to BS 7870-1 Annex B, LSOH sheathing compound

*A semi conducting sheath or graphite layer can be applied for sheath integrity testing purposes.

Triplex: An option is available to lay up three completed single core cables to enable installers to pull the three phases in one pull, such as in one duct.

AIM

The purpose of this guide is to inform users about characteristics and limitations of electric cables and thereby ensure correct use. These cables are intended for the transmission and distribution of electricity or earthing purposes. BS 7870-4.10 assumes that the design of installations and the specification, purchase and installation of cables specified is entrusted to people who meet the definition of a skilled person or instructed person, as given in Electricity Safety, Quality and Continuity Regulations (ESQCR).

The appropriate levels of safety should be observed when handling cables and reference should be made to such documents as Health & Safety at Work Act 1974 and any relevant local Risk Assessments.

GENERAL

This guide should be read in conjunction with the latest issue of the product datasheet.

These cables are designed and manufactured to BS 7870-4.10 and are used by the Distribution Network Operators (DNOs) and Independent Network Operators (IDNOs) throughout the UK.

They incorporate a Copper Wire Screen (CWS) which has been sized accordingly for the fault level of the network concerned. Typically, these would be 35 or 50mm², but other sizes can be specified and are outlined in **Table 6 in BS 7870-4.10**. Copper screens are less susceptible to corrosion than that of steel or aluminium armour. These cables are supplied with an MDPE sheath, making them more resistant to water penetration than PVC. For installations known to be prone to wet conditions, such as Wind Farms, then customer specifications may stipulate water blocking of CWS and/or conductor.

Where reduced flame propagating or low smoke and low corrosive acid gas properties are required, such as within buildings, a Low Smoke Zero Halogen (LSOH) sheath should be specified.

These cables are intended for installation in free air, clipped direct to a surface or cable tray/basket, buried either direct in the ground or installed in ducts in the ground.

COMPLIANCE

Construction Products Regulation – CPR

The Construction Products Regulation is a legal requirement of the UK and European markets. Cable products are subject to Reaction to Fire performance requirements where they are intended for use in construction works (Fixed Installation), including both buildings and civil engineering works.

Cables manufactured to this standard are predominately used in construction works so must meet the requirements for CPR. A Declaration of Performance (DoP) certificate can be obtained from <https://uk.prysmian.com/technical-area>

REACH/ROHS/WEEE

The *Registration, Evaluation, Authorisation & restriction of Chemicals (REACH) Regulations* in the EU and the UK operate independently from each other. Companies that supply and

purchase substances, mixtures or articles to and from the EU/EEA/Northern Ireland and Great Britain (England, Scotland and Wales) need to ensure that the relevant duties are met under both pieces of legislation. Under the Northern Ireland Protocol the EU REACH Regulation continues to apply to Northern Ireland, while UK REACH regulates the access of substances to the GB market. Prysmian UK uses substances (as raw materials) in articles (not intentionally releasing substances) and mixtures and, it has undertaken all necessary steps to comply with both regulations.

Under *The Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) Regulations*, any manufacturer, importer or distributor of electrical and electronic equipment (EEE) for the Great Britain market has the responsibility for ensuring that levels of certain hazardous substances and chemicals are not exceeded. Prysmian UK undertakes all necessary steps to ensure compliance to the ROHS regulations.

The Waste Electrical and Electronic Equipment Regulations (WEEE) are aimed at reducing the amount of waste electrical and electronic equipment (WEEE) incinerated or sent to landfill sites. Reduction is achieved through various measures which encourage the recovery, reuse and recycling of products and components.

Statements of Compliance to the above regulations can be obtained from <https://uk.prysmian.com/technical-area>

ENVIRONMENT AND APPLICATION

BS 7870-4.10 cables are designed primarily for buried direct installations or installed in ducts in the ground but can also be used for installations in free air, clipped directly to a surface or on tray, in basket. These are intended for power distribution networks used by the Distribution Network Operators (DNOs) and Independent Network Operators (IDNOs) throughout the UK.

BS 7870-4.10 cables are **not** suitable for:

- Applications where a low level of emission of smoke and corrosive gases are required (except for where LSOH has been specified)
- The provision of circuit integrity in case of a fire
- Applications where the cable is to be installed below the water table*
- Connections to mobile equipment
- As self-supporting aerial cables
- As trailing or reeling cables
- As submarine cable or for laying in water-logged conditions*
- Where subsidence is likely, unless special precautions are taken to minimize any damage

*These cables are suitable for free draining soil. Where the ground is expected to be permanently wet, MDPE sheath should be specified, and water blocking should be considered.

These cables do not provide protection against damage by rodents, termites etc.

These cables can be harmed by exposure to corrosive products or solvent substances, especially petroleum-based chemicals, or their vapours.

When using this cable in the presence of explosive or flammable atmospheres, reference should be made to **BS EN 60079**.

VOLTAGE

In an alternating current system, the rated voltage of the cable shall be at least equal to the nominal voltage of the system for which it is intended.

These cables are intended for use within a nominal power frequency range of 49 Hz to 61 Hz.

The operating voltage of the system may permanently exceed the nominal voltage of the system. The maximum permanent permitted operating voltage of the cable is stated in the table below.

| Rated voltage of cable | Maximum permanent permitted operating voltage of the system | |
|------------------------|---|---------------------|
| | a.c. | |
| U_0/U | Conductor-earth | Conductor-conductor |
| kV | U_0 max (V) | U max (V) |
| 6.35/ 11 | 6.9 | 12 |
| 12.7/ 22 | 13.9 | 24 |
| 19/ 33 | 20.9 | 36 |

CABLE SELECTION

Cable selection is the responsibility of the system designer.

The method of installation used for the cable affects its current-carrying capacity, and due account should be taken for this. If the cables are to be exposed to localized heat or higher ambient conditions, the current carrying capacity will be reduced and may therefore impact on the size of cable required.

Short circuit requirements may also be a determining factor in cable size selection. Appropriate current ratings for these products can be obtained from our datasheets. Please contact power.distribution@prysmian.com

Volt drop – For medium voltage circuits, voltage drop is not considered an issue except for very long circuits. However, this is normally controlled by adjusting the tapping's on the transformer to achieve the desired voltage at the end of the circuit.

Tables for correction factors are available on request.

Please contact power.distribution@prysmian.com

CABLE INSTALLATION

Operating temp: -25 °C to +90°C
(the cable should not be installed when either the ambient or cable temperature is below 0 °C)

Max. short circuit temp: Maximum conductor temperature should not exceed 250 °C*.
MDPE - maximum screen temperature should not exceed 250 °C.
LSOH - maximum screen temperature should not

| | exceed 200 °C. Maximum allowable time is 5 s. | | | | | | |
|--------------------------|--|---------------|---------|--------|------------|---------|---------|
| Max. overload temp: | These cables may be subjected to overloads under the following limitations: Maximum conductor temperature of 105 °C, maximum duration of 4 hours at any one time, maximum of 100 hours in any 12 consecutive months, maximum of 400 hours in cable lifetime. | | | | | | |
| Min. bending radius: | <table border="1"> <thead> <tr> <th>MV Cable Type</th> <th>Dynamic</th> <th>Static</th> </tr> </thead> <tbody> <tr> <td>S-C CWS MV</td> <td>20 x OD</td> <td>15 x OD</td> </tr> </tbody> </table> <p>Note: Wherever possible, larger installation radii should be used.</p> | MV Cable Type | Dynamic | Static | S-C CWS MV | 20 x OD | 15 x OD |
| MV Cable Type | Dynamic | Static | | | | | |
| S-C CWS MV | 20 x OD | 15 x OD | | | | | |
| Cable Pulling Tension | Copper – maximum pulling tension is 5 kg/mm ² Aluminium – maximum pulling tension is 3 kg/mm ² Maximum pulling tension of total conductor cross sectional area up to a maximum of 2000 kg. Exceeding the recommended pulling tensions can result in damage to the cable. | | | | | | |
| Tests after installation | A voltage test can be carried out on the insulated core, and if a graphite coating has been specified, a test can also be carried out to test the oversheath integrity. | | | | | | |

*Repeated short circuits and overloads can potentially damage the cable and lead to premature failure.
Note: More installation guidance on these cables can be found on our website <https://uk.prysmian.com/technical-area>

BS 7870-4.10 cables should be installed in accordance with the appropriate regulations, including the latest edition of the Electricity Safety, Quality and Continuity Regulations (ESQCR), making sure it is suitable for the intended operating conditions and equipment classification, and taking into consideration any external influences which may exist such as ambient temperature, presence of water and fauna.

Precautions should be taken to avoid damage to the insulation during the installation and termination of these cables and should be prevented from being in contact with or close to hot surfaces.

This cable shall be located and installed such that their intended heat dissipation is not inhibited, and to ensure they do not present a fire hazard to adjacent materials.

Cables shall not be operated at temperatures higher than those recommended within this guide. Operation at higher temperatures can cause serious damage resulting in premature failure or a significant reduction of the properties of the cables.

Additional protection should be used in installations where the cable may be subject to damage by fauna.

The selection of cable glands, accessories and any associated tools should take account of all aspects of intended use. Any semi-conducting coating present on the oversheath should be removed for a suitable distance from joints and terminations. For further information please visit www.biconcomponents.co.uk.

CABLE FIXING AND SUPPORT

Cables are intended for use in fixed wiring applications which should be supported adequately and shall not be damaged by any mechanical restraint used for their support.

Where cables are installed vertically, without intermediate support, and are inaccessible and unlikely to be moved or disturbed, they shall be supported at the top of the run such that the internal radius of the resultant bend is not less than the appropriate minimum bending radius. The unsupported vertical length should not exceed 5m.

Account shall be taken of the possibility of damage to cables and their supports due to the disruptive effects of the electromechanical forces caused by any current which the cables may have to carry in service, including short circuit ratings.

Cables which have been in use in fixed installations can be damaged if they are disturbed.

The likelihood of vibration and the mass of the cable between the supports shall be considered when deciding the actual spacing required. BS 7870-3.40 does not provide any recommendations for support spacing. However, Prysmian would recommend using the maximum spacing of supports given in the table below.

| Table of Cable Support Distances | | |
|---|----------------------|---------------|
| Overall cable diameter (<i>D</i>) (mm) | Recommended spacing* | |
| | Horizontal (mm) | Vertical (mm) |
| Over 9 not exceeding 15 | 300 | 400 |
| Over 15 not exceeding 20 | 350 | 450 |
| Over 20 not exceeding 40 | 400 | 550 |
| Over 40 not exceeding 50 | 600 | 800 |
| Over 50 not exceeding 60 | 750 | 1000 |
| Over 60 not exceeding 70 | 900 | 1200 |
| Over 70 | 1000 | 1400 |

Note: Runs at an angle of more than 30° from vertical – use horizontal. Runs at angle 30° or less – use vertical.

*The spacing of fixings on single core cables in a.c. installations must take into account the magnitude of forces generated under fault conditions.

STORAGE AND HANDLING OF CABLE

Cables shall be stored in dry locations indoors and shall not exceed the recommended storage temperature of 40°C, or be lower than the recommended minimum installation and handling temperature of 0°C. If the cable falls below the minimum installation temperature or if it exceeds the maximum storage temperature then additional precautions shall be taken as the likelihood of damage to the cable is increased.

Care shall be taken during handling or transportation to minimise any mechanical stress.

Suitable precautions shall be taken to assure safe handling of the packaged cable so as not to damage the cable or cause danger to others.

Note: A detailed guide to the safe handling of cable drums is given in **BS 8512**. Prysmian UK have a general guide covering this. For more information, please refer to the following website, <https://uk.prysmian.com/technical-area/guides>.

END OF LIFE/WASTE AND SCRAP CABLE

Product – Information and guidance on the incineration of scrap cable should be obtained from the Environment Agency.

Packaging – Where possible, packaging should be recycled. Please check with Local Authorities.

Drums – Prysmian UK offer a drum collection service. Please check drum label for details.

CABLE DESIGN LIFE

Prysmian UK cables will meet or exceed their design life of 25 years when correctly selected and installed in accordance with appropriate regulations. This design life has been assessed on a continuous maximum loading, which is the cable running at the maximum conductor temperature (90°C) for 24 hours a day and 365 days a year.

It is not recommended that the cables are relocated from their original installation location. This is because cables will tend to set in position over time and moving them can damage the cable.

Further information concerning this area can be found in our guide to design life. Please refer to <https://uk.prysmian.com/technical-area/guides>.

CONTACT INFORMATION

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uk.prysmian.com

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