



# High - Extra High Voltage Power Cables

PHELPS DODGE

HIGH - EXTRA HIGH VOLTAGE POWER CABLES

REVISION : 2/2016



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## A World Leader in Wire and Cable Technology

Phelps Dodge International (Thailand) Limited (PDITL) was established in 1968 as a joint-venture between an existing Thai firm and Phelps Dodge Corporation. We have been a pioneer in the local industry and were the first company to introduce the majority of new processes, products and technology related to wire and cable manufacturing.

PDITL is the only supplier in Thailand with complete in-house facilities for testing power cable up to 400 kV. PDITL has got its certification type test from International Independent Laboratories such as KEMA, Cable Technology Lab, etc. for LSHF cable, Fire resistant cable, Medium voltage, High voltage and Extra high voltage XLPE cables up to 245 kV cables.

PDITL manufactures world-class quality wire and cable, not only for the local market but also for international markets, complying with strict international standards. It is proud of its customer services and long term relationship.

PDITL has a team of over 700 employees, which are most important assets. We promote safety, health and environmental protection both within the company and in the community where we operate.

### Production Facilities

State-of-the-art manufacturing facilities:

**Bangplee Plant** is one of the most modern wire and cable plants in Southeast Asia with world-class manufacturing capabilities. Built and specially designed in response to the increase in demand for wire and cable products, Bangplee plant incorporates the latest technology and highest quality control standards throughout the production process. At present, the complex features

**A Vertical Continuous Vulcanization (VCV) Tower** – the first vertical cross-link high voltage insulating unit in Southeast Asia and one of very few of its kind in the world, another catenary CV lines and a modern high voltage testing laboratory.

Aside from producing Medium, High, and Extra high voltage cables, the Bangplee facility also manufactures Low voltage power cables, Internal and External telecommunications cables, and Overhead line conductors.

**Rayong Plant** is specialized in automated, high-volume building wire production and capable of consolidating all PDITL's building wire production activities into one single plant. The facility in Rayong province is equipped with state-of-the-art technology and equipment with capacity to serve as manufacturing base for all kinds of low voltage power cables and industrial cables.



สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
กระทรวงอุตสาหกรรม

รางวัลผู้รักษามาตรฐานดีเด่น  
จากกระทรวงอุตสาหกรรม  
และ สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

The Prime Minister's Industry Award  
From Ministry of Industry Thailand  
and Thai Industrial Standards Institute

International Standard



KEMA



ACCREDITED LABORATORY

VCV Tower  
(The highest cable production line in Asia-Pacific)

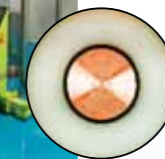
## World-class and finest wire and cable products

- Bare copper conductor
- Low voltage power cable (XLPE, PVC, PE, EPR insulation)
- Control cable and Instrumentation cable
- Lead sheathed cable
- Fire resistant and LSHF cable
- Flame retardant and LSHF cable
- Medium voltage power cable
- High voltage power cable (69 kV, 115 kV XLPE cable)
- Extra high voltage power cable (230 kV XLPE cable)
- All aluminium conductor (AAC)
- Aluminium conductor steel reinforced (ACSR)
- All Aluminium alloy conductor (AAAC)
- Weather Proof Cable (WPC)
- Service entrance cables (SEC)
- Service drop cables (SDC)
- Spaced aerial cables (SAC)



### Trusted Quality

- One and only in SEA and Highest VCV production line in Asia-Pacific



- With VCV technology, conductor is centered for the highest level of safety
- Conductor sizes up to 2500 sq.mm. with up to 5 segments
- Super or Ultra clean XLPE compound
- Clean Room Compound Loading with technology of gravity feeding
- Triple Cross-Head Extrusion : to get rid of contaminations from environment

- Premium Raw Materials

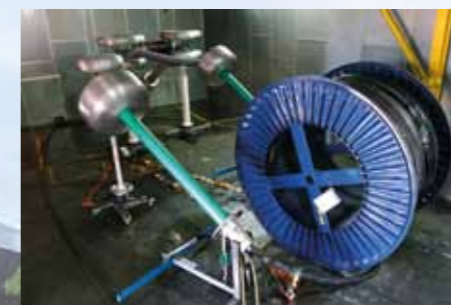
99.99% copper cathode (LME Grade A)



- **Our Copper Cathode**  
PDITL's products produce from 99.99% copper cathode (LME Grade A)
- **Our In-house Copper Melting Process**  
Closed-copper Melting System which reduce Oxygen  $\leq 5$  ppm
- **Our Copper Rod**  
Copper Conductivity > 101% IACS

- International Standard Testing Lab

- Complete in-house facilities for testing power cable up to 400 kV
- In-house facilities for testing electrical cable under fire conditions



SAFETY FIRST +ปลอดภัย

## Introduction

High Voltage (HV) and Extra High Voltage (EHV) power cable is a major back bone of the electric system. The reliability and safety of the electric power transmission system essentially depend upon the quality of the cable.

High voltage transmission cables have traditionally used paper/oil systems as the insulation. Years back, a variation of this paper insulation was developed, the material being a laminate of paper with polypropylene (PPP or PPLP). However since the advent of synthetic polymer, polyethylene (PE) and cross-linked polyethylene (XLPE) have been used as an insulation material. In most countries the use of polyethylene have been limited to the cross-linked version (XLPE) due to major advantage XLPE has over PE in that it enables the cables to be operated at a higher temperature and results in higher current carrying capacity.

Cross-linked polyethylene is also considered to be the material of choice due to its ease of processing and handling as compared to paper/oil. In addition, the low dielectric losses of cross-linked polyethylene which become increasingly important with increase in voltage as well as high intrinsic electrical strength makes it the favored material for the range of extra-high-voltage applications.

After elaborate research and extensive testing, Phelps Dodge International (Thailand) Ltd. accepted cross-linked polyethylene as its standard insulation for high voltage and extra high voltage cables.

Phelps Dodge International (Thailand) Ltd. is a leader in high voltage and extra high voltage power cables, with experience in manufacturing of such cables for nearly 40 years. We have state-of-the-art facilities that can produce high voltage underground cable with the rated voltage up to 245 kV. The cables have been stringently designed to meet if not exceed requirements of international standards such as IEC, ICEA, UL, DIN, VDE, AS/NZS, TIS, IS as well as other standards specified by customers. Materials used for manufacturing cables have been thoroughly selected with rigorous quality control systems so as to ensure the highest quality of cables.

## Cable Construction

This cable construction based on manufacturer's standard model of cable, other models, however, are also available as for required standard.

Components	Detail	Function
CONDUCTOR	Copper or Aluminium	The compact circular stranded conductors are made of copper with copper purity of 99.99% or aluminium with aluminium purity of 99.7%. For conductor sized 1000 mm <sup>2</sup> and bigger, Milliken conductor can be manufactured as option.
CONDUCTOR SHIELD OR SCREEN	Semi-conducting compound	A layer of extruded semi-conductive cross-linked polyethylene applied over the conductor and bonded to the insulation, semi-conductive tape may be applied helically with a proper lapping between the conductor and the conductor shield. This provides a smooth, circular interface between the conductor and the insulation and precludes excessive voltage stress in possible voids between the conductor and the insulation.
INSULATION	Cross-linked polyethylene (XLPE)	The insulation is an unfilled cross-linked polyethylene with the suitable thickness calculated and tested to meet electrical, dimensional, and physical requirements specified.
INSULATION SHIELD OR SCREEN	Semi-conducting compound	The insulation is shielded with a layer of extruded semi-conductive cross-linked polyethylene which applied directly over and bonded to the insulation. This confines the dielectric field within the cable and provides symmetrical distribution of the voltage stress.
METALLIC SHIELD OR SCREEN	Copper wire or Copper tape or Lead sheath or Corrugated Copper/Aluminium Sheath	The metallic shield acts as a return path for induced circulating currents under normal operating conditions as well as carrying short circuit current in the event of an electrical fault in the circuit.

Components	Detail	Function
LONGITUDINAL MOISTURE BARRIER	Water swellable tape	The water swellable tape shall be applied under and over the metallic shield or screen to longitudinal perform water blocking function when contact with water.
RADIAL MOISTURE BARRIER	<ul style="list-style-type: none"> <li>- Laminated plastic-coated aluminium tape</li> <li>- Lead sheath</li> <li>- Corrugated aluminium sheath</li> <li>- Corrugated copper sheath</li> </ul>	Radial moisture barrier acts as a blockade to the water in the radial direction of cable. They also carry the earth fault current and acts as metallic shield in some type of cable. Laminated plastic-coated aluminium tape is applied longitudinally over cable core with an appropriate overlap and join seam together. Lead sheath is continuously extruded over the cable core and is seamless. Corrugated aluminium and corrugated copper sheath is seam-welded applied over the cable core.
Oversheath	Polyethylene (PE) or Polyvinyl Chloride (PVC) or Low Smoke Halogen Free (LSHF)	The outer sheath is an extruded polyethylene (PE) or polyvinyl chloride (PVC) for external protection against mechanical impact and corrosion. For the cables in application which flame retardant, low emission of smoke and corrosive gases when affected by fire are required, Low Smoke Halogen Free (LSHF) material can be applied. If required, a graphite coating can be applied over the outer sheath to facilitate testing of the outer sheath to ensure the physical integrity of the cable.

## INSULATING PROCESS

As the insulation is one of the most critical elements in the cable assembly, our high and extra-high voltage cross-linked polyethylene insulated cables are produced under clean room condition to eliminate contamination and prevent airborne particles from entering the extruded layers. The manufacturing is carried out in a controlled, clean environment to ensure that cable insulation has the highest purity and the exact uniform dimensions.

The conductor shield, insulation, and insulation shield are extruded simultaneously on the conductor through a single extrusion process by use of a triple extrusion head. This process ensures that the interface between the conductor shield, insulation and insulation shield are completely free of voids and contamination. The cross-linking process is carried out in a totally water-free environment, using inert gas rather than steam as the curing medium. This dry-cure process ensures high integrity insulation and leads to excellent electrical performance.



The triple extrusion process is augmented by the highly specialised Vertical Continuous Vulcanization (VCV) Machinery / Tower, which is the first VERTICAL Cross-Link High Voltage insulation unit in Southeast Asia. This ensures the super-fine quality of our extra-high voltage cross-linked polyethylene insulated cables which is not feasible without a VCV Unit.

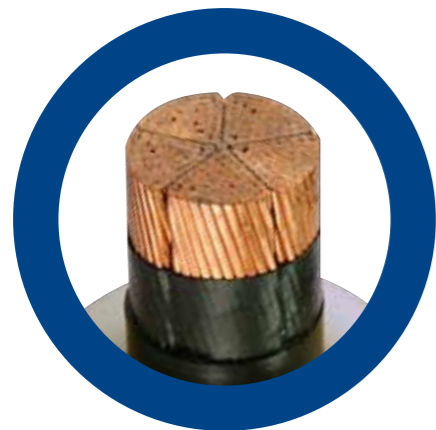
The dimensions of all three layers are constant and concentric through-out the entire length of the cable through use of specialized X-ray equipment installed in the machine. These accurately measure the thickness of the three layers in the cable core and guarantees highest quality standards and veracity of the design specification

## PDITL's core competence

Phelps Dodge International (Thailand) Limited is the industry leader in manufacturing of Wire and Cables in Thailand with experience and expertise for more than 48 years. We have a state-of-the-art factory with sophisticated production technology and advanced machinery with capability of producing the full range of medium voltage to extra high voltage cables.

We are capable of producing extra high voltage XLPE cables up to voltage of 245 kV. Furthermore, we are the only one in Thailand that can produce the highest size of cable going up to conductor size of 2,500 mm<sup>2</sup>. Especially manufacturing cables of conductor size 1,000 mm<sup>2</sup> and higher is a case in point. These are commonly produced with **Milliken** construction with associated ability of higher current capacity as well as more flexibility as compared to traditional round compacted conductor of the same size. Additionally the factory is fitted with specialized machinery capable of producing two types of special sheath such as **Corrugated Metal Sheath** and **Seamless Lead Sheath**. Both types of sheath have properties of near-perfect moisture barrier an important characteristic requirement for Power Cables as these guarantee protection of cables in wet environment. Moreover the advantage of Lead sheath is that it can protect the cable insulation from oil, chemicals and sulfides which makes it the preferred type for almost all petrochemical and refinery plants.

Milliken conductor, corrugated metal sheath and lead sheath need advance technology support, modern machinery and expertise of production. Phelps Dodge International (Thailand) Limited is the one and only manufacturer in Thailand who are capable of manufacturing Cables with these special construction, enabling us to support and provide nearly all applications desired by the customers.



### Milliken Conductor

- Higher Current carrying capacity
- Increased flexibility



### Corrugated Metal Sheath

- Protection against physical / mechanical damage
- High Level of Moisture barrier



### Lead Sheath

- Protection against physical / mechanical damage
- Near-perfect Moisture barrier
- Protection against Oil, Chemicals and Sulfides

## Milliken Conductor

Due to the natural phenomenon of electromagnetic field generation of AC circuits, there is a tendency for more of the current to be carried on the outside portion of the conductor rather than the center, as shown in Fig 1. This is commonly called as "skin effect".

To mitigate this shortcoming the Milliken conductor was developed. So today, all large conductors are constructed from 4 to 5 sector shaped conductors assembled together to form one round conductor. Each sector shaped conductor is lightly insulated so that this reduces the AC resistance by increasing the surface area at the edge which normally carries most of the current. As an example the Milliken conductor can carry at least 5% more current than a round compacted conductor of 1,000 mm<sup>2</sup>. It is not economic to use this concept for smaller conductors, below 900 mm<sup>2</sup>. Obviously higher the size of conductors more are the number of sectors.

Such segmental conductors require critical manufacturing capability and PDITL is one of the few manufacturer to possess such expertise. Another benefit from Milliken conductor is the greater flexibility of conductors compared to the round compact conductor of the same size.

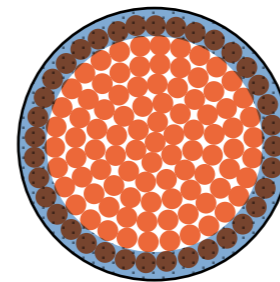


Figure 1: AC current flows on round compact conductor.

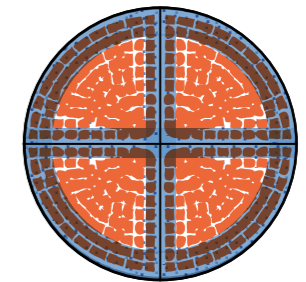


Figure 2: AC current flows on Milliken conductor.

Phelps Dodge International (Thailand) Ltd. produces Milliken conductor starting from 1,000 mm<sup>2</sup> to 2,500 mm<sup>2</sup> for both copper and aluminium conductor. Another conductor size can be designed to Milliken conductor upon request.

### Milliken Conductor

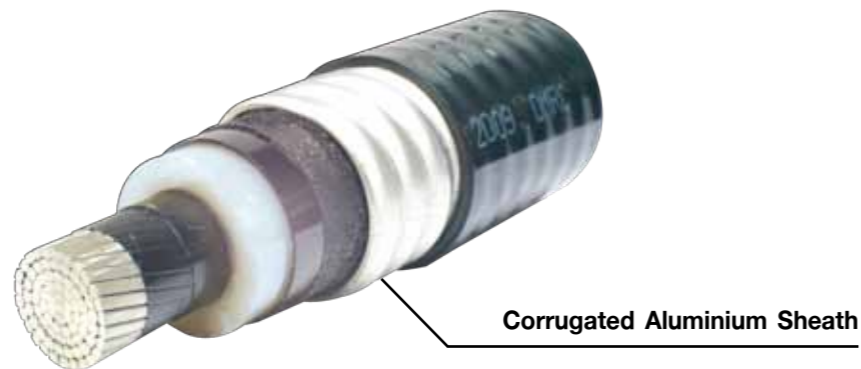


## Corrugated Metal Sheath

Aluminium, Copper and Stainless Steel can be used for corrugated metal sheath. The main function of all these types are to create a perfect moisture barrier for power cables which imparts the protection of cables required for wet environment. The metal sheath is extruded over the insulation screen which is normally covered with semi-conductive water swellable tape. The metal sheath is seam welded by using TIG (Tungsten Inert Gas) welding technique and the integrity of the weld is ensured by using eddy current detection equipment. Corrugation of course helps to reduce any rigidity of sheathing and will increase flexibility.

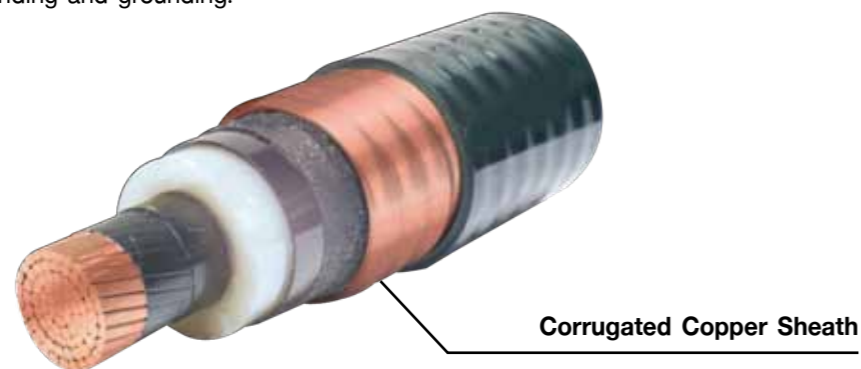
## Corrugated Aluminium Sheath

Cables with corrugated aluminium sheath have high fault current carrying capability due to the high electrical conductivity of Aluminium. This results in reduction of the external magnetic field and induced voltage. Good mechanical protection is also achieved from Aluminium sheath due to its rigidity. The bitumen coating or bituminized tape over the Aluminium can be requested to increase the corrosion resistance.



## Corrugated Copper Sheath

Most of the advantages of the corrugated copper sheath are the same as Aluminium sheath. Moreover it has high conductivity and good mechanical protection even though the thickness is thinner than Aluminium sheath. The copper sheath is also good for electrical connectivity for bonding and grounding.



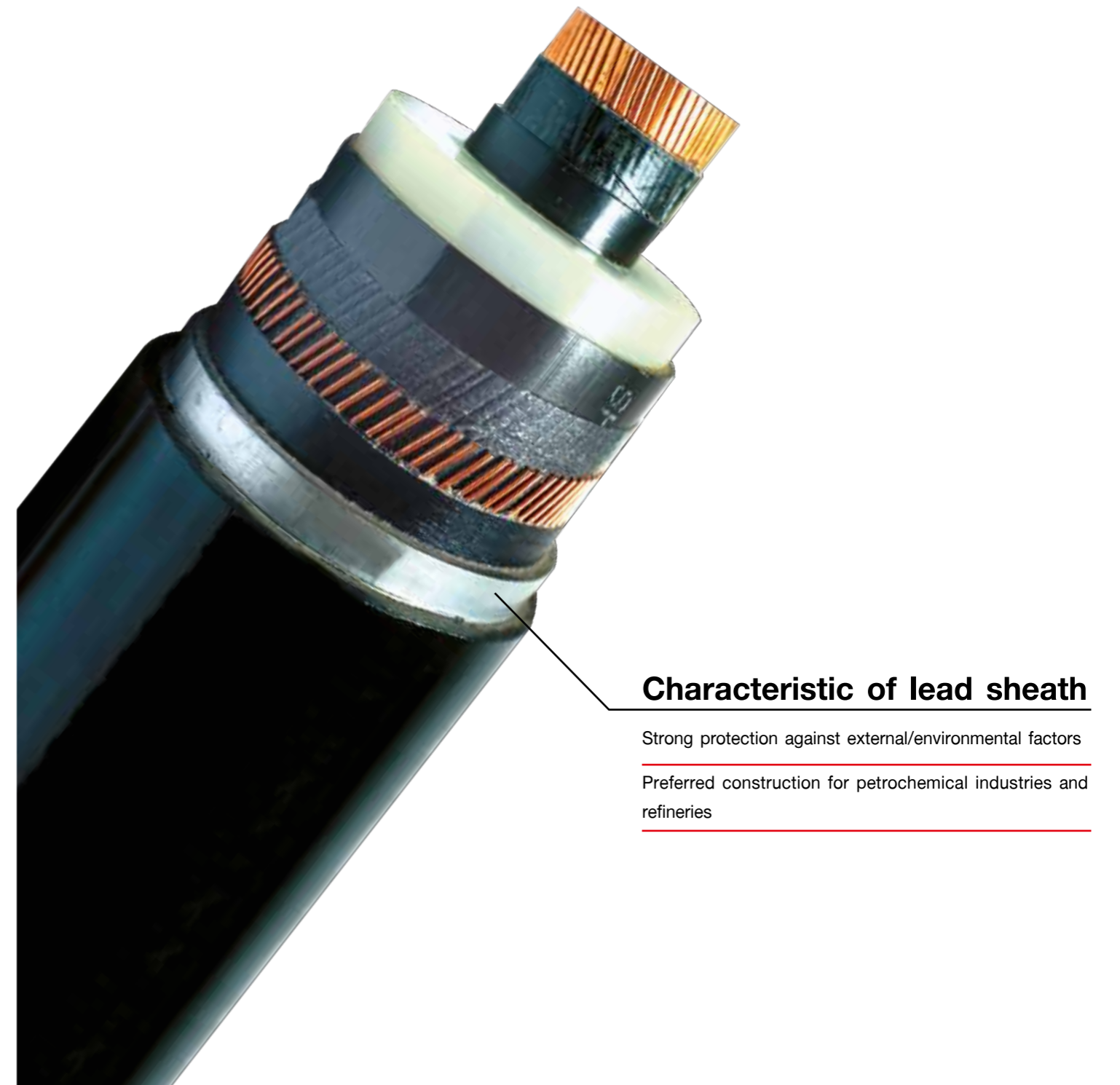
## Corrugated Stainless Steel Sheath

The corrugated stainless steel sheath are mostly used for cables which require very good corrosion resistance and low loss. Due to high resistance of stainless steel, it has low eddy current loss on it when operated while very good mechanical protection and corrosion resistance can be achieved. Normally, the copper wire shield will be provided under the corrugated stainless steel sheath to act as shield and ground conductor. This type of sheath is mainly used in chemical plants in Japan and Australia.

## Lead Sheath

Lead is a very stable metal. Some lead water pipes have survived since Roman time. Extruded lead sheath is a perfect moisture barrier. It also can prevent the cable insulation from oil, petrochemical and sulfides. Most petrochemical and refinery plant prefer cable with lead sheath. The cable with lead sheath has very long life. The advantage of lead sheath also includes its flexibility and no mechanical stress exert on the cable insulation during production.

Phelps Dodge International (Thailand) Ltd. has the capacity to manufacture cables with lead sheath starting from small low voltage cable to extra high voltage cable.



### Characteristic of lead sheath

- Strong protection against external/environmental factors
- Preferred construction for petrochemical industries and refineries



## CONTENT

CABLE NAME	REFERENCE STANDARD	PAGE NO.
<b>Copper Underground Cable with XLPE Insulation</b>		
<b>HXLP-CWS-LAT</b> Copper conductor with copper wire shield and laminated aluminium tape, ribbed oversheath	TIS 2202-2547	1-4
<b>HXLP-CWS-LAT</b> Copper conductor with copper wire shield and laminated aluminium tape	IEC 60840	5-12
<b>HXLP-CAS</b> Copper conductor with corrugated aluminium sheath	IEC 60840	13-20
<b>HXLP-CCS</b> Copper conductor with corrugated copper sheath	IEC 60840	21-28
<b>HXLP-CWS-LS</b> Copper conductor with copper wire shield and lead sheath	IEC 60840	29-36
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<b>EHXLP-CWS-LAT</b> Copper conductor with copper wire shield and laminated aluminium tape	IEC 62067	45-46
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<b>EHXLP-CCS</b> Copper conductor with corrugated copper sheath	IEC 62067	49-50
<b>EHXLP-CWS-LS</b> Copper conductor with copper wire shield and lead sheath	IEC 62067	51-52
<b>EHXLP-LS</b> Copper conductor with lead sheath	IEC 62067	53-54

**69 kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE, RIBBED OVERSHEATH  
TIS 2202-2547 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Light weight, small overall diameter and easy to bend. Ribbed type oversheath reduce friction during pulling and provide additional mechanical protection to the cable.

**Max. Conductor Temperature :**

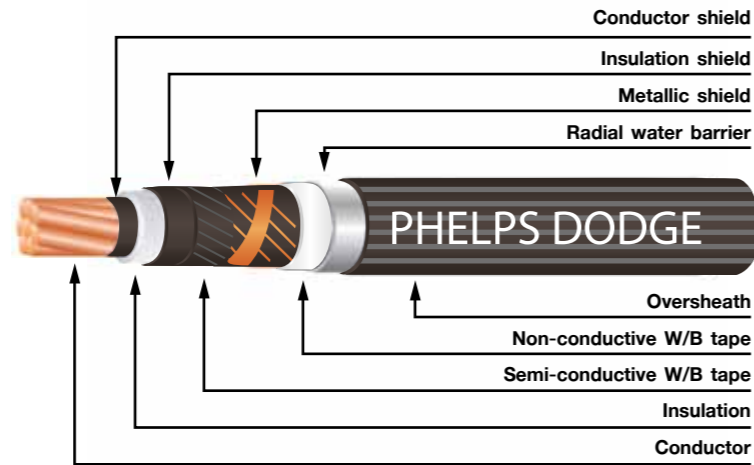
90 °C

**AC TEST VOLTAGE :**

90 kV (30 minutes)

**REFERENCE STANDARD :**

TIS 2202-2547



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- blocking layer : Non-conductive water blocking tape
- Radial water barrier : Laminated aluminium
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Nominal thickness of insulation mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of laminated Al sheath mm	Nominal thickness of oversheath mm	Overall diameter excluding rib (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	11.0	48 - 52	95	0.2	3.5	65 - 70	7,230	1,000/R
500	25.9	11.0	51 - 55	95	0.2	3.5	68 - 73	8,165	1,000/R
630	29.9	11.0	55 - 58	95	0.2	3.5	72 - 77	9,775	1,000/R
800	33.8	11.0	59 - 62	95	0.2	3.5	76 - 81	11,700	1,000/R
1,000	39.8	11.0	64 - 67	120	0.2	3.5	81 - 86	14,025	500/R
1,200	43.0	11.0	67 - 73	120	0.2	3.5	84 - 92	15,810	500/R

R = Packing in reel

**69 kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE, RIBBED OVERSHEATH  
TIS 2202-2547 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
400	0.0470	7,770	787	905	546	579	526	550
500	0.0366	7,200	903	1,047	616	658	597	627
630	0.0283	6,530	1,039	1,217	694	749	680	718
800	0.0221	5,980	1,177	1,396	770	841	763	810
1,000	0.0176	5,310	1,311	1,595	832	927	842	903
1,200	0.0151	5,010	1,399	1,722	875	986	895	965

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).



**115 kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE, RIBBED OVERSHEATH  
TIS 2202-2547 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Light weight, small overall diameter and easy to bend. Ribbed type oversheath reduce friction during pulling and provide additional mechanical protection to the cable.

**Max. Conductor Temperature :**

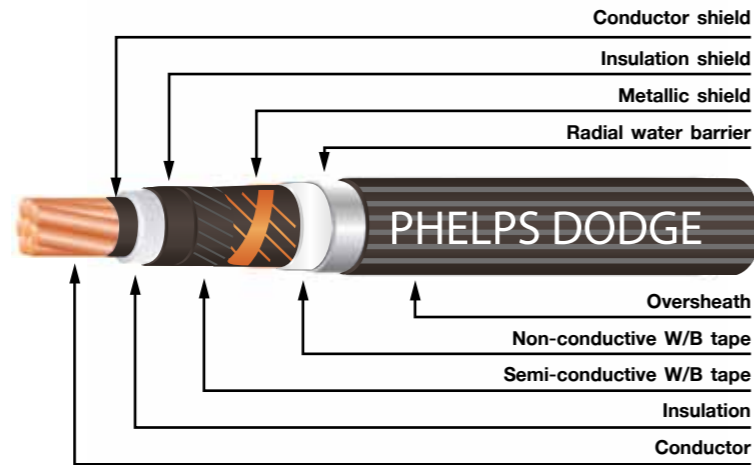
90 °C

**AC TEST VOLTAGE :**

160 kV (30 minutes)

**REFERENCE STANDARD :**

TIS 2202-2547



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Non-conductive water blocking tape
- Radial water barrier : Plastic-coated aluminium tape
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Nominal thickness of insulation mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of Al sheath mm	Nominal thickness of oversheath mm	Overall diameter (excluding rib) (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	16.0	59 - 62	95	0.2	3.5	76 - 81	8,395	1,000/R
500	25.9	16.0	62 - 65	95	0.2	3.5	79 - 84	9,345	1,000/R
630	29.9	16.0	65 - 68	95	0.2	3.5	83 - 88	11,035	1,000/R
800	33.8	16.0	69 - 72	95	0.2	3.5	86 - 91	12,890	500/R
1,000	39.8	16.0	75 - 78	120	0.2	3.6	92 - 97	15,390	500/R
1,200	43.0	16.0	77 - 83	120	0.2	3.8	93 - 101	17,200	500/R

R = Packing in reel

**115 kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE, RIBBED OVERSHEATH  
TIS 2202-2547 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
400	0.0470	10,200	782	882	545	577	530	554
500	0.0366	9,490	897	1,019	616	656	602	632
630	0.0283	8,670	1,032	1,184	694	747	684	722
800	0.0221	8,000	1,170	1,359	771	838	769	815
1,000	0.0176	7,160	1,307	1,550	835	926	848	908
1,200	0.0151	6,770	1,395	1,673	879	985	901	970

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**36/69 (72.5) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Light weight, small overall diameter and easy to bend.

**Max. Conductor Temperature :**

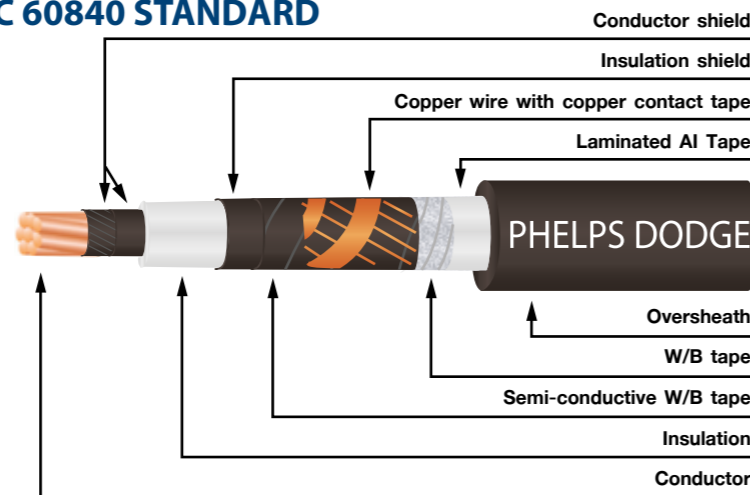
90 °C

**AC TEST VOLTAGE :**

90 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Water blocking tape
- Radial water barrier : Laminated Aluminium tape
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of Al tape mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
150	14.2	44.5	150	0.2	2.6	59	4,875	1,000/R
185	15.8	45.0	185	0.2	2.7	60	5,560	1,000/R
240	18.2	45.5	220	0.2	2.7	61	6,380	1,000/R
300	20.3	47.5	220	0.2	2.8	63	7,070	1,000/R
400	23.0	49.0	220	0.2	2.8	64	7,895	1,000/R
500	25.9	52.5	220	0.2	2.9	68	9,105	1,000/R
630	29.9	56.5	220	0.2	3.0	72	10,670	1,000/R
800	33.8	60.5	220	0.2	3.2	77	12,600	500/R
1,000	39.8	66.5	220	0.2	3.3	83	14,865	500/R
1,200	43.0	70.0	220	0.2	3.4	87	16,665	500/R
1,000(M)	39.1	67.0	220	0.2	3.3	84	14,845	500/R
1,200(M)	42.2	70.0	220	0.2	3.4	87	16,615	500/R
1,400(M)	45.7	73.5	220	0.2	3.5	91	18,670	500/R
1,600(M)	48.8	77.5	220	0.2	3.7	96	20,815	500/R
1,800(M)	51.6	80.5	220	0.2	3.8	99	22,715	500/R
2,000(M)	54.7	83.5	220	0.2	3.9	102	24,895	500/R
2,500(M)	61.1	90.0	220	0.2	4.1	109	29,855	400/R

(M) is Milliken conductor

R = Packing in reel

**36/69(72.5) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
150	0.124	11,850	448	505	330	344	314	325
185	0.0991	10,880	510	578	370	388	354	367
240	0.0754	9,460	597	685	426	449	408	425
300	0.0601	8,850	679	783	477	506	460	480
400	0.0470	7,910	780	909	538	575	522	547
500	0.0366	7,200	891	1,048	603	651	592	624
630	0.0283	6,530	1,020	1,217	674	738	671	712
800	0.0221	5,980	1,150	1,392	743	826	752	804
1,000	0.0176	5,310	1,285	1,584	807	913	830	897
1,200	0.0151	5,010	1,368	1,707	846	969	882	959
1,000(M)	0.0176	5,270	1,358	1,642	853	950	871	933
1,200(M)	0.0151	4,980	1,461	1,783	904	1,017	932	1,004
1,400(M)	0.0129	4,700	1,570	1,937	955	1,088	997	1,082
1,600(M)	0.0113	4,640	1,660	2,063	998	1,147	1,055	1,150
1,800(M)	0.0101	4,440	1,737	2,178	1,032	1,197	1,101	1,207
2,000(M)	0.0090	4,250	1,816	2,299	1,066	1,248	1,147	1,265
2,500(M)	0.0072	3,890	1,964	2,534	1,126	1,343	1,236	1,379

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**64/115 (123) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Light weight, small overall diameter and easy to bend.

**Max. Conductor Temperature :**

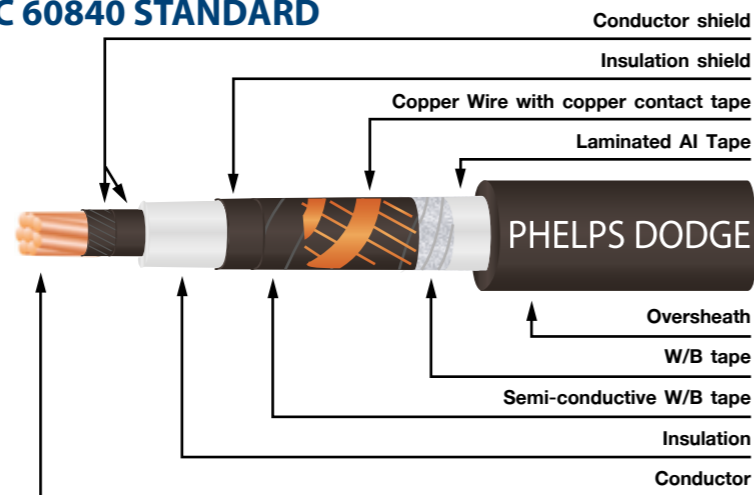
90 °C

**AC TEST VOLTAGE :**

160 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Water blocking tape
- Radial water barrier : Laminated aluminium tape
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of Al tape mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	48.5	220	0.2	2.8	64	6,665	1,000/R
300	20.3	49.5	220	0.2	2.8	65	7,280	1,000/R
400	23.0	52.5	220	0.2	2.9	68	8,230	1,000/R
500	25.9	56.0	220	0.2	3.0	71	9,465	1,000/R
630	29.9	61.0	220	0.2	3.2	77	11,185	1,000/R
800	33.8	64.5	220	0.2	3.3	81	13,135	500/R
1,000	39.8	71.5	220	0.2	3.5	89	15,600	500/R
1,200	43.0	75.0	220	0.2	3.6	92	17,440	500/R
1,000(M)	39.1	72.0	220	0.2	3.5	89	15,580	500/R
1,200(M)	42.2	75.0	220	0.2	3.6	93	17,390	500/R
1,400(M)	45.7	78.5	220	0.2	3.7	97	19,480	500/R
1,600(M)	48.8	82.0	220	0.2	3.8	100	21,500	500/R
1,800(M)	51.6	85.5	220	0.2	3.9	104	23,580	500/R
2,000(M)	54.7	88.5	220	0.2	4.0	107	25,795	500/R
2,500(M)	61.1	95.0	220	0.2	4.2	114	30,830	400/R

(M) is Milliken conductor

R = Packing in reel

**64/115 (123) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	10,310	595	679	424	448	408	425
300	0.0601	9,390	677	779	475	504	459	480
400	0.0470	8,690	778	901	536	573	521	546
500	0.0366	7,930	889	1,038	601	649	591	623
630	0.0283	7,430	1,018	1,202	673	736	672	712
800	0.0221	6,830	1,148	1,375	742	823	750	803
1,000	0.0176	6,270	1,282	1,560	806	910	832	898
1,200	0.0151	5,920	1,366	1,680	846	966	881	957
1,000(M)	0.0176	6,220	1,352	1,616	850	947	869	931
1,200(M)	0.0151	5,890	1,455	1,755	901	1,013	932	1,004
1,400(M)	0.0129	5,560	1,563	1,906	953	1,083	998	1,082
1,600(M)	0.0113	5,300	1,654	2,038	994	1,142	1,051	1,147
1,800(M)	0.0101	5,240	1,731	2,146	1,029	1,192	1,098	1,204
2,000(M)	0.0090	5,010	1,810	2,264	1,062	1,243	1,144	1,262
2,500(M)	0.0072	4,600	1,958	2,496	1,123	1,338	1,232	1,375

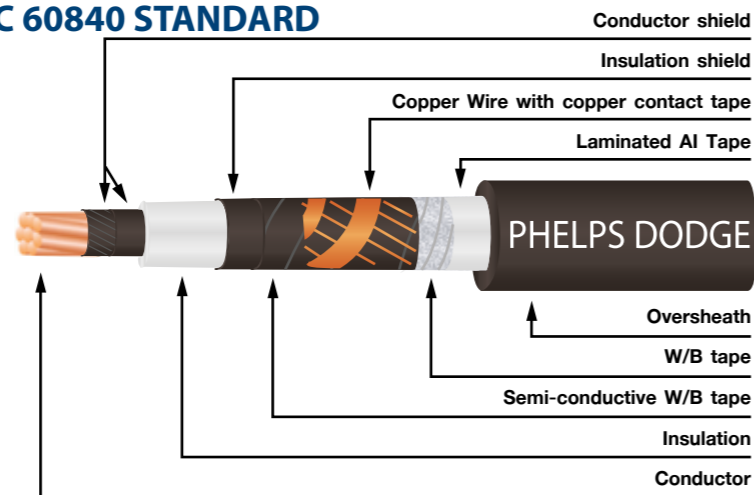
(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**76/132 (145) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE**

**IEC 60840 STANDARD**



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water : Semi-conductive water blocking tape blocking layer
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water : Water blocking tape blocking layer
- Radial water barrier : Laminated aluminium tape
- Oversheath : Black PE (ST-7)

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Light weight, small overall diameter and easy to bend.

**Max. Conductor Temperature :**

90 °C

**AC TEST VOLTAGE :**

190 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of Al tape mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	54.5	220	0.2	3.0	70	7,265	1,000/R
300	20.3	55.5	220	0.2	3.0	71	7,890	1,000/R
400	23.0	56.5	220	0.2	3.1	72	8,665	1,000/R
500	25.9	59.0	220	0.2	3.1	75	9,795	1,000/R
630	29.9	64.0	220	0.2	3.3	80	11,540	1,000/R
800	33.8	68.0	220	0.2	3.4	85	13,510	500/R
1,000	39.8	75.0	220	0.2	3.6	92	16,010	500/R
1,200	43.0	78.0	220	0.2	3.7	96	17,865	500/R
1,000(M)	39.1	75.0	220	0.2	3.6	93	15,990	500/R
1,200(M)	42.2	78.5	220	0.2	3.7	96	17,820	500/R
1,400(M)	45.7	83.0	220	0.2	3.8	101	20,075	500/R
1,600(M)	48.8	86.0	220	0.2	3.9	104	22,115	500/R
1,800(M)	51.6	88.5	220	0.2	4.0	107	24,065	500/R
2,000(M)	54.7	92.0	220	0.2	4.1	111	26,295	400/R
2,500(M)	61.1	99.0	220	0.2	4.4	119	31,565	400/R

(M) is Milliken conductor

R=Packing in reel

**76/132 (145) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE**

**IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	11,860	594	669	424	447	410	427
300	0.0601	10,910	676	767	475	503	461	482
400	0.0470	9,670	776	891	535	572	523	548
500	0.0366	8,620	887	1,030	601	648	593	624
630	0.0283	8,070	1,016	1,192	672	735	672	713
800	0.0221	7,420	1,146	1,364	742	822	753	804
1,000	0.0176	6,810	1,281	1,547	807	909	832	898
1,200	0.0151	6,440	1,365	1,666	847	965	884	959
1,000(M)	0.0176	6,760	1,348	1,602	849	945	871	933
1,200(M)	0.0151	6,410	1,451	1,740	900	1,012	932	1,004
1,400(M)	0.0129	6,220	1,559	1,885	952	1,082	998	1,082
1,600(M)	0.0113	5,930	1,650	2,015	994	1,141	1,052	1,147
1,800(M)	0.0101	5,690	1,727	2,127	1,028	1,191	1,098	1,204
2,000(M)	0.0090	5,450	1,806	2,245	1,062	1,241	1,147	1,264
2,500(M)	0.0072	5,140	1,955	2,468	1,124	1,338	1,237	1,378

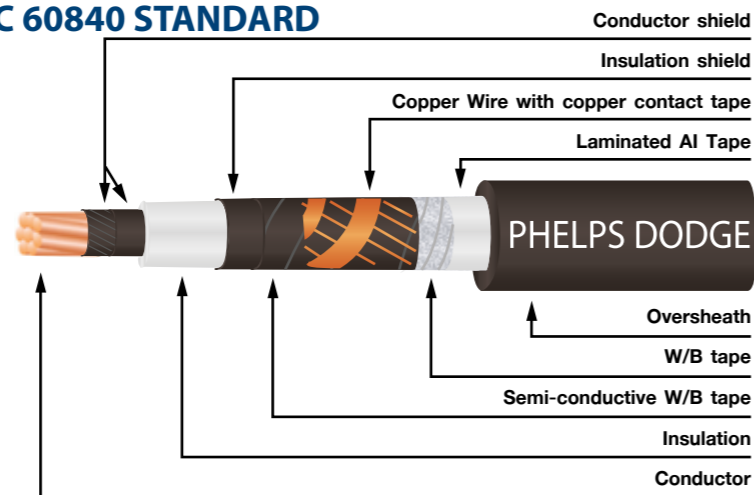
(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**87/150 (170) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE**

**IEC 60840 STANDARD**



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water : Semi-conductive water blocking tape blocking layer
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water : Water blocking tape blocking layer
- Radial water barrier : Laminated aluminium tape
- Oversheath : Black PE (ST-7)

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Light weight, small overall diameter and easy to bend.

**Max. Conductor Temperature :**

90 °C

**AC TEST VOLTAGE :**

218 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of Al tape mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	62.0	220	0.2	3.3	78	8,055	1,000/R
300	20.3	62.0	220	0.2	3.3	78	8,590	1,000/R
400	23.0	62.5	220	0.2	3.3	79	9,345	1,000/R
500	25.9	64.0	220	0.2	3.3	80	10,390	1,000/R
630	29.9	67.0	220	0.2	3.4	83	11,910	500/R
800	33.8	71.0	220	0.2	3.5	88	13,900	500/R
1,000	39.8	77.0	220	0.2	3.7	94	16,305	500/R
1,200	43.0	80.0	220	0.2	3.8	98	18,170	500/R
1,000(M)	39.1	78.5	220	0.2	3.7	96	16,420	500/R
1,200(M)	42.2	82.5	220	0.2	3.8	101	18,410	500/R
1,400(M)	45.7	86.0	220	0.2	3.9	104	20,545	500/R
1,600(M)	48.8	89.0	220	0.2	4.0	108	22,600	500/R
1,800(M)	51.6	93.0	220	0.2	4.2	112	24,755	500/R
2,000(M)	54.7	96.0	220	0.2	4.3	115	27,005	400/R
2,500(M)	61.1	102.5	220	0.2	4.5	122	32,120	400/R

(M) is Milliken conductor

R=Packing in reel

**87/150 (170) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE**

**IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	13,460	591	659	423	446	412	429
300	0.0601	12,270	673	757	474	503	463	484
400	0.0470	11,010	774	879	535	571	525	551
500	0.0366	9,700	885	1,017	600	647	594	626
630	0.0283	8,670	1,014	1,183	672	734	672	713
800	0.0221	8,000	1,145	1,352	742	821	753	805
1,000	0.0176	7,160	1,280	1,538	806	908	831	897
1,200	0.0151	6,770	1,364	1,656	847	964	883	958
1,000(M)	0.0176	7,280	1,345	1,589	848	944	871	933
1,200(M)	0.0151	7,070	1,447	1,721	900	1,011	934	1,007
1,400(M)	0.0129	6,690	1,555	1,870	951	1,081	998	1,082
1,600(M)	0.0113	6,380	1,647	1,999	993	1,139	1,054	1,149
1,800(M)	0.0101	6,270	1,724	2,104	1,029	1,190	1,101	1,206
2,000(M)	0.0090	6,010	1,803	2,221	1,063	1,241	1,147	1,264
2,500(M)	0.0072	5,540	1,952	2,448	1,124	1,336	1,236	1,377

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**36/69 (72.5) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

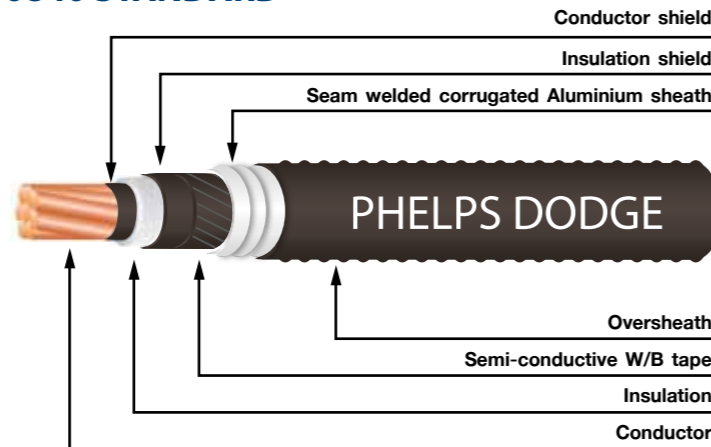
90 °C

**AC TEST VOLTAGE :**

90 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of Conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Al sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
150	14.2	44.5	1.5	2.9	70	4,740	1,000/R
185	15.8	45.0	1.5	2.9	71	5,090	1,000/R
240	18.2	45.5	1.5	2.9	71	5,600	1,000/R
300	20.3	47.5	1.5	3.0	74	6,320	1,000/R
400	23.0	49.0	1.5	3.1	76	7,210	1,000/R
500	26.0	53.0	1.6	3.2	80	8,570	1,000/R
630	29.9	56.5	1.6	3.3	84	10,220	1,000/R
800	33.8	60.5	1.8	3.5	89	12,340	500/R
1,000	39.8	66.5	1.9	3.6	96	14,830	500/R
1,200	43.0	70.0	2.0	3.7	100	16,790	500/R
1,000(M)	39.1	67.0	2.0	3.6	96	14,890	500/R
1,200(M)	42.2	70.0	2.0	3.7	100	16,700	500/R
1,400(M)	45.7	73.5	2.1	3.9	104	18,960	500/R
1,600(M)	48.8	77.5	2.2	4.0	109	21,260	500/R
1,800(M)	51.6	80.5	2.2	4.1	112	23,240	500/R
2,000(M)	54.7	83.5	2.3	4.2	115	25,590	500/R
2,500(M)	61.1	90.0	2.5	4.4	123	30,910	400/R

(M) is Milliken conductor

R = Packing in reel

**36/69 (72.5) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
150	0.124	11,850	455	505	335	348	321	331
185	0.0991	10,880	519	579	377	392	362	374
240	0.0754	9,460	610	687	436	455	419	434
300	0.0601	8,850	695	786	490	513	473	490
400	0.0470	7,910	800	913	554	584	538	559
500	0.0366	7,170	917	1,054	622	663	610	638
630	0.0283	6,530	1,051	1,222	697	752	692	728
800	0.0221	5,980	1,181	1,396	766	839	773	820
1,000	0.0176	5,310	1,316	1,587	828	925	853	915
1,200	0.0151	5,010	1,398	1,707	864	980	903	976
1,000(M)	0.0176	5,270	1,379	1,641	866	960	889	949
1,200(M)	0.0151	4,980	1,482	1,782	916	1,026	952	1,022
1,400(M)	0.0129	4,700	1,584	1,931	962	1,093	1,015	1,098
1,600(M)	0.0113	4,640	1,666	2,053	996	1,148	1,067	1,164
1,800(M)	0.0101	4,440	1,738	2,165	1,027	1,195	1,112	1,220
2,000(M)	0.0090	4,250	1,808	2,279	1,052	1,241	1,155	1,277
2,500(M)	0.0072	3,890	1,934	2,500	1,096	1,325	1,235	1,385

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**64/115 (123) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

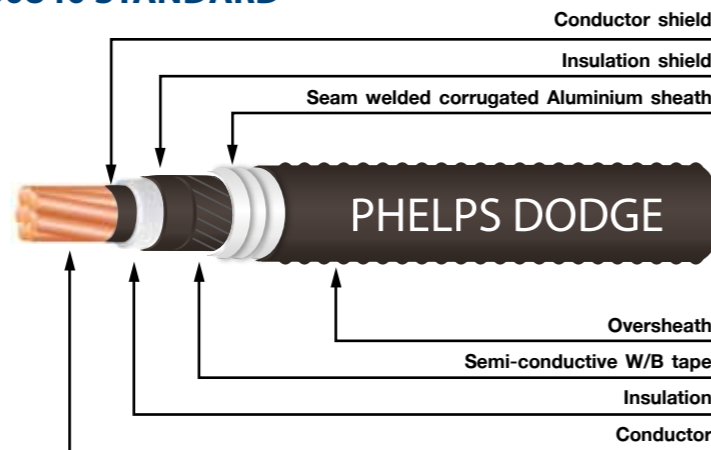
90 °C

**AC TEST VOLTAGE :**

160 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Al sheath mm	Nominal thickness of overshath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	48.5	1.5	3.1	75	5,970	1,000/R
300	20.3	49.5	1.5	3.1	76	6,570	1,000/R
400	23.0	52.5	1.6	3.2	79	7,640	1,000/R
500	26.0	56.0	1.6	3.3	83	8,960	1,000/R
630	29.9	61.0	1.8	3.5	89	10,910	1,000/R
800	33.8	64.5	1.9	3.6	94	12,990	500/R
1,000	39.8	71.5	2.0	3.8	102	15,700	500/R
1,200	43.0	75.0	2.1	3.9	105	17,690	500/R
1,000(M)	39.1	72.0	2.1	3.8	102	15,770	500/R
1,200(M)	42.2	75.0	2.1	3.9	106	17,610	500/R
1,400(M)	45.7	78.5	2.2	4.0	110	19,870	500/R
1,600(M)	48.8	82.0	2.2	4.1	113	21,960	500/R
1,800(M)	51.6	85.5	2.3	4.3	118	24,260	500/R
2,000(M)	54.7	88.5	2.5	4.4	121	26,740	400/R
2,500(M)	61.1	95.0	2.5	4.6	128	31,930	400/R

(M) is Milliken conductor

R = Packing in reel

**64/115 (123) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	10,310	608	680	434	453	419	433
300	0.0601	9,390	693	781	487	511	472	489
400	0.0470	8,690	796	904	550	581	536	558
500	0.0366	7,910	912	1,043	619	660	609	637
630	0.0283	7,430	1,042	1,205	691	747	690	727
800	0.0221	6,830	1,172	1,377	759	834	771	819
1,000	0.0176	6,270	1,305	1,559	821	919	851	913
1,200	0.0151	5,920	1,386	1,677	858	973	900	973
1,000(M)	0.0176	6,220	1,364	1,612	857	953	886	947
1,200(M)	0.0151	5,890	1,465	1,750	906	1,018	947	1,019
1,400(M)	0.0129	5,560	1,567	1,898	951	1,084	1,010	1,095
1,600(M)	0.0113	5,300	1,654	2,025	989	1,141	1,063	1,160
1,800(M)	0.0101	5,240	1,721	2,127	1,016	1,186	1,107	1,216
2,000(M)	0.0090	5,010	1,788	2,239	1,040	1,231	1,149	1,272
2,500(M)	0.0072	4,600	1,923	2,460	1,090	1,318	1,232	1,382

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

76/132 (145) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

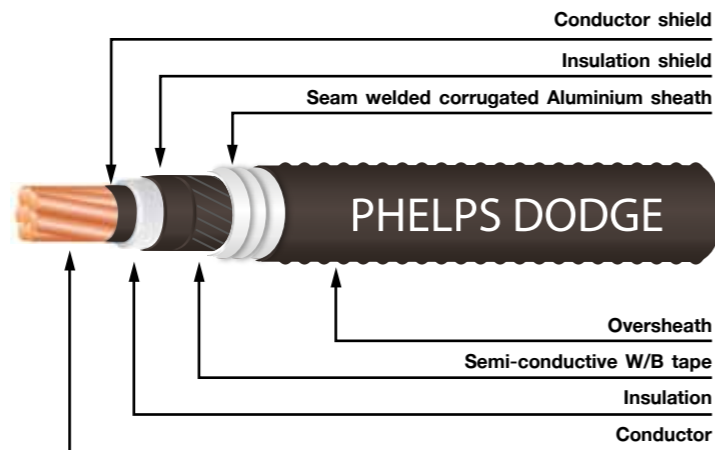
90 °C

**AC TEST VOLTAGE :**

190 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Al sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	54.5	1.6	3.3	82	6,770	1,000/R
300	20.3	55.5	1.6	3.3	83	7,390	1,000/R
400	23.0	56.5	1.6	3.4	84	8,170	1,000/R
500	26.0	59.0	1.8	3.4	87	9,490	1,000/R
630	29.9	64.0	1.9	3.6	93	11,420	1,000/R
800	33.8	68.0	2.0	3.7	97	13,520	500/R
1,000	39.8	75.0	2.1	3.9	105	16,270	500/R
1,200	43.0	78.0	2.2	4.0	109	18,290	500/R
1,000(M)	39.1	75.0	2.1	3.9	106	16,270	500/R
1,200(M)	42.2	78.5	2.2	4.0	109	18,210	500/R
1,400(M)	45.7	83.0	2.3	4.2	115	20,700	500/R
1,600(M)	48.8	86.0	2.3	4.3	118	22,810	500/R
1,800(M)	51.6	88.5	2.5	4.4	121	25,020	500/R
2,000(M)	54.7	92.0	2.5	4.5	125	27,330	400/R
2,500(M)	61.1	99.0	2.5	4.8	133	32,790	300/R

(M) is Milliken conductor

R = Packing-in-reel

76/132 (145) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	11,860	604	671	432	452	420	435
300	0.0601	10,910	688	769	486	510	473	491
400	0.0470	9,670	792	893	549	580	537	559
500	0.0366	8,600	907	1,034	615	657	608	637
630	0.0283	8,070	1,036	1,194	688	744	690	727
800	0.0221	7,420	1,166	1,364	756	831	770	819
1,000	0.0176	6,810	1,298	1,544	817	916	850	913
1,200	0.0151	6,440	1,379	1,661	854	970	900	973
1,000(M)	0.0176	6,760	1,358	1,597	854	950	885	947
1,200(M)	0.0151	6,410	1,456	1,733	900	1,014	945	1,018
1,400(M)	0.0129	6,220	1,556	1,873	945	1,080	1,009	1,095
1,600(M)	0.0113	5,930	1,642	1,999	983	1,137	1,062	1,160
1,800(M)	0.0101	5,690	1,709	2,106	1,008	1,181	1,104	1,215
2,000(M)	0.0090	5,450	1,782	2,220	1,037	1,228	1,149	1,272
2,500(M)	0.0072	5,140	1,915	2,432	1,089	1,316	1,233	1,383

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).



87/150 (170) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

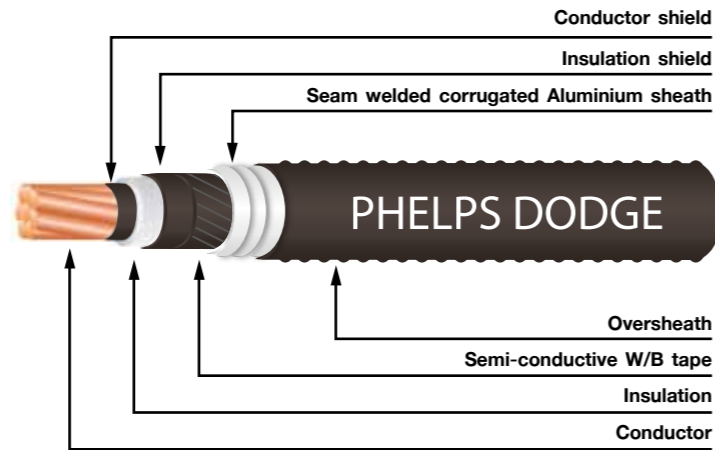
90 °C

**AC TEST VOLTAGE :**

218 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Al sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	62.0	1.8	3.6	91	7,880	1,000/R
300	20.3	62.0	1.8	3.6	91	8,370	1,000/R
400	23.0	62.5	1.9	3.6	92	9,200	1,000/R
500	26.0	64.0	1.9	3.6	93	10,290	1,000/R
630	29.9	67.0	1.9	3.7	96	11,870	500/R
800	33.8	71.0	2.0	3.8	101	13,990	500/R
1,000	39.8	78.0	2.2	4.0	109	16,870	500/R
1,200	43.0	82.0	2.2	4.2	114	19,020	500/R
1,000(M)	39.1	78.5	2.2	4.0	109	16,860	500/R
1,200(M)	42.2	82.5	2.3	4.2	114	19,030	500/R
1,400(M)	45.7	86.0	2.3	4.3	118	21,250	500/R
1,600(M)	48.8	89.0	2.5	4.4	122	23,570	500/R
1,800(M)	51.6	93.0	2.5	4.6	126	25,840	500/R
2,000(M)	54.7	96.0	2.5	4.6	129	28,130	400/R
2,500(M)	61.1	102.5	2.5	4.9	136	33,430	300/R

(M) is Milliken conductor

R = Packing in reel

87/150 (170) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH IEC 60840 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	13,460	599	660	431	451	421	437
300	0.0601	12,270	683	758	483	509	474	493
400	0.0470	11,010	785	880	545	578	538	561
500	0.0366	9,680	901	1,020	613	655	609	638
630	0.0283	8,670	1,032	1,184	686	742	689	727
800	0.0221	8,000	1,161	1,352	754	829	770	818
1,000	0.0176	7,330	1,291	1,530	813	913	849	912
1,200	0.0151	7,100	1,373	1,642	852	968	900	974
1,000(M)	0.0176	7,280	1,349	1,582	849	947	884	946
1,200(M)	0.0151	7,070	1,445	1,712	895	1,010	945	1,018
1,400(M)	0.0129	6,690	1,549	1,857	942	1,078	1,008	1,095
1,600(M)	0.0113	6,380	1,630	1,981	975	1,131	1,059	1,159
1,800(M)	0.0101	6,270	1,701	2,082	1,006	1,178	1,105	1,215
2,000(M)	0.0090	6,010	1,773	2,195	1,034	1,225	1,149	1,272
2,500(M)	0.0072	5,540	1,909	2,412	1,086	1,313	1,233	1,382

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

36/69 (72.5) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

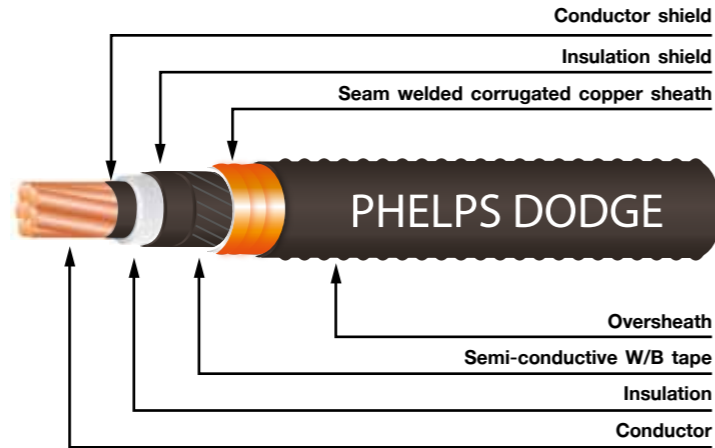
90 °C

**AC TEST VOLTAGE :**

90 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Cu sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
150	14.2	44.5	1.0	2.9	69	5,640	1,000/R
185	15.8	45.0	1.0	2.9	70	6,000	1,000/R
240	18.2	45.5	1.0	2.9	70	6,510	1,000/R
300	20.3	47.5	1.0	3.0	73	7,270	1,000/R
400	23.0	49.0	1.0	3.1	75	8,180	1,000/R
500	26.0	53.0	1.0	3.2	79	9,550	1,000/R
630	29.9	56.5	1.0	3.3	83	11,250	1,000/R
800	33.8	60.5	1.0	3.4	87	13,280	500/R
1,000	39.8	66.5	1.0	3.5	94	15,770	500/R
1,200	43.0	70.0	1.0	3.7	98	17,730	500/R
1,000(M)	39.1	67.0	1.0	3.5	94	15,770	500/R
1,200(M)	42.2	70.0	1.0	3.7	98	17,650	500/R
1,400(M)	45.7	73.5	1.0	3.8	102	19,830	500/R
1,600(M)	48.8	77.5	1.0	3.9	106	22,100	500/R
1,800(M)	51.6	80.5	1.0	4.0	109	24,110	500/R
2,000(M)	54.7	83.5	1.0	4.1	113	26,400	400/R
2,500(M)	61.1	90.0	1.0	4.3	120	31,590	400/R

(M) is Milliken conductor

R = Packing in reel

36/69 (72.5) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
150	0.124	11,850	453	504	334	347	320	330
185	0.0991	10,880	517	578	376	392	361	373
240	0.0754	9,460	608	685	434	454	418	432
300	0.0601	8,850	692	784	488	512	471	489
400	0.0470	7,910	796	910	551	582	536	558
500	0.0366	7,170	912	1,050	620	661	608	636
630	0.0283	6,530	1,045	1,218	695	750	690	726
800	0.0221	5,980	1,178	1,393	766	839	772	818
1,000	0.0176	5,310	1,315	1,584	831	927	852	913
1,200	0.0151	5,010	1,401	1,705	872	983	904	974
1,000(M)	0.0176	5,270	1,384	1,640	875	963	891	948
1,200(M)	0.0151	4,980	1,488	1,781	926	1,031	954	1,021
1,400(M)	0.0129	4,700	1,597	1,934	977	1,101	1,020	1,099
1,600(M)	0.0113	4,640	1,685	2,060	1,017	1,159	1,075	1,166
1,800(M)	0.0101	4,440	1,760	2,173	1,050	1,208	1,121	1,222
2,000(M)	0.0090	4,250	1,837	2,291	1,081	1,257	1,167	1,281
2,500(M)	0.0072	3,890	1,977	2,519	1,135	1,348	1,253	1,392

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

64/115 (123) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

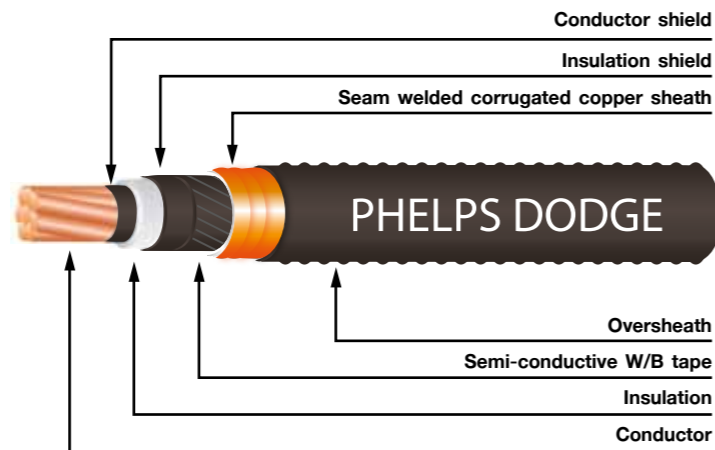
90 °C

**AC TEST VOLTAGE :**

160 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Cu sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	48.5	1.0	3.0	74	6,910	1,000/R
300	20.3	49.5	1.0	3.1	75	7,550	1,000/R
400	23.0	52.5	1.0	3.2	78	8,600	1,000/R
500	26.0	56.0	1.0	3.3	82	9,980	1,000/R
630	29.9	61.0	1.0	3.4	88	11,850	500/R
800	33.8	64.5	1.0	3.5	92	13,910	500/R
1,000	39.8	71.5	1.0	3.7	100	16,630	500/R
1,200	43.0	75.0	1.0	3.8	103	18,580	500/R
1,000(M)	39.1	72.0	1.0	3.7	100	16,630	500/R
1,200(M)	42.2	75.0	1.0	3.8	103	18,510	500/R
1,400(M)	45.7	78.5	1.0	4.0	107	20,750	500/R
1,600(M)	48.8	82.0	1.0	4.1	111	22,870	500/R
1,800(M)	51.6	85.5	1.0	4.2	115	25,080	500/R
2,000(M)	54.7	88.5	1.0	4.3	118	27,400	400/R
2,500(M)	61.1	95.0	1.0	4.5	125	32,640	300/R

(M) is Milliken conductor

R = Packing in reel

64/115 (123) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	10,310	605	679	433	452	417	432
300	0.0601	9,390	690	778	486	510	470	488
400	0.0470	8,690	793	901	549	580	535	557
500	0.0366	7,910	908	1,040	617	658	607	635
630	0.0283	7,430	1,039	1,203	691	746	688	725
800	0.0221	6,830	1,171	1,374	762	834	770	817
1,000	0.0176	6,270	1,307	1,558	827	922	851	911
1,200	0.0151	5,920	1,391	1,678	867	978	903	973
1,000(M)	0.0176	6,220	1,371	1,613	868	957	889	946
1,200(M)	0.0151	5,890	1,475	1,752	919	1,024	951	1,019
1,400(M)	0.0129	5,560	1,583	1,901	970	1,094	1,017	1,096
1,600(M)	0.0113	5,300	1,673	2,031	1,010	1,152	1,071	1,162
1,800(M)	0.0101	5,240	1,746	2,136	1,042	1,200	1,117	1,219
2,000(M)	0.0090	5,010	1,822	2,252	1,073	1,249	1,163	1,277
2,500(M)	0.0072	4,600	1,962	2,477	1,127	1,339	1,248	1,388

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

76/132 (145) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

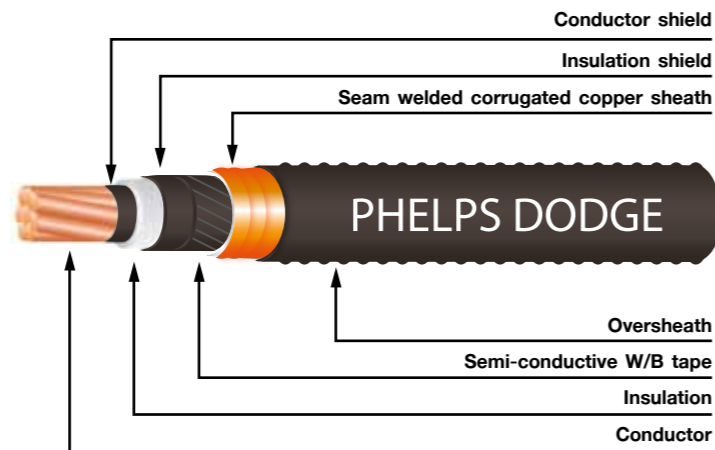
90 °C

**AC TEST VOLTAGE :**

190 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Cu sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	54.5	1.0	3.2	81	7,750	1,000/R
300	20.3	55.5	1.0	3.3	82	8,400	1,000/R
400	23.0	56.5	1.0	3.3	83	9,170	1,000/R
500	26.0	59.0	1.0	3.4	86	10,430	1,000/R
630	29.9	64.0	1.0	3.5	91	12,330	500/R
800	33.8	68.0	1.0	3.7	95	14,430	500/R
1,000	39.8	75.0	1.0	3.8	103	17,160	500/R
1,200	43.0	78.0	1.0	4.0	107	19,160	500/R
1,000(M)	39.1	75.0	1.0	3.8	103	17,160	500/R
1,200(M)	42.2	78.5	1.0	4.0	107	19,080	500/R
1,400(M)	45.7	83.0	1.0	4.1	112	21,500	500/R
1,600(M)	48.8	86.0	1.0	4.2	115	23,640	500/R
1,800(M)	51.6	88.5	1.0	4.3	118	25,680	500/R
2,000(M)	54.7	92.0	1.0	4.4	122	28,010	400/R
2,500(M)	61.1	99.0	1.0	4.6	129	33,490	300/R

(M) is Milliken conductor

R=Packing in reel

76/132 (145) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	11,860	602	669	431	451	419	434
300	0.0601	10,910	685	767	484	509	472	490
400	0.0470	9,670	789	891	547	579	535	558
500	0.0366	8,600	904	1,031	616	656	607	635
630	0.0283	8,070	1,035	1,192	689	744	689	725
800	0.0221	7,420	1,167	1,362	761	832	770	817
1,000	0.0176	6,810	1,302	1,544	825	919	851	911
1,200	0.0151	6,440	1,387	1,662	866	976	903	973
1,000(M)	0.0176	6,760	1,365	1,598	865	955	888	946
1,200(M)	0.0151	6,410	1,468	1,735	916	1,021	951	1,019
1,400(M)	0.0129	6,220	1,573	1,879	966	1,090	1,016	1,097
1,600(M)	0.0113	5,930	1,663	2,006	1,006	1,148	1,071	1,162
1,800(M)	0.0101	5,690	1,738	2,116	1,038	1,197	1,116	1,218
2,000(M)	0.0090	5,450	1,814	2,232	1,069	1,245	1,162	1,277
2,500(M)	0.0072	5,140	1,952	2,448	1,123	1,335	1,248	1,388

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

87/150 (170) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

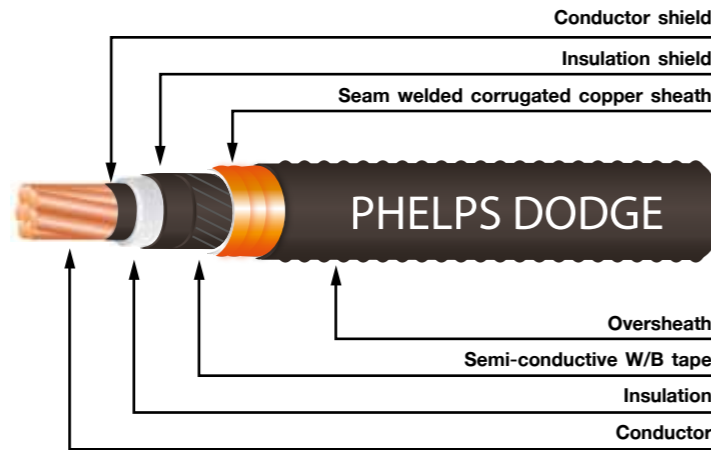
90 °C

**AC TEST VOLTAGE :**

218 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Cu sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	62.0	1.0	3.5	89	8,830	1,000/R
300	20.3	62.0	1.0	3.5	89	9,320	1,000/R
400	23.0	62.5	1.0	3.5	90	10,100	1,000/R
500	26.0	64.0	1.0	3.6	91	11,230	1,000/R
630	29.9	67.0	1.0	3.6	94	12,820	500/R
800	33.8	71.0	1.0	3.8	99	14,940	500/R
1,000	39.8	78.0	1.0	3.9	106	17,700	500/R
1,200	43.0	82.0	1.0	4.1	111	19,900	500/R
1,000(M)	39.1	78.5	1.0	3.9	107	17,700	500/R
1,200(M)	42.2	82.5	1.0	4.1	111	19,830	500/R
1,400(M)	45.7	86.0	1.0	4.2	115	22,080	500/R
1,600(M)	48.8	89.0	1.0	4.3	118	24,240	500/R
1,800(M)	51.6	93.0	1.0	4.5	123	26,530	400/R
2,000(M)	54.7	96.0	1.0	4.5	126	28,840	400/R
2,500(M)	61.1	102.5	1.0	4.8	133	34,190	300/R

(M) is Milliken conductor

R=Packing in reel

87/150 (170) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 60840 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	13,460	598	659	430	450	420	435
300	0.0601	12,270	681	756	483	508	473	491
400	0.0470	11,010	784	878	546	577	537	559
500	0.0366	9,680	899	1,017	614	655	608	637
630	0.0283	8,670	1,031	1,182	688	742	689	725
800	0.0221	8,000	1,162	1,350	759	830	770	817
1,000	0.0176	7,330	1,297	1,531	823	917	851	911
1,200	0.0151	7,100	1,380	1,643	864	973	904	973
1,000(M)	0.0176	7,280	1,358	1,584	862	952	887	946
1,200(M)	0.0151	7,070	1,459	1,715	912	1,018	950	1,019
1,400(M)	0.0129	6,690	1,566	1,862	962	1,087	1,015	1,096
1,600(M)	0.0113	6,380	1,655	1,988	1,002	1,145	1,069	1,161
1,800(M)	0.0101	6,270	1,728	2,092	1,035	1,193	1,116	1,219
2,000(M)	0.0090	6,010	1,804	2,206	1,065	1,242	1,161	1,276
2,500(M)	0.0072	5,540	1,944	2,425	1,120	1,332	1,247	1,387

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**36/69 (72.5) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier. Excellent sulfide, oil and chemical resistance. Increase earth fault current carrying capacity by added copper wire shield.

**Max. Conductor Temperature :**

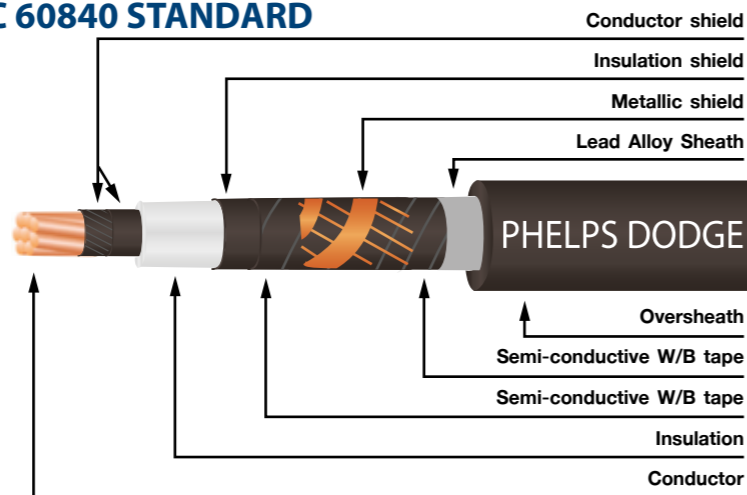
90 °C

**AC TEST VOLTAGE :**

90 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic Shield and moisture barrier : Lead alloy sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
150	14.2	44.5	155	1.9	2.8	63	8,570	1,000/R
185	15.8	45.0	155	1.9	2.8	63	8,935	1,000/R
240	18.2	45.5	155	1.9	2.8	64	9,460	1,000/R
300	20.3	47.5	145	2.0	2.8	66	10,425	1,000/R
400	23.0	49.0	145	2.0	2.9	68	11,370	1,000/R
500	26.0	53.0	140	2.0	3.0	72	12,815	500/R
630	29.9	56.5	135	2.1	3.1	76	14,825	500/R
800	33.8	60.5	125	2.2	3.3	80	17,200	500/R
1,000	39.8	66.5	115	2.3	3.4	87	20,110	500/R
1,200	43.0	70.0	105	2.4	3.5	90	22,390	500/R
1,000(M)	39.1	67.0	110	2.3	3.4	88	20,180	500/R
1,200(M)	42.2	70.0	100	2.4	3.5	92	22,470	500/R
1,400(M)	45.7	73.5	90	2.5	3.6	95	25,050	500/R
1,600(M)	48.8	77.5	80	2.6	3.8	100	27,525	400/R
1,800(M)	51.6	80.5	75	2.6	3.9	103	29,930	400/R
2,000(M)	54.7	83.5	65	2.7	3.9	106	32,575	300/R
2,500(M)	61.1	90.0	55	2.8	4.2	113	38,435	300/R

(M) is Milliken conductor

R= Packing in reel

**36/69 (72.5) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
150	0.124	11,850	453	509	334	346	318	328
185	0.0991	10,880	516	583	376	391	359	371
240	0.0754	9,460	607	692	434	453	415	429
300	0.0601	8,850	692	793	488	512	468	485
400	0.0470	7,910	797	921	551	582	532	553
500	0.0366	7,170	914	1,064	621	661	605	632
630	0.0283	6,530	1,051	1,237	699	751	687	721
800	0.0221	5,980	1,189	1,417	775	843	772	815
1,000	0.0176	5,310	1,337	1,617	848	936	856	911
1,200	0.0151	5,010	1,431	1,747	895	997	912	976
1,000(M)	0.0176	5,270	1,418	1,679	900	977	899	949
1,200(M)	0.0151	4,980	1,535	1,828	962	1,050	967	1,025
1,400(M)	0.0129	4,700	1,662	1,994	1,026	1,128	1,040	1,107
1,600(M)	0.0113	4,640	1,769	2,130	1,080	1,196	1,104	1,179
1,800(M)	0.0101	4,440	1,860	2,255	1,124	1,253	1,157	1,240
2,000(M)	0.0090	4,250	1,955	2,387	1,170	1,312	1,212	1,303
2,500(M)	0.0072	3,890	2,142	2,648	1,256	1,427	1,317	1,427

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**64/115 (123) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH  
IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier. Excellent sulfide, oil and chemical resistance. Increase earth fault current carrying capacity by added copper wire shield.

**Max. Conductor Temperature :**

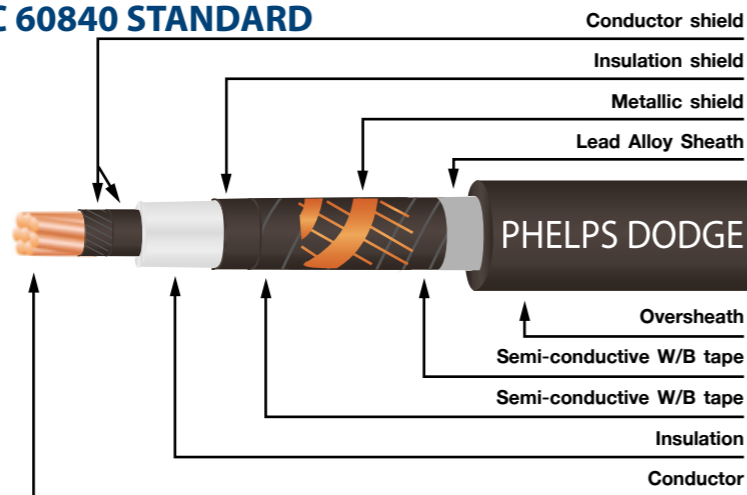
90 °C

**AC TEST VOLTAGE :**

160 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic Shield and moisture barrier : Lead alloy sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	48.5	145	2.0	2.9	67	10,105	1,000/R
300	20.3	49.5	145	2.0	2.9	68	10,745	1,000/R
400	23.0	52.5	140	2.0	3.0	71	11,845	500/R
500	26.0	56.0	135	2.1	3.1	75	13,520	500/R
630	29.9	61.0	125	2.2	3.3	81	15,765	500/R
800	33.8	64.5	115	2.3	3.4	85	18,170	500/R
1,000	39.8	71.5	100	2.5	3.6	93	21,650	500/R
1,200	43.0	75.0	90	2.5	3.7	96	23,720	500/R
1,000	39.1	72.0	95	2.5	3.6	94	21,740	500/R
1,200	42.2	75.0	90	2.5	3.7	97	23,805	500/R
1,400(M)	45.7	78.5	80	2.6	3.8	101	26,450	400/R
1,600(M)	48.8	82.0	75	2.6	3.9	104	28,430	400/R
1,800(M)	51.6	85.5	65	2.7	4.0	108	31,335	400/R
2,000(M)	54.7	88.5	55	2.8	4.1	112	34,125	300/R
2,500(M)	61.1	95.0	35	3.0	4.3	119	40,355	300/R

(M) is Milliken conductor

R = Packing in reel

**64/115 (123) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH  
IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xDe	Flat ≥0.5xDe	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	10,310	606	686	432	452	415	430
300	0.0601	9,390	690	788	486	510	467	485
400	0.0470	8,690	794	912	549	580	531	552
500	0.0366	7,910	912	1,054	620	659	605	632
630	0.0283	7,430	1,048	1,221	698	749	688	722
800	0.0221	6,830	1,187	1,399	774	841	773	815
1,000	0.0176	6,270	1,336	1,593	850	935	858	912
1,200	0.0151	5,920	1,429	1,719	897	995	914	976
1,000	0.0176	6,220	1,413	1,653	900	974	900	950
1,200	0.0151	5,890	1,528	1,798	961	1,047	968	1,025
1,400(M)	0.0129	5,560	1,654	1,961	1,026	1,126	1,041	1,107
1,600(M)	0.0113	5,300	1,760	2,101	1,078	1,192	1,102	1,176
1,800(M)	0.0101	5,240	1,851	2,217	1,125	1,250	1,157	1,238
2,000(M)	0.0090	5,010	1,950	2,349	1,172	1,310	1,214	1,303
2,500(M)	0.0072	4,600	2,143	2,609	1,264	1,427	1,322	1,428

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic Shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**76/132 (145) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH  
IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier. Excellent sulfide, oil and chemical resistance. Increase earth fault current carrying capacity by added copper wire shield.

**Max. Conductor Temperature :**

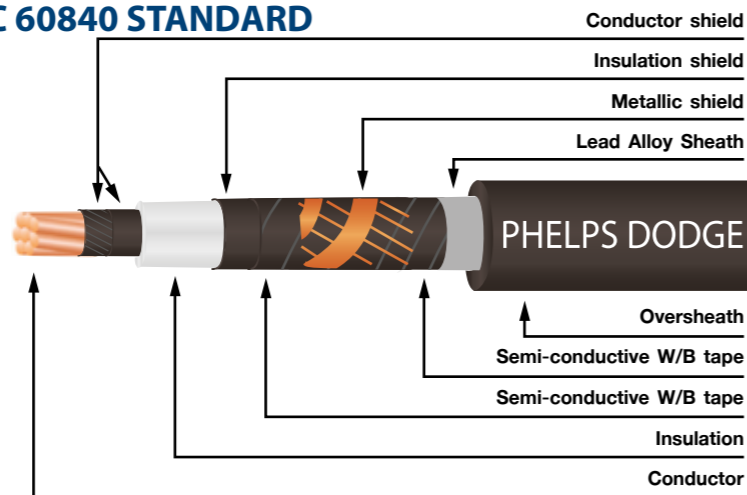
90 °C

**AC TEST VOLTAGE :**

190 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic Shield and moisture barrier : Lead alloy sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	54.5	135	2.1	3.1	74	11,270	1,000/R
300	20.3	55.5	135	2.1	3.1	75	11,940	500/R
400	23.0	56.5	135	2.1	3.2	76	12,745	500/R
500	26.0	59.0	125	2.2	3.2	79	14,260	500/R
630	29.9	64.0	115	2.3	3.4	84	16,565	500/R
800	33.8	68.0	110	2.4	3.5	88	19,015	500/R
1,000	39.8	75.0	95	2.5	3.7	96	22,240	500/R
1,200	43.0	78.0	85	2.6	3.8	99	24,610	500/R
1,000(M)	39.1	75.0	90	2.5	3.7	97	22,385	500/R
1,200(M)	42.2	78.5	80	2.6	3.8	101	24,760	500/R
1,400(M)	45.7	83.0	70	2.7	3.9	105	27,615	400/R
1,600(M)	48.8	86.0	65	2.7	4.0	109	29,615	400/R
1,800(M)	51.6	88.5	55	2.8	4.1	112	32,395	400/R
2,000(M)	54.7	92.0	45	2.9	4.2	115	35,190	300/R
2,500(M)	61.1	99.0	20	3.1	4.5	123	41,775	300/R

(M) is Milliken conductor

R=Packing in reel

**76/132 (145) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH  
IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	11,860	603	676	432	451	416	431
300	0.0601	10,910	688	775	485	509	470	487
400	0.0470	9,670	792	902	549	579	533	554
500	0.0366	8,600	911	1,045	620	658	605	632
630	0.0283	8,070	1,047	1,211	698	748	689	723
800	0.0221	7,420	1,185	1,387	775	840	773	816
1,000	0.0176	6,810	1,332	1,577	851	933	859	913
1,200	0.0151	6,440	1,427	1,703	900	995	916	977
1,000(M)	0.0176	6,760	1,408	1,637	900	973	902	951
1,200(M)	0.0151	6,410	1,525	1,783	962	1,047	971	1,027
1,400(M)	0.0129	6,220	1,648	1,936	1,027	1,125	1,043	1,108
1,600(M)	0.0113	5,930	1,755	2,075	1,081	1,192	1,104	1,178
1,800(M)	0.0101	5,690	1,850	2,199	1,128	1,250	1,160	1,241
2,000(M)	0.0090	5,450	1,948	2,328	1,176	1,311	1,215	1,304
2,500(M)	0.0072	5,140	2,139	2,578	1,270	1,429	1,326	1,430

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).



**87/150 (170) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier. Excellent sulfide, oil and chemical resistance. Increase earth fault current carrying capacity by added copper wire shield.

**Max. Conductor Temperature :**

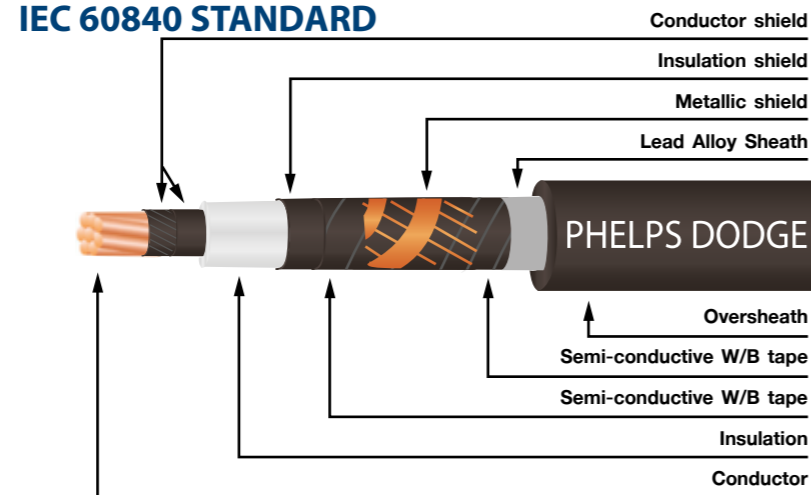
90 °C

**AC TEST VOLTAGE :**

218 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic Shield and moisture barrier : Lead alloy sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	62.0	120	2.3	3.3	82	12,960	500/R
300	20.3	62.0	120	2.3	3.3	82	13,460	500/R
400	23.0	62.5	120	2.3	3.4	83	14,275	500/R
500	26.0	64.0	115	2.3	3.4	84	15,435	500/R
630	29.9	67.0	110	2.4	3.5	88	17,400	500/R
800	33.8	71.0	100	2.5	3.6	92	19,895	500/R
1,000	39.8	78.0	85	2.6	3.8	99	23,180	500/R
1,200	43.0	82.0	75	2.7	3.9	104	25,815	500/R
1,000(M)	39.1	78.5	85	2.6	3.8	100	23,335	500/R
1,200(M)	42.2	82.5	70	2.7	3.9	105	25,975	500/R
1,400(M)	45.7	86.0	65	2.7	4.0	109	28,320	400/R
1,600(M)	48.8	89.0	55	2.8	4.1	112	30,675	400/R
1,800(M)	51.6	93.0	45	2.9	4.3	116	33,765	300/R
2,000(M)	54.7	96.0	35	3.0	4.4	120	36,615	300/R
2,500(M)	61.1	102.5	35	3.1	4.6	127	42,820	300/R

(M) is Milliken conductor

R=Packing in reel

**87/150 (170) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	13,460	601	666	432	451	419	434
300	0.0601	12,270	685	765	486	509	472	489
400	0.0470	11,010	790	889	550	579	535	557
500	0.0366	9,680	907	1,032	620	658	608	634
630	0.0283	8,670	1,045	1,201	698	748	690	724
800	0.0221	8,000	1,184	1,376	776	840	775	817
1,000	0.0176	7,330	1,331	1,564	852	933	861	914
1,200	0.0151	7,100	1,426	1,685	903	995	919	980
1,000(M)	0.0176	7,280	1,405	1,623	900	972	902	951
1,200(M)	0.0151	7,070	1,520	1,763	964	1,047	972	1,028
1,400(M)	0.0129	6,690	1,644	1,919	1,028	1,124	1,043	1,108
1,600(M)	0.0113	6,380	1,752	2,058	1,083	1,192	1,107	1,180
1,800(M)	0.0101	6,270	1,846	2,174	1,132	1,251	1,162	1,242
2,000(M)	0.0090	6,010	1,944	2,302	1,181	1,312	1,220	1,307
2,500(M)	0.0072	5,540	2,118	2,547	1,257	1,419	1,320	1,427

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**36/69 (72.5) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier.  
Excellent sulfide, oil and chemical resistance.

**Max. Conductor Temperature :**

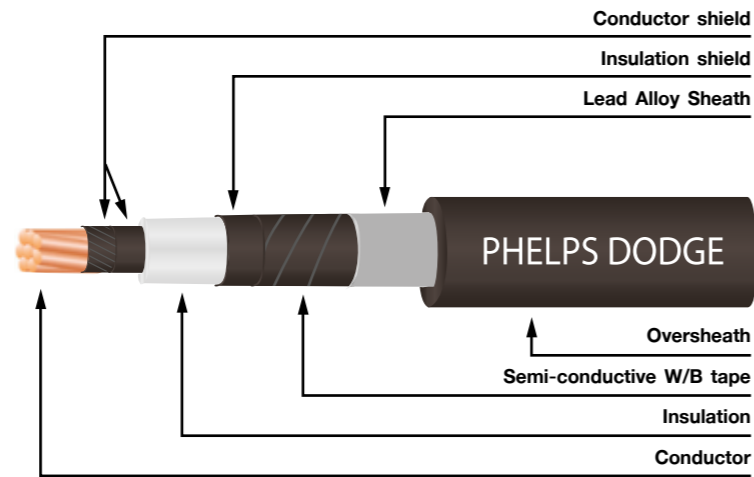
90 °C

**AC TEST VOLTAGE :**

90 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Lead Alloy Sheath and moisture barrier
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
150	14.2	44.5	2.0	2.6	58	6,870	1,000/R
185	15.8	45.0	2.0	2.7	59	7,270	1,000/R
240	18.2	45.5	2.0	2.7	59	7,790	1,000/R
300	20.3	47.5	2.0	2.7	61	8,590	1,000/R
400	23.0	49.0	2.0	2.8	63	9,550	1,000/R
500	26.0	53.0	2.0	2.9	67	11,020	1,000/R
630	29.9	56.5	2.0	3.0	71	12,830	500/R
800	33.8	60.5	2.1	3.1	75	15,220	500/R
1,000	39.8	66.5	2.2	3.3	82	18,200	500/R
1,200	43.0	70.0	2.3	3.4	86	20,520	500/R
1,000(M)	39.1	67.0	2.2	3.3	82	18,170	500/R
1,200(M)	42.2	70.0	2.3	3.4	86	20,410	500/R
1,400(M)	45.7	73.5	2.4	3.5	90	23,170	500/R
1,600(M)	48.8	77.5	2.5	3.7	95	25,960	500/R
1,800(M)	51.6	80.5	2.6	3.8	98	28,420	400/R
2,000(M)	54.7	83.5	2.6	3.9	101	30,870	400/R
2,500(M)	61.1	90.0	2.8	4.1	109	37,100	300/R

(M) is Milliken conductor

R = Packing in reel

**36/69 (72.5) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
150	0.124	11,850	448	503	334	345	314	323
185	0.0991	10,880	511	577	377	390	355	365
240	0.0754	9,460	602	684	437	452	411	423
300	0.0601	8,850	688	785	492	511	464	479
400	0.0470	7,910	795	912	559	583	529	547
500	0.0366	7,170	916	1,056	633	664	603	625
630	0.0283	6,530	1,056	1,229	716	757	686	715
800	0.0221	5,980	1,199	1,412	797	852	771	808
1,000	0.0176	5,310	1,352	1,614	875	948	858	906
1,200	0.0151	5,010	1,448	1,745	924	1,011	915	971
1,000(M)	0.0176	5,270	1,440	1,677	935	990	903	943
1,200(M)	0.0151	4,980	1,563	1,830	1,001	1,067	973	1,020
1,400(M)	0.0129	4,700	1,692	1,992	1,068	1,147	1,048	1,103
1,600(M)	0.0113	4,640	1,800	2,130	1,124	1,216	1,111	1,174
1,800(M)	0.0101	4,440	1,894	2,256	1,169	1,274	1,163	1,234
2,000(M)	0.0090	4,250	1,991	2,388	1,216	1,335	1,220	1,299
2,500(M)	0.0072	3,890	2,172	2,648	1,296	1,447	1,322	1,421

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**64/115 (123) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier.  
Excellent sulfide, oil and chemical resistance.

**Max. Conductor Temperature :**

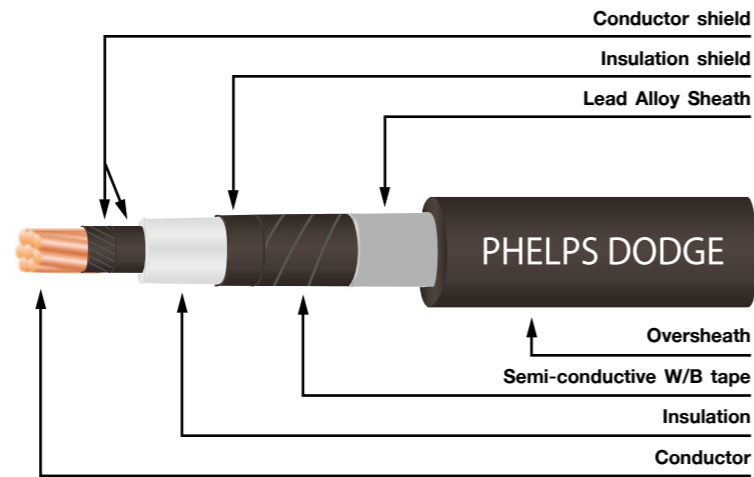
90 °C

**AC TEST VOLTAGE :**

160 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Lead Alloy Sheath and moisture barrier
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	48.5	2.0	2.8	62	8,280	1,000/R
300	20.3	49.5	2.0	2.8	63	8,930	1,000/R
400	23.0	52.5	2.0	2.9	66	10,050	1,000/R
500	26.0	56.0	2.0	3.0	70	11,540	1,000/R
630	29.9	61.0	2.1	3.2	76	13,820	500/R
800	33.8	64.5	2.2	3.3	80	16,260	500/R
1,000	39.8	71.5	2.4	3.5	88	19,810	500/R
1,200	43.0	75.0	2.4	3.6	91	21,910	500/R
1,000(M)	39.1	72.0	2.4	3.5	88	19,790	500/R
1,200(M)	42.2	75.0	2.4	3.6	92	21,800	500/R
1,400(M)	45.7	78.5	2.5	3.7	96	24,620	500/R
1,600(M)	48.8	82.0	2.6	3.8	99	27,220	400/R
1,800(M)	51.6	85.5	2.7	4.0	104	30,000	400/R
2,000(M)	54.7	88.5	2.8	4.0	107	32,810	300/R
2,500(M)	61.1	95.0	2.9	4.3	114	38,840	300/R

(M) is Milliken conductor

R = Packing in reel

**64/115 (123) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	10,310	601	679	435	451	410	423
300	0.0601	9,390	686	780	490	509	463	478
400	0.047	8,690	792	904	557	581	528	546
500	0.0366	7,910	913	1,046	631	661	601	624
630	0.0283	7,430	1,053	1,214	714	754	686	715
800	0.0221	6,830	1,196	1,394	795	848	771	808
1,000	0.0176	6,270	1,347	1,588	873	944	859	907
1,200	0.0151	5,920	1,443	1,716	923	1,007	914	969
1,000(M)	0.0176	6,220	1,429	1,649	929	985	902	943
1,200(M)	0.0151	5,890	1,551	1,799	995	1,061	971	1,018
1,400(M)	0.0129	5,560	1,678	1,957	1,062	1,141	1,045	1,100
1,600(M)	0.0113	5,300	1,787	2,100	1,117	1,209	1,108	1,172
1,800(M)	0.0101	5,240	1,878	2,215	1,162	1,267	1,161	1,233
2,000(M)	0.009	5,010	1,973	2,346	1,206	1,326	1,214	1,295
2,500(M)	0.0072	4,600	2,153	2,599	1,288	1,438	1,319	1,418

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**76/132 (145) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier.  
Excellent sulfide, oil and chemical resistance.

**Max. Conductor Temperature :**

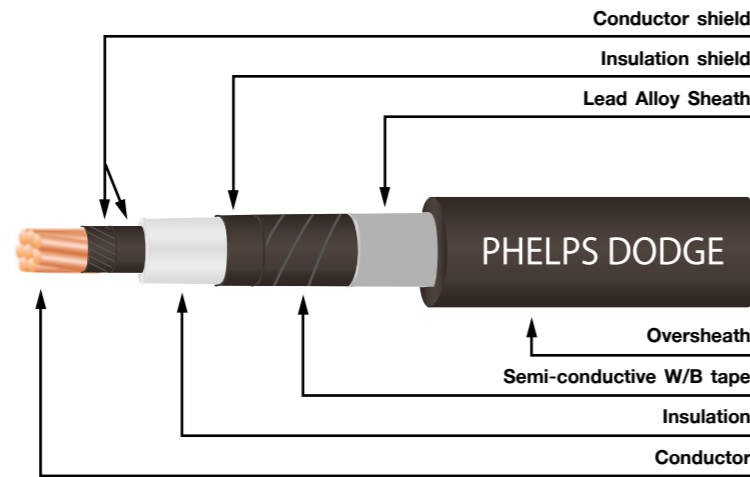
90 °C

**AC TEST VOLTAGE :**

190 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Lead Alloy Sheath and moisture barrier
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	54.5	2.0	3.0	69	9,290	1,000/R
300	20.3	55.5	2.0	3.0	70	9,950	1,000/R
400	23.0	56.5	2.1	3.1	71	10,990	1,000/R
500	26.0	59.0	2.1	3.1	74	12,310	500/R
630	29.9	64.0	2.2	3.3	79	14,650	500/R
800	33.8	68.0	2.3	3.4	84	17,140	500/R
1,000	39.8	75.0	2.4	3.6	91	20,470	500/R
1,200	43.0	78.0	2.5	3.7	95	22,890	500/R
1,000(M)	39.1	75.0	2.4	3.6	92	20,450	500/R
1,200(M)	42.2	78.5	2.5	3.7	95	22,790	500/R
1,400(M)	45.7	83.0	2.6	3.8	100	25,890	500/R
1,600(M)	48.8	86.0	2.7	4.0	104	28,570	400/R
1,800(M)	51.6	88.5	2.8	4.1	107	31,120	400/R
2,000(M)	54.7	92.0	2.8	4.2	111	33,630	300/R
2,500(M)	61.1	99.0	3.0	4.4	119	40,340	300/R

(M) is Milliken conductor

R = Packing in reel

**76/132 (145) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	11,860	599	670	434	450	413	426
300	0.0601	10,910	684	768	490	509	465	481
400	0.047	9,670	791	895	556	580	530	548
500	0.0366	8,600	911	1,038	630	660	603	626
630	0.0283	8,070	1,051	1,204	713	753	687	716
800	0.0221	7,420	1,193	1,382	795	847	772	809
1,000	0.0176	6,810	1,344	1,574	873	943	860	907
1,200	0.0151	6,440	1,440	1,701	923	1,005	916	971
1,000(M)	0.0176	6,760	1,423	1,633	927	983	902	943
1,200(M)	0.0151	6,410	1,544	1,782	992	1,059	972	1,019
1,400(M)	0.0129	6,220	1,668	1,933	1,059	1,138	1,047	1,103
1,600(M)	0.0113	5,930	1,776	2,072	1,114	1,206	1,108	1,172
1,800(M)	0.0101	5,690	1,868	2,194	1,158	1,263	1,160	1,232
2,000(M)	0.009	5,450	1,964	2,322	1,204	1,323	1,216	1,296
2,500(M)	0.0072	5,140	2,139	2,565	1,283	1,434	1,317	1,417

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**87/150 (170) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier.  
Excellent sulfide, oil and chemical resistance.

**Max. Conductor Temperature :**

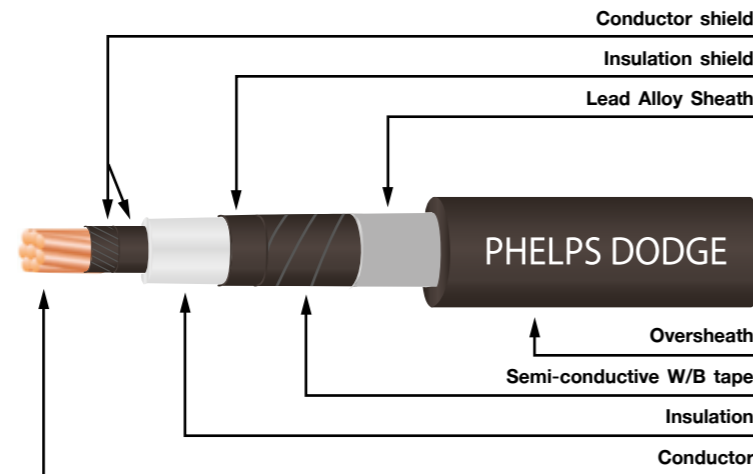
90 °C

**AC TEST VOLTAGE :**

218 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 60840



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Lead Alloy Sheath and moisture barrier
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
240	18.2	62.0	2.2	3.2	77	11,040	1,000/R
300	20.3	62.0	2.2	3.2	77	11,540	1,000/R
400	23.0	62.5	2.2	3.3	78	12,360	500/R
500	26.0	64.0	2.2	3.3	79	13,530	500/R
630	29.9	67.0	2.3	3.4	83	15,520	500/R
800	33.8	71.0	2.4	3.5	87	18,050	500/R
1,000	39.8	78.0	2.5	3.7	95	21,460	500/R
1,200	43.0	82.0	2.6	3.8	99	24,150	500/R
1,000(M)	39.1	78.5	2.5	3.7	95	21,440	500/R
1,200(M)	42.2	82.5	2.6	3.8	100	24,050	500/R
1,400(M)	45.7	86.0	2.7	4.0	104	27,000	400/R
1,600(M)	48.8	89.0	2.8	4.1	108	29,690	400/R
1,800(M)	51.6	93.0	2.9	4.2	112	32,540	300/R
2,000(M)	54.7	96.0	2.9	4.3	115	35,080	300/R
2,500(M)	61.1	102.5	3.1	4.5	122	41,610	300/R

(M) is Milliken conductor

R = Packing in reel

**87/150 (170) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 60840 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	13,460	597	661	434	450	415	428
300	0.0601	12,270	682	759	489	508	468	483
400	0.047	11,010	788	883	556	579	532	551
500	0.0366	9,680	908	1,025	630	660	604	627
630	0.0283	8,670	1,048	1,195	712	752	687	716
800	0.0221	8,000	1,190	1,371	794	846	773	810
1,000	0.0176	7,330	1,340	1,561	872	941	860	907
1,200	0.0151	7,100	1,435	1,681	923	1,004	917	972
1,000(M)	0.0176	7,280	1,417	1,619	924	981	902	944
1,200(M)	0.0151	7,070	1,535	1,761	989	1,056	971	1,020
1,400(M)	0.0129	6,690	1,660	1,915	1,055	1,135	1,045	1,102
1,600(M)	0.0113	6,380	1,767	2,053	1,110	1,203	1,108	1,172
1,800(M)	0.0101	6,270	1,856	2,167	1,154	1,260	1,161	1,233
2,000(M)	0.009	6,010	1,951	2,293	1,200	1,319	1,214	1,295
2,500(M)	0.0072	5,540	2,127	2,539	1,278	1,429	1,314	1,415

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

**127/230 (245) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE**

**IEC 62067 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Light weight, small overall diameter and easy to bend.

**Max. Conductor Temperature :**

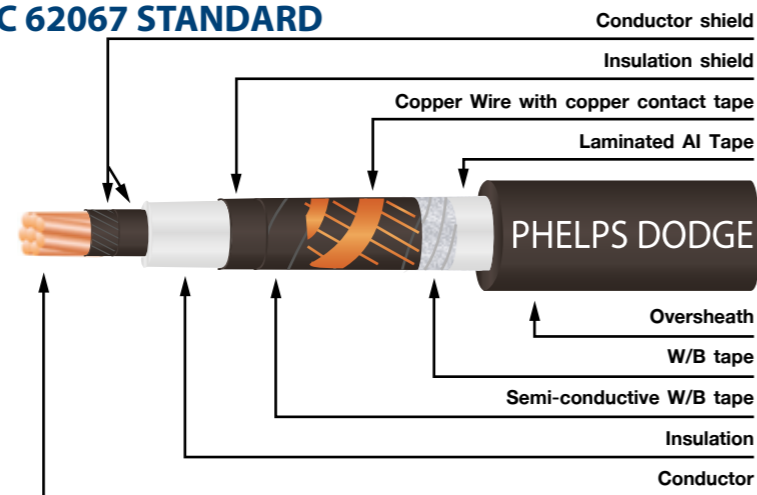
90 °C

**AC TEST VOLTAGE :**

318 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 62067



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water : Semi-conductive water blocking tape blocking layer
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water : Water blocking tape blocking layer
- Radial water barrier : Laminated aluminium tape
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of Al tape mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	87.0	220	0.2	4.1	105	12,680	500/R
500	25.9	86.5	220	0.2	4.1	104	13,485	500/R
630	29.9	86.5	220	0.2	4.1	104	14,635	500/R
800	33.8	87.5	220	0.2	4.1	106	16,270	500/R
1,000	39.8	93.0	220	0.2	4.1	112	18,770	500/R
1,200	43.0	96.5	220	0.2	4.2	115	20,720	500/R
1,000(M)	39.1	90.5	220	0.2	4.1	109	18,285	500/R
1,200(M)	42.2	93.5	220	0.2	4.2	113	20,205	500/R
1,400(M)	45.7	97.0	220	0.2	4.3	116	22,405	500/R
1,600(M)	48.8	100.5	220	0.2	4.4	120	24,515	500/R
1,800(M)	51.6	104.0	220	0.2	4.6	124	26,745	400/R
2,000(M)	54.7	107.0	220	0.2	4.7	127	29,055	400/R
2,500(M)	61.1	114.5	220	0.2	4.9	135	34,485	300/R

(M) is Milliken conductor

R = Packing in reel

**127/230 (245) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LAMINATED ALUMINIUM TAPE**

**IEC 62067 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
400	0.0470	15,310	760	838	533	568	531	557
500	0.0366	13,610	871	971	599	644	600	632
630	0.0283	11,980	1,001	1,133	671	730	678	719
800	0.0221	10,690	1,133	1,301	740	816	757	808
1,000	0.0176	9,660	1,268	1,480	806	903	837	900
1,200	0.0151	9,170	1,352	1,593	847	959	889	962
1,000(M)	0.0176	9,160	1,329	1,540	842	936	868	931
1,200(M)	0.0151	8,720	1,431	1,672	892	1,002	931	1,003
1,400(M)	0.0129	8,280	1,539	1,816	944	1,071	996	1,080
1,600(M)	0.0113	7,920	1,630	1,941	986	1,129	1,049	1,144
1,800(M)	0.0101	7,750	1,707	2,045	1,022	1,180	1,099	1,203
2,000(M)	0.0090	7,440	1,786	2,158	1,056	1,230	1,145	1,261
2,500(M)	0.0072	7,000	1,935	2,375	1,117	1,325	1,235	1,374

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

127/230 (245) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH  
IEC 62067 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

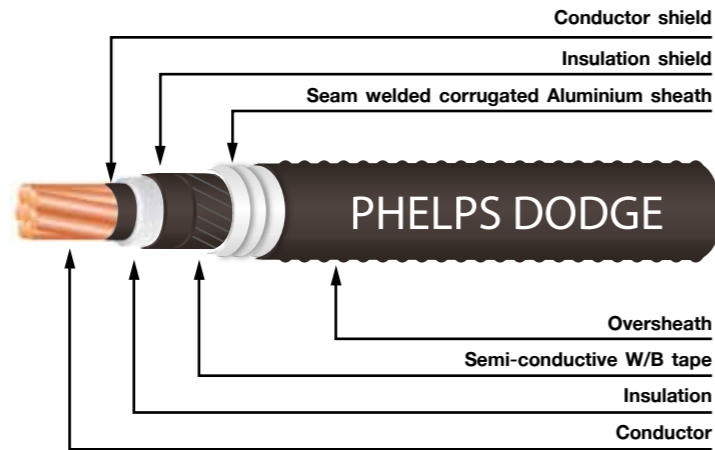
90 °C

**AC TEST VOLTAGE :**

318 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 62067



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated Aluminium sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Al sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	87.0	2.3	4.4	119	13,550	500/R
500	26.0	86.5	2.3	4.4	119	14,350	500/R
630	29.9	86.5	2.3	4.4	119	15,470	500/R
800	33.8	87.5	2.3	4.4	120	17,070	500/R
1,000	39.8	90.0	2.5	4.5	123	19,390	500/R
1,200	43.0	93.5	2.5	4.6	127	21,420	500/R
1,000(M)	39.1	90.5	2.5	4.5	123	19,400	500/R
1,200(M)	42.2	93.5	2.5	4.6	127	21,350	500/R
1,400(M)	45.7	97.0	2.5	4.7	131	23,640	500/R
1,600(M)	48.8	100.5	2.5	4.8	134	25,830	500/R
1,800(M)	51.6	104.0	2.5	4.9	138	28,120	400/R
2,000(M)	54.7	107.0	2.5	5.0	141	30,500	400/R
2,500(M)	61.1	114.5	2.5	5.0	149	36,010	300/R

(M) is Milliken conductor

R = Packing in reel

127/230 (245) kV COPPER CONDUCTOR WITH CORRUGATED ALUMINIUM SHEATH  
IEC 62067 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
400	0.047	15,310	763	837	536	571	540	565
500	0.0366	13,580	875	970	602	647	611	642
630	0.0283	11,980	1,005	1,130	673	733	689	729
800	0.0221	10,690	1,134	1,297	741	818	768	818
1,000	0.0176	9,220	1,268	1,480	800	901	844	909
1,200	0.0151	8,760	1,349	1,593	839	955	895	969
1,000(M)	0.0176	9,160	1,320	1,530	832	933	877	942
1,200(M)	0.0151	8,720	1,418	1,660	879	997	938	1,013
1,400(M)	0.0129	8,280	1,520	1,801	925	1,063	1,000	1,088
1,600(M)	0.0113	7,920	1,606	1,922	962	1,119	1,053	1,152
1,800(M)	0.0101	7,750	1,676	2,023	992	1,165	1,098	1,208
2,000(M)	0.0090	7,440	1,749	2,132	1,022	1,212	1,142	1,265
2,500(M)	0.0072	7,000	1,884	2,342	1,072	1,299	1,225	1,374

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

127/230 (245) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 62067 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantages :**

Perfect radial moisture barrier and excellent earth fault current carrying capacity.

**Max. Conductor Temperature :**

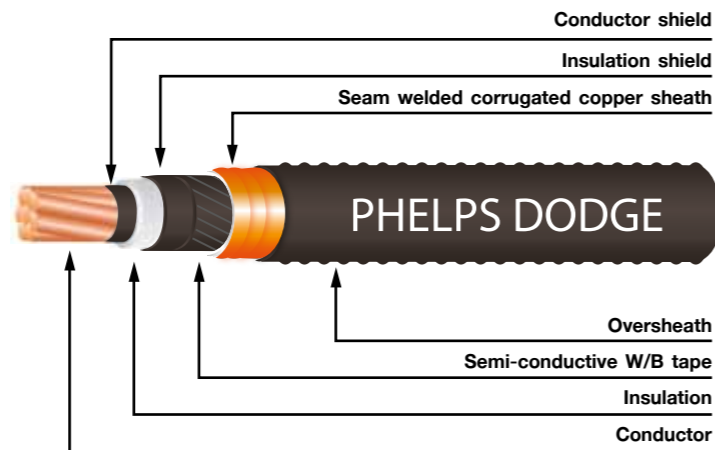
90 °C

**AC TEST VOLTAGE :**

318 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 62067



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield and radial water barrier : Seam welded corrugated copper sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of Cu sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	87.0	1.0	4.4	117	14,420	500/R
500	26.0	86.5	1.0	4.4	116	15,210	500/R
630	29.9	86.5	1.0	4.3	116	16,300	500/R
800	33.8	87.5	1.0	4.3	117	17,910	500/R
1,000	39.8	90.0	1.0	4.4	120	20,070	500/R
1,200	43.0	93.5	1.0	4.5	123	22,110	500/R
1,000(M)	39.1	90.5	1.0	4.4	120	20,070	500/R
1,200(M)	42.2	93.5	1.0	4.5	124	22,040	500/R
1,400(M)	45.7	97.0	1.0	4.6	127	24,360	500/R
1,600(M)	48.8	100.5	1.0	4.7	131	26,570	400/R
1,800(M)	51.6	104.0	1.0	4.8	135	28,890	400/R
2,000(M)	54.7	107.0	1.0	4.9	138	31,300	400/R
2,500(M)	61.1	114.5	1.0	5.2	146	37,000	300/R

(M) is Milliken conductor

R = Packing in reel

127/230 (245) kV COPPER CONDUCTOR WITH CORRUGATED COPPER SHEATH  
IEC 62067 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
400	0.047	15,310	763	835	539	572	540	563
500	0.0366	13,580	876	969	606	648	611	640
630	0.0283	11,980	1,007	1,130	679	735	690	728
800	0.0221	10,690	1,139	1,297	749	821	770	817
1,000	0.0176	9,220	1,276	1,481	814	907	848	908
1,200	0.0151	8,760	1,360	1,594	854	962	899	969
1,000(M)	0.0176	9,160	1,332	1,532	849	940	882	942
1,200(M)	0.0151	8,720	1,433	1,664	898	1,005	944	1,013
1,400(M)	0.0129	8,280	1,538	1,805	947	1,073	1,008	1,089
1,600(M)	0.0113	7,920	1,626	1,928	986	1,130	1,061	1,154
1,800(M)	0.0101	7,750	1,699	2,029	1,018	1,177	1,107	1,210
2,000(M)	0.0090	7,440	1,774	2,139	1,048	1,225	1,152	1,267
2,500(M)	0.0072	7,000	1,912	2,347	1,102	1,314	1,237	1,377

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).



**127/230 (245) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH  
IEC 62067 STANDARD**

**APPLICATION :**

Preferably used for urban networks. Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier. Excellent sulfide, oil and chemical resistance. Increase earth fault current carrying capacity by added copper wire shield.

**Max. Conductor Temperature :**

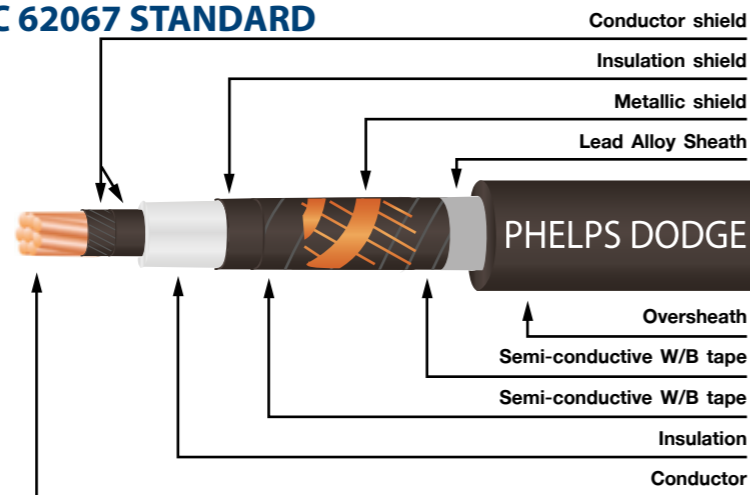
90 °C

**AC TEST VOLTAGE :**

318 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 62067



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Annealed uncoated copper wire with copper contact tape
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic Shield and moisture barrier : Lead alloy sheath
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal area of copper wire shield mm <sup>2</sup>	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	87.0	115	2.9	4.3	110	21,685	500/R
500	26.0	86.5	115	2.9	4.2	109	22,430	500/R
630	29.9	86.5	115	2.9	4.2	109	23,555	500/R
800	33.8	87.5	115	2.9	4.2	110	25,220	500/R
1,000	39.8	90.0	110	2.9	4.2	113	27,500	400/R
1,200	43.0	93.5	95	3.0	4.4	117	30,085	400/R
1,000(M)	39.1	90.5	105	2.9	4.2	114	27,670	400/R
1,200(M)	42.2	93.5	95	3.0	4.3	118	30,230	400/R
1,400(M)	45.7	97.0	85	3.1	4.5	122	33,145	300/R
1,600(M)	48.8	100.5	75	3.1	4.6	125	35,185	300/R
1,800(M)	51.6	104.0	55	3.2	4.7	135	39,085	300/R
2,000(M)	54.7	107.0	40	3.2	4.8	144	42,365	300/R
2,500(M)	61.1	114.5	40	3.4	5.0	159	50,495	200/R

(M) is Milliken conductor

R = Packing in reel

**127/230 (245) kV COPPER CONDUCTOR WITH COPPER WIRE SHIELD AND LEAD SHEATH  
IEC 62067 STANDARD**

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
240	0.0754	13,460	601	666	432	451	419	434
300	0.0601	12,270	685	765	486	509	472	489
400	0.0470	11,010	790	889	550	579	535	557
500	0.0366	9,680	907	1,032	620	658	608	634
630	0.0283	8,670	1,045	1,201	698	748	690	724
800	0.0221	8,000	1,184	1,376	776	840	775	817
1,000	0.0176	7,330	1,331	1,564	852	933	861	914
1,200	0.0151	7,100	1,426	1,685	903	995	919	980
1,000(M)	0.0176	7,280	1,405	1,623	900	972	902	951
1,200(M)	0.0151	7,070	1,520	1,763	964	1,047	972	1,028
1,400(M)	0.0129	6,690	1,644	1,919	1,028	1,124	1,043	1,108
1,600(M)	0.0113	6,380	1,752	2,058	1,083	1,192	1,107	1,180
1,800(M)	0.0101	6,270	1,846	2,174	1,132	1,251	1,162	1,242
2,000(M)	0.0090	6,010	1,944	2,302	1,181	1,312	1,220	1,307
2,500(M)	0.0072	5,540	2,118	2,547	1,257	1,419	1,320	1,427

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

127/230 (245) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 62067 STANDARD

**APPLICATION :**

Preferably used for urban networks.  
Suitable for use in duct, trays and direct burial in ground.

**Advantage :**

Perfect radial moisture barrier.  
Excellent sulfide, oil and chemical resistance.

**Max. Conductor Temperature :**

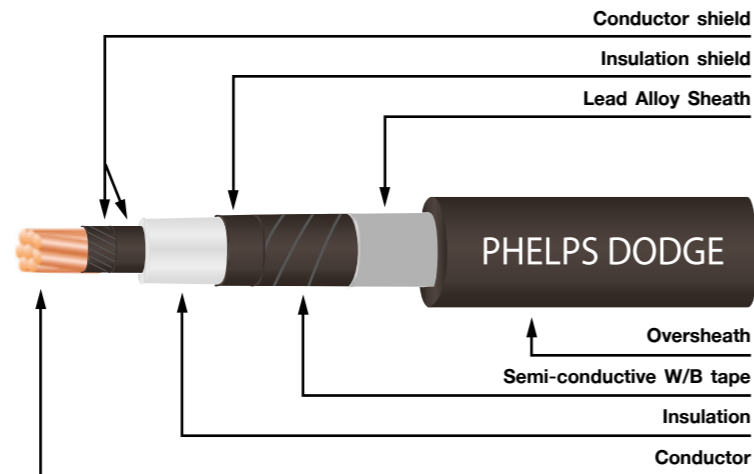
90 °C

**AC TEST VOLTAGE :**

318 kV (30 minutes)

**REFERENCE STANDARD :**

IEC 62067



**CONSTRUCTION :**

- Conductor : Round compact stranded or Milliken conductor
- Conductor shield : Semi-conducting tape and/or extruded semi-conducting cross-linked polyethylene
- Insulation : Cross-linked polyethylene
- Insulation shield : Semi-conducting cross-linked polyethylene
- Longitudinal water blocking layer : Semi-conductive water blocking tape
- Metallic shield : Lead Alloy Sheath and moisture barrier
- Oversheath : Black PE (ST-7)

**Cable Construction**

Nominal cross-sectional area mm <sup>2</sup>	Diameter of conductor (Approx.) mm	Diameter over insulation (Approx.) mm	Nominal thickness of lead sheath mm	Nominal thickness of oversheath mm	Overall diameter (Approx.) mm	Cable weight (Approx.) kg/km	Standard packing m
400	23.0	87.0	2.8	4.2	106	19,610	500/R
500	26.0	86.5	2.8	4.1	105	20,340	500/R
630	29.9	86.5	2.8	4.1	105	21,460	500/R
800	33.8	87.5	2.8	4.1	106	23,120	500/R
1,000	39.8	90.0	2.8	4.1	108	25,420	500/R
1,200	43.0	93.5	2.9	4.3	112	28,060	400/R
1,000(M)	39.1	90.5	2.8	4.1	109	25,410	500/R
1,200(M)	42.2	93.5	2.9	4.3	113	27,970	400/R
1,400(M)	45.7	97.0	3.0	4.4	117	31,060	400/R
1,600(M)	48.8	100.5	3.1	4.5	120	33,870	300/R
1,800(M)	51.6	104.0	3.2	4.6	125	36,880	300/R
2,000(M)	54.7	107.0	3.2	4.7	128	39,510	300/R
2,500(M)	61.1	114.5	3.4	5.0	136	46,660	200/R

(M) is Milliken conductor

R = Packing in reel

127/230 (245) kV COPPER CONDUCTOR WITH LEAD SHEATH  
IEC 62067 STANDARD

**Electrical Properties and Current Rating (A)**

Nominal cross-sectional area mm <sup>2</sup>	Maximum DC resistance of conductor at 20°C Ω/km	Minimum insulation resistance at 20°C MΩ-km	Current rating in air* (A)		Current rating direct burial* (A)		Current rating in PE duct in ground* (A)	
			Trefoil ≥0.5xD <sub>c</sub>	Flat ≥0.5xD <sub>c</sub>	Trefoil 1 m	Flat 1 m	Trefoil 1 m	Flat 1 m
400	0.047	15,310	772	842	552	576	538	558
500	0.0366	13,580	890	978	625	655	610	634
630	0.0283	11,980	1,029	1,143	707	746	692	722
800	0.0221	10,690	1,171	1,317	788	839	776	813
1,000	0.0176	9,220	1,322	1,511	865	932	859	906
1,200	0.0151	8,760	1,416	1,630	915	993	915	970
1,000(M)	0.0176	9,160	1,390	1,566	911	970	897	941
1,200(M)	0.0151	8,720	1,506	1,705	974	1,043	966	1,016
1,400(M)	0.0129	8,280	1,627	1,854	1,038	1,121	1,038	1,097
1,600(M)	0.0113	7,920	1,732	1,986	1,091	1,186	1,098	1,165
1,800(M)	0.0101	7,750	1,819	2,096	1,134	1,242	1,150	1,225
2,000(M)	0.009	7,440	1,911	2,217	1,179	1,300	1,204	1,287
2,500(M)	0.0072	7,000	2,080	2,446	1,254	1,406	1,302	1,406

(M) is Milliken conductor

**\*CONDITION :**

1. Ambient air temperature 40°C
2. Ground temperature 30°C
3. Thermal resistivity of soil 1.2 K-m/W
4. Depth of laying 1.0 m
5. Axial spacing between phase cable is 2xOD<sub>cable</sub> or 2xOD<sub>duct</sub>
6. Metallic shield and/or sheath bonded at single point or cross-bonded (no sheath circulating current).

## Correction Factors for Other Laying Conditions

### AMBIENT AIR TEMPERATURE

Maximum conductor temperature 90°C	Ambient air temperature (°C)					
	10	20	30	40	50	60
Rating Factor	1.30	1.21	1.11	1.00	0.88	0.75

### AMBIENT GROUND TEMPERATURE

Maximum conductor temperature 90°C	Ambient air temperature (°C)					
	10	20	30	40	50	60
Rating Factor	1.16	1.08	1.00	0.91	0.82	0.70

### DEPTH OF LAYING

Depth of laying (m)	Rating factor
	Direct burial
0.50	1.16
0.75	1.09
1.00	1.05
1.25	1.02
1.50	1.00
1.75	0.99
2.00	0.97
2.25	0.96
2.50	0.95
2.75	0.95
3.00	0.94

### SOIL THERMAL RESISTIVITY

Soil thermal resistivity (K·m/W)	Rating factor
	Direct burial
0.80	1.30
0.90	1.23
1.00	1.18
1.20	1.10
1.50	1.00
2.00	0.88
2.50	0.80

### GROUPS OF THREE-PHASE CIRCUITS OF SINGLE CORE CABLES LAID DIRECT IN GROUND (TREFOIL OR FLAT FORMATION)

Axial spacing between circuits (mm)	Number of circuits		
	2	3	4
Touching	0.67	0.60	0.44
200	0.75	0.67	0.55
400	0.83	0.74	0.67
600	0.88	0.80	0.74
800	0.92	0.83	0.78

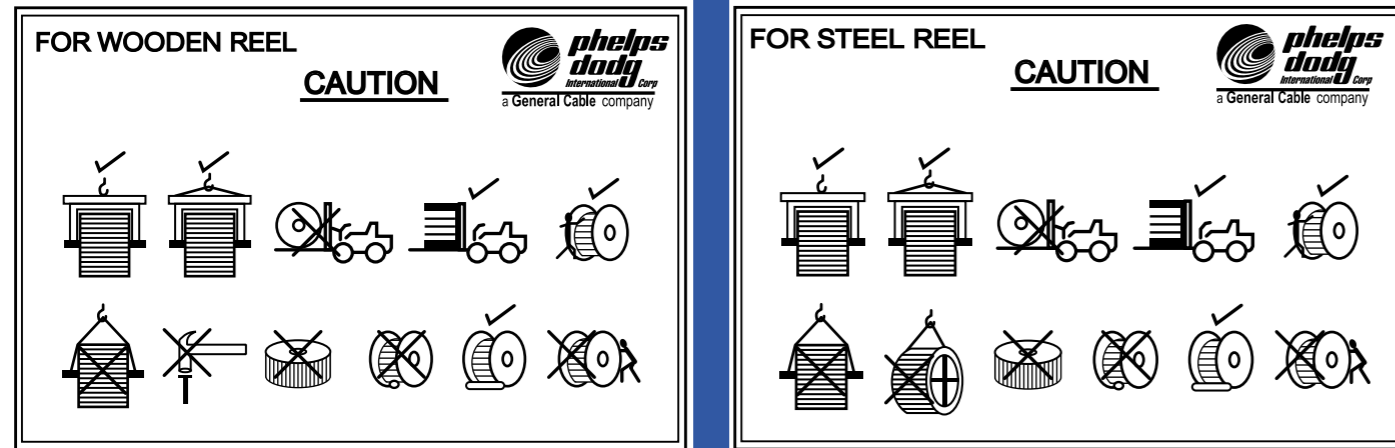
# CABLE HANDLING

## Storage

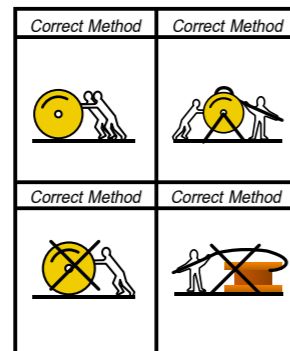
Cable should be stored in a dry place with roof in order to prevent the premature rotten of the wooden drum or lagging. The floor should be concrete or firm enough to prevent the drum from sinking. Chocks must be used to prevent the movement of the drum. The cable drum should be kept in a place where security and fire damage are protected during storage.

## Safe Handling and Unloading of Cable Drum

- As received at stores or site, check the cable drums for any physical damages to the drum and outer wooden laggings. Also check that the cable end cover are proper and in position.
- Loading/unloading of the drum to or from truck should be done by crane or use of a ramp. Do not drop the drum or throw from the truck since this is not only damage the drum, the cable may also be damaged. Follows the below picture.



- Flanges shall be kept always in up-right position during storage and handling and paying off or during transportation of drum. Use pair of jacks with stand and shaft for mounting cable drums before paying off. Spindles of adequate size will be selected depending on the weight and size of the cable drum.
- After removal of the drum lagging, a thorough physical inspection of the cable shall be carried out.
- Roll the drum only in the direction of painted arrow on the drum flanges and only for short distances.



- Keep a man stationed near the drum with a plank wedged against the flange so that overrunning of the drum could be prevented if rolling stops.
- Cable end shall be taken out from the top side of the mounted drum of cable, and never from the bottom side.
- Do not lay the damaged cables before repair and testing.

## Installation

- Follows the National Code of Installation.
- The following is a guideline for the maximum pulling tension to be used.

Pulling at Conductor (Pulling Eyes) - The maximum pulling tension is calculated from the following formula

### Maximum Allowable Conductor Stress (S)

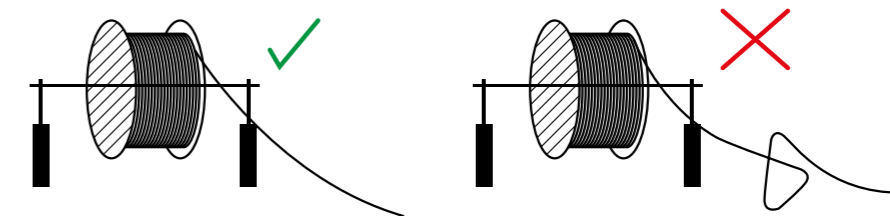
Cable Type	Material	Temper	N/mm <sup>2</sup>
All	Copper	Soft	70
Power	Aluminum	Hard	50

### Maximum Allowable Pulling Tension = S x n x A

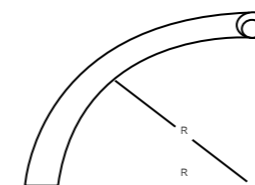
- S = Maximum allowable conductor stress , kg/mm<sup>2</sup>
- n = Number of conductors
- A = Nominal cross-sectional area of conductor , mm<sup>2</sup>

Cable Grip over Outer Sheath - The maximum pulling tension is 4400 N but in no case shall not be more than pulling at conductor

- If the pulling tension is likely to be close to the maximum pulling tension (in rage of 10%), the tension metering device is recommended.
- Do not start and stop pull, pull and constant low speed.
- Do not lay the cable with sharp bend, twisting or kinking. Care must be taken since this will harm the cable.



- The bending radius (R) during pulling of the cable should not exceed the following value.



### High Voltage Cable (> 33kV)

Cable's Outer Sheath or Covering	Installation Bending Radius as a Multiple of Cable Diameter		
	Cable placed into position adjacent to joint or termination With former	Laid direct in ground or in air	Laid in ducts
Single-core Copper Wire Shield or Lead Sheath or Corrugated Sheath	20	30	35

