



**Technical Catalogue
for
Electrical Overhead Conductor
& LT Power Cable**

BANGLADESH CABLE SHILPA LIMITED
(An Enterprise of Govt. of Bangladesh)

INTRODUCTION

History of BCSL:

Since 1967, followed by a vision to serve quality products to the common people of Bangladesh. BCSL has initiated its journey with Telecom Copper Cable for Bangladesh T&T Board. Within four decades, BCSL has become the only telecom cable manufacturer of Bangladesh at that time with export quality and being able to proclaim good responses from its customers. In 2011, the company diversified their product range in to OFC, Silicon Core DUCT for OFC categories to cater and satisfy to larger markets with up to date technology for “Digital Bangladesh”.

BCSL has become synonymous with “standard’ to the folks of this country. BCSL has maintained stringent consistency throughout these decades as quality is concerned. BCSL is currently spread over an area of 600.000 square meters and are fully equipped with State of the Art industrial manufacturing machines. With raw materials to finished goods conversion capacity of over 20,000 km per year. BCSL has earned a significant leadership in the arena of Telecom Copper Cable and OFC cable manufacturing plant in Bangladesh.

In 2019, BCSL started production of Electrical Overhead Conductor and LT Power Cable products. As a part of this initiative BCSL stands in the market as a brand for cables. The production process is well equipped with hi-efficient modern machineries and to conform to the latest national and international standards. Now the company complies with all required mandates.

BCSL has taken steps to manufacture drop fiber cable, simplex duplex cables for FTTH and super enameled copper wire within 2022. These products will also assist to take part in the ongoing developing infrastructure in IT and Power Sector.

The 21st century is regarded as the era of globalization where only quality matters and BCSL believes that these standards can be reached and sustained by utilizing our available indigenous resources. In this way, we also believe that the health of the national economy of Bangladesh can be enriched through such indigenization.



From the Desk of Managing Director

Improving Customer Satisfaction

A warm welcome to BCSL. Over the years we have taken some opportunities to sharpen ourselves as the most diversified and consumer focused business in the country. Currently we are proudly holding a leading place in Bangladesh Telecom Copper Cable, Optical Fiber Cable, Silicon core DUCT and LT Power Cable industry. Today, we are trying to share our evolved industries knowledge of 48 years to the other sectors of our conglomerate, which holds significant potentials to grow forth.

BCSL started manufacturing its first power cables production in September 2019 at Khulna, Bangladesh. Both household and Industrial cables are manufactured with the world class European state of the art technology. Simultaneously, we are producing and marketing PVC/XLPE LT cables, Communication/instrumentation cables, Aluminum Overhead Conductor. Other cables like Fiber optics and some special purpose cables are in the process cue of a sizable production.

Our production plant is fully integrated with for 99.99% conductivity primary wire, drawing machine and PVC & HDPE extrusion. We are extremely strict to achieve top quality and standards in terms of thickness, copper & aluminum conductivity and insulation Jacket.

We are going to produce FTTH related cable products and Super Enameled Copper Wire for strengthen the existing structure of BCSL as well as for development partner in different related projects.

We proudly consider ourselves unique in the fields of sales, distribution and marketing in Bangladesh. Our latest mission is increasing our own capacity and capabilities to meet our consumer's expectations.

BCSL has brought a great honor for country as it has transcended the area of country and expanded the business to outer world.

Thank you for your continued patronage for BCSL products.

Jagadish Chandra Mandal
MD, BCSL



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ABBREVIATION

Abbreviation	Interpretation
BDS	Bangladesh Standard
IEC	International Electro technical Commission
VDE	Union of German Electrical Engineer
BS	British Standard
ASTM	American Society for Testing and Material
ICEA	Insulated Cable Engineers Associana
NEMA	National Electric Manufacturers Association
DIN	Deutsche Industrial Norms
ANSI	American National Standard Institution (USA)
BSI	British Standard Institution (Great Britain)
IEEE	Institute of Electrical & Electronics Engineers (Great Britain)
ISO	International Organization for Standardization
MIL	Military Specification (USA)
NEC	National Electrical Code (USA)
NF	Norms Francaises (France)
NFC	Norms Francaises Class C (France)

DESIGN CODE & STANDARDS FOR BCSL PRODUCTS

For Aluminium Overhead Line Conductors:

IEC 60104	Aluminum-magnesium-silicon alloy wire for overhead line conductors
IEC 60888	Zinc-coated steel wires for stranded conductors
IEC 60889	Hard-drawn aluminum wire for overhead line conductors
IEC 61089	Round wire concentric lay overhead electrical stranded conductors
IEC 61232	Aluminum-clad steel wires for electrical purposes
IEC 209	Aluminium Conductor Steel Reinforced (Dimension, Construction & Testing)
ASTM B230	Standard specification for aluminum 1350-H19 wire for electrical purposes
ASTM B231	Standard specification for concentric-lay-stranded aluminum 1350 conductors
ASTM B232	Standard specification for concentric-lay-stranded aluminum conductors, coated steel reinforced (ACSR)
ASTM B398	Standard specification for aluminum-alloy 6201-T81 wire for electrical purposes
ASTM B399	Standard specification for concentric-lay-stranded aluminum-alloy 6201-T81 conductors
ASTM B415	Standard specification for hard-drawn aluminum-clad steel wire
ASTM B416	Standard specification for concentric-lay-stranded aluminum-clad steel conductors
ASTM B498	Standard specification for zinc-coated (galvanized) steel core wire for aluminum conductors, steel reinforced (ACSR)
ASTM B502	Standard specification for aluminum-clad steel core wire for aluminum conductors, aluminum-clad steel reinforced
ASTM B549	Standard specification for concentric-lay-stranded aluminum conductors, aluminum clad steel reinforced (ACSR/AW)
ASTM B609	Standard specification for aluminum 1350 round wire, annealed and intermediate tempers, for electrical purposes
BS 251-1&2	Aluminum Conductors Steel-Reinforced - For overhead power transmission

For MHD Copper, PVC/XLPE Insulated Cable:

ASTM B2	Specification for Medium-Hard-Drawn Copper Wire
ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM B49	Specification for Copper Rod for Electrical Purposes
ASTM B193	Standard Test Method for Resistivity of Electrical Conductor Materials
ASTM B258	Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors

For PVC/XLPE Insulated LT Cable:

IEC 60502-1	Power Cables with extruded insulation and their accessories for rated voltages from 1 kV up to 30 kV (Part 1: Cables for rated voltages of 1 kV and 3 kV)
IEC 60502-2	Power Cables with extruded insulation and their accessories for rated voltages from 1 kV up to 30 kV (Part 2: Cables for rated voltages of 6 kV and 30 kV)



COMMON FEATURES OF BCSL POWER CABLE & OVERHEAD CONDUCTORS

Energy Efficient Cable

BCSL power cable and electrical overhead conductors provide highest level of electrical conductivity at in the world at 99.98% copper conductivity. Exceeding the parameter indicated by the International Annealed copper standards (IACS). This ensures minimum loss throughout the length of the cable which translated to saving of 2-3% in the electricity bill. It also provides additional protection against voltage fluctuations.

Low Voltage Drop

Drop the voltage from point of supply to the end receiving point is called voltage drop. High voltage drop across conductor is undesirable as it reduces the supplied energy. BCSL Cables have adequate conductor diameter to ensure low voltage drop and higher efficiency while using electrical equipment.

Short Circuit Protection

Fire caused due to short-circuit is the most common electrical mishap. Short-circuit can be caused by a host of reasons such as faulty wiring. Broken Insulation due to inferior quality of insulation circuit-overload and defective plugs switches, cords, receptacles, etc. BCSL cable ensures superior insulation and conductor characteristics to prevent short-circuit due to wiring.

Higher Di-electric Strength

Di-electric strength represents the magnitude of voltage endured by a test-piece of wire when a specified voltage is passed through it for a specified duration of time. Higher di-electric strength means better electrical characteristics.

Higher Convection of Heat

Convection is the flow of heat from hot cool region. Lubricants like wax are required to prevent PVC melt from sticking to hot extruder surface, which ensures a good heat transfer within the melt. Higher convective heat dissipation capability of compound enables BCSL cables to carry more current in overload condition.

Water Proof and UV resistant

In many building .construction concrete may itself not be water-tight. Contact with eater caused deterioration of the cables electrical and mechanical properties. Exposure to cable polymer to UV radiation induces chemical processes that cause-polymer damage like chalking. Loss of impact or tensile strength and a host of other chemical changes. All this can greatly reduce the service lifer of the cable and expose people to electrical shocks.

BCSL has developed a high-quality Thermoplastic Insulation compound made of single carbon-bond polymer chain this makes BCSL cables impermeable to water. Ultra violet (UV) radiation and chemicals, thereby significantly enhancing the life and safety of cable.



Product Range

- PVC Insulated/skin Coated Copper/Aluminium Cables.
- PVC/XLPE Insulated, PVC Sheathed Power Cables with or without Armor
- XLPE Insulated, PVC Sheathed power cables up to kV voltage 1.2 kV.
- Pre-Assembled Insulated Aluminium Cables with ACSR messenger wire
- Bare Aluminium & Copper Conductors and wire or without Annealing
- Insulated or Bare Aluminium Stranded Conductors (AAC)
- Aluminium Conductor Steel Re-enforced (ACSR)
- All Aluminium Alloy Conductors (AAAC)
- Customized Cables, Wires, and Conductors as per Customers `Requirement
 - 1) PVC Insulated Non Sheathed Copper Cable (BYA)
 - 2) PVC Insulated PVC Sheathed Copper Cable (NYY)
 - 3) PVC Insulated Non Sheathed Aluminium Cable (BAYA)
 - 4) PVC Insulated PVC Sheathed Aluminium Cable (NAYY)
 - 5) PVC Insulated PVC Sheathed Multi Core Copper Cable (BYM)
 - 6) PVC Insulated PVC Sheathed Multi Core Aluminium Cable (NYY-M)

Product Design

Our expert team is able to customize cable to suit specific customer's requirement. To ensure the quality of our cables, our qualified engineers use the latest technology and equipments to test and monitor the entire production process. In today's market no product can expect sell effectively. If it is not rooted in sound engineering design. BCSL CABLES are designed and manufactured with the latest national and international standards.

Product Test

Using the latest Technology and equipment BCSL Ltd, carries out a full range of Routine and Type Tests as per BS, IEC, VDE. and other National and International standars. in the manufacturing process we maintain quality assurance procedures to give long term reliability and peace of mind.

Health, Safety & Environment

To maintain health and safety standards, regular training is provided to all of our employees that covers special hazards, how to protect one, causes of accidents at work preventing slips and falls and how to use tools and machine safely. BCSL uses only tried and tested materials and follows the processes in full compliance with all relevant National and International standars.to protect and Preserve the Environment.

Factors to be Considered in Cables Selection Process

Installation: The area of installation whether indoor, outdoor, underground, or aerial is critical in the choice of cable because the exposures to various elements may affect the performance and safety of cable, This is where the characteristics of insulation play an important part.

Voltage Rating: Determine the size of the conductor and the Thickness and type of Insulation.

Conductor Size: The current load, KVA load and kelowatt load are governed by voltage drop beside the heating and power factors. These must be known before determining the conductor size.

Ampacity Limitation: The maximum current a cable can safety carry without exceeding the capacity of the insulation or jacketed material.

External Condition: The presence pf other sources of heat located in the installation, such as pipes. corrosive agents, structural materials and other cables cancause increase in the temperature of cables.

Optimum cable performance can be obtained from a cable such as BCSL CABLES. with access to the latest developments in conductor, insulation, and protective materials technology. Our experienced Technical personnel can provide guidance on cable selection and installation and can ensure that you get the right cables for your job.



APPLICATIONS

Extensively used for power distribution, control, instrumentation, communication, and signaling and data transmission applications.

PVC as insulation and sheath compounds, has the following superior features

- Strong and made for easy processing
- Resistant to water, moisture, oils and chemicals
- PVC black compound can resist ultraviolet degradation
- Specially formulated PVC is flame retardant and reduces emission of halogens and smoke

PE, as insulation, has the following superior features

- Good for low distortion and high speed data transmission
- Used precision audio, pulse of R,F, signal transmission
- Good for all modern electronic equipments where high speed data processing is required
- Low capacitance, with high speed signal processing in computer, Telephone etc.

XLPE, as insulation has the following superior features

- Low dielectric loss
- Higher temperature rating and higher emergency overload, rating
- High continuous current rating
- Superior short circuit rating
- Much better insulation resistance
- Higher resistance to moisture
- Resistant to chemicals and corrosive gases
- Exhibits better properties, such as resistance to vibration, impact, ageing and hot deformation
- Termination and jointing methods are easy, as compared to other cables.

Basic Cable Laying Instruction:

Power Cable up to nominal voltage of 30 kV are suitable for indoors, outdoors, direct burial in earth as well as in water or in concrete. The installation must be carried out carefully. Avoiding any impact on the properties of the cable & followings has to be considered.

Protection against direct sun irradiation.

Laying on solid, smooth and free of stones ground or bedding in sand or stone free soil

Protection against mechanical damage

Protection against chemical and thermal influence

The maximum permitted pulling force during installation is $P = S \times A$

Where, $S = 50\text{N/m}^2$ and $A = \text{Sum of the cross section of all copper conductors}$, All turns of the installation line shall be well shaped and equipped with rolls.

The bending radius of single core cables shall not be smaller than $15 \times DA$, for multi-core cables $12 \times DA$.

The minimum installation temperature for the cables is -5°C for cables with PVC sheath and -20°C for cables with PE sheath. This value refers to the cable temperature. Not the environmental temperature.

The inner diameter of ducts and tubes should be not less than $1.5 \times DA$. If more than one cable per tube is installed, they should not touch each other.

Underground Cables should be buried at least 60 cm under the surface, the depth of cables under roadways not less than 80 cm

Fixing of Cables

If Cables are installed horizontally on walls. Ceiling or trays by clamps, the distance between fixings $20 \times DA$. But not more than 80 cm. For vertical installation the distance may be increased, but not more than 150 cm. Compression of the cable must be strictly avoided. Single-core cables must be fixed with non-magnetic clamps only.

Meter Marking

According to the standard Cables with diameter > 10 mm must carry a meter mark. The marks may have a tolerance of 1%, but they are not calibrated. Incomplete or missing marks (on short distances) may not be claimed. For defining the delivery length only calibrated measuring equipment has to be used.

Cable Structure

Low voltage cables are manufactured with PVC, PE and XLPE insulation for various applications within voltage range from 400 V to 1000 V category.

1.0 CONDUCTORS

A conductor is the metallic part of cable that is carrying the electric current, Stranding makes cable flexible and easy to handle while shaping makes them compact. Under strict supervision, stranding and compacting is carried out by skilled operators to bring out a smooth surface so as to ensure minimum stress development on the surface of the conductor.

Conductor materials are

- # Plain annealed copper conductor (ASTM B3, ASTM B49)
- # Aluminum (to ASTM B233)

The conductor structure is complying with the requirements of IEC 60228 (BS EN 60228) Class 2 stranded. Non Compacted or compacted sector shaped conductors, and class 5 Flexible conductors.

The shape codes are

- re: round solid
- rm: round stranded
- rmc: round compacted stranded
- sm: Sectoral stranded

2.0 INSULATION

BCSL designed and manufactured its cable with polymer dielectrics to bear thermal and thermo mechanical stresses safely at continuous normal and short circuit temperature condition, the insulation thickness is selected based on the designated voltage rate complying with standards.

Insulation Material:

Insulation material is selected to match the desired customer requirements and customer specification. Standard polyvinyl chloride type (PVC/A 70°C) complying with IEC 60502-1 requirements of types (TI-1 70°C) and heat resistant PVC type (TI-3 90°C) complying with BS 6004.

Cross linked polyethylene XLPE complying with IEC 60502.













The XLPE is selected to comply with the requirements of GP8 evaluation as specified in BS 7655-1.3

BCSL Cables standard insulation color codes are described in Table-1 (i.e. used in the products of this catalogue).

Meanwhile other color code is offered to our customers upon their request.

Table 1: Insulated Core Color Codes for Cables

Number of Cores	Colors to IEC	Colors to BS
1	Red/Black/Yellow/Blue/Green/or Yellow-Green	Red/Black/Yellow/Blue/Green/or Yellow-Green
2	Red & Black	Brown & Blue
3	Red, Yellow & Blue	Brown, Black and Grey
4	Red, Yellow, Blue & Black	Blue, Brown, Black and Grey
5	Red, Yellow, Blue, Black, & Green/Yellow	Green,/Yellow, Blue, Brown, Black and Grey

Function	UK (New Code as per IEC)	UK (Old Code)
Three Phase Line (L1)		
Three Phase Line (L2)		
Three Phase Line (L3)		
Neural (N)		
Productive Eart or Ground (PE)		
Single Phase Line		

The insulation is covered by Ultra-violet (UV) resistant Master batch. This protects the insulation from deterioration when exposed to continuous sun light.

3.0 CABLE ASSEMBLY

The Insulated cores are laid up together to form the laid up cable, Extruded suitable polymer compound or non-hygro-scope polypropylene filler is applied (when required) between laid up cores to provide a circular shape to the cable.

Polypropylene tape (S) PETF (Polyester) tape (s) is used as a barrier tape over the laid up cores. Such tape(s) will bind the cores together and prevents them from opening out, acts as a separator between different polymers used in a cable and works as a heat barrier between the cores and extruded bedding.

4.0 BEDDING

It could be also called inner sheathe or inner jacket, which serves as a bedding under cable armoring to protect the laid up cores and as a separation sheath.

- # One layer Galvanized Round Steel wire is applied helically over the bedding.
- # Galvanized Flat Steel Wire followed by galvanized steel tape is applied helically over the bedding
- # Aluminum wire armoring for a single Core Cable acts as non magnetic armor

5.0 OUTER SHEATH (OUTER JACKET)

- # It is the outer protection part of the cable against the surrounding environment.
- # Several materials can be used as over sheath based on the intended application.
- # General purpose PVC Type ST2 compound as specified in IEC 60502-1. Or its equivalent PVC Type 9 to BS 7655-4.2.

High density polyethylene (HDPE) Compound fulfills and exceeds the requirements of type ST7 IEC 60502-1 for cables that require being abrasion resistant. Protected against water ingress and strong Environmental Stress Crack Resistant.

The standard sheath color is Black. Meanwhile other colors such as Red and Light Blue can also be provided as per customer request and in this case suitable UV proved additive is added to the Master batch to ensure resistance to sun light. When the cable is required to be anti-termite / anti-vermin, a special additive is added to the sheathing compound.

All Cables produced at BCSL with PVC FR/FRLS jackets are complying with the flame retardant test to IEC 60332-1. Whenever a requirement for more servers' tests as IEC 60332-3 is needed, a jacketing compound with Oxygen index value more than 29% will be used.

6.0 TESTING AND QUALITY ASSURANCE

The various tests carried on low voltage cables are classified in three different groups.

6.1 ROUTINE TESTS

The following tests constitute Routine Test which is carried out on each and every length of cable as per relevant specification.

- Conductor Resistance Test.
- High Voltage Test.
- Insulation Test (where required)

6.2 TYPE TEST

These are carried out on samples taken from each production lot as per relevant specification. They are carried out to prove conformity as regards the general qualities and design to the particular type of cables.

6.3 ACCEPTANCE TEST

These tests are carried out as per relevant specification in the presence of the concerned inspecting Authority for Testing Approval and Release of material for inspection.



Electrical Overhead Conductor & Earthing/Grounding Cable

Type: Insulated All Aluminium Conductor (AAC-INS)

Standard: As per BDS-1036 Part-1, BS-215 Part 1, BS 6485, IEC-207

Application:

PVC Insulated All Aluminum Stranded Hard drawn Aluminium Conductors are used for Overhead Power Distribution line.



Code Name	Cross Sectional Area of Al	Strand / Wire Diameter	Dia of Bare Conductor	Minimum Thickness of Insulation	Approx. Overall Diameter	Nominal Breaking Load	Max. DC Resistance at 20 C	Cable Weight	Current Rating
-	mm ²	no./mm	mm	mm	mm	kgf	ohm/km	kg/km	amps
ANT	52.84	7/3.10	9.3	0.8	11.3	846	0.5419	215	172
WASP	106	7/4.39	13.17	0.8	15.57	1632	0.2702	389	260

Type: All Aluminium Conductor (AAC)

Standard: As per BS-1036 Part-1, BS-215 Part-1 & IEC-207

Application:

Stranded Hard drawn Aluminium Conductors are used for Overhead Power Distribution line, Overhead Feeders and Buses



Code Name	Nominal Aluminium Area	Equivalent Copper Area	Number & Diameter of Al. Wires		Overall Diameter	Nominal Breaking Load	Max. DC Resistance at 20 C	Cable Weight	Current Rating
-	mm ²	mm ²	no.	mm	mm	kgf	ohm/km	kg/km	amps
ROSE	21.16	13.65	7	1.96	5.9	375	1.3620	58	104
ANT	50	32.3	7	3.10	9.3	846	0.5419	145	181
POPY	53.48	34.5	7	3.12	9.4	846	0.5390	148	180
OXLIP	107.2	69.14	7	4.42	13.3	1628	0.2688	296	273
WASP	100	64.5	7	4.39	13.2	1632	0.2702	292	271

Type: Insulated Aluminium Conductor Steel Reinforced (ACSR-INS)

Standard: As per BDS-1037, BS-215, Part-2 & IEC-209

Uses: Outdoor Cable

Application:

Stranded Hard drawn Aluminium Conductors are used for Overhead Power line



Code Name	Cross Sectional Area		No. & Dia of Wire		Overall Diameter	Minimum Insulation Thickness	Max. DC Resistance at 20 C	Cable Weight			Current Rating
	Cond.	Al	Al	Steel				Cond.	Al	Steel	
-	mm ²	mm ²	mm	mm	mm	mm	ohm/km	kg/km	kg/km	kg/km	amps
RABBIT	61.67	52.85	6/3.35	1/3.35	11.85	0.85	0.5426	295	146	69	180
DOG	118.53	104.93	6/4.72	7/1.57	15.95	0.85	0.2733	550	289	106	270
MERLIN	336.4	170.45	18/3.47	1/3.47	20.60	1.60	0.1692	688	496	74	366

Type: Hard Drawn Aluminum Grounding Wire

Standard: ASTM B 230, B 609, B 531, B 193, B 233

Voltage: 600/1000 Volts

Uses: Indoor/Underground Cable

Construction:

Plain Hard Drawn Aluminum Conductor.



BREB Item Code	Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Minimum Breaking Load	Approx. Conductor Diameter	Approx. weight of Cable
	mm ²	no./mm	ohm/km	mm	kg	mm	kg/km
D-4	21.15	1/5.189	1.325	-	342	5.189	57.145

Type: Aluminium Conductor Steel Reinforced (ACSR)

Standard: As per BDS-1037, IEC-209, BS-215 Part-2

Uses: Outdoor Cable

Application:

Stranded Hard drawn Aluminium Conductors are used for Overhead Power line



Code Name	Cross Sectional Area		No. & Dia of Wire		Overall Diameter	Calculated Breaking Load	Max. DC Resistance at 20 C	Cable Weight			Current Rating at 35 deg C rise over 40 deg C
	Cond.	Al	Al	Steel				Cond.	Al	Steel	
-	mm ²	mm ²	mm	mm	mm	kgf	ohm/km	kg/km	kg/km	kg/km	amps
RABBIT	61.67	52.85	6/3.35	1/3.35	10.05	1876	0.5426	215	146	69	185
SWAN	4	21.15	6/2.12	1/2.12	6.36	846	1.356	85	58	27	105
GOPHER	30.62	26.24	6/2.36	1/2.36	7.08	980	1.093	106	72	34	115
SWALLOW (D-1)	3	26.65	6/2.38	1/2.38	7.14	1040	1.076	108	73	35	121
RAVEN (D-2)	1/0	53.48	6/3.37	1/3.37	10.11	1990	0.5364	216	147	69	183
PENGUIN (D-3)	4/0	107.23	6/4.77	1/4.77	14.31	3790	0.2676	433	294	139	276
DOG	118.53	104.93	6/4.72	7/1.57	14.15	3335	0.2733	395	289	106	273
WOLF	194.90	158.1	30/2.59	7/2.59	18.13	7057	0.1828	726	436	290	350
MERLIN	336.4	170.45	18/3.47	1/3.47	17.35	3940	0.1692	570	496	74	366
ORIOLE (D-26)	336.4	170.50	30/2.69	7/2.69	18.82	7870	0.1698	783	470	313	380
HAWK (D-28)	477	241.68	26/3.44	7/2.68	21.80	8870	0.11982	975	667	310	455
GROSBEAK (D-27)	636	322.46	26/3.97	7/3.09	25.15	11400	0.08989	1301	893	409	538
DRAKE (D-32)	795	402.55	26/4.44	7/3.45	28.14	14289	0.07020	1627	1109	518	907

Type: Annealed Aluminum Tie Wire

Standard: ASTM B 230, B 609, B 531, B 193, B 233

Voltage: 600/1000 Volts

Uses: Indoor/Outdoor Cable

Construction:

Plain annealed Aluminum Conductor.



BREB Item Code	Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Maximum Breaking Load	Approx. Conductor Diameter	Approx. weight of Cable
	mm ²	no./mm	ohm/km	mm	kg	mm	kg/km
D-5	21.15	1/5.189	1.325	-	167	5.189	57.145

Type: XLPE Insulated ACSR Aerial Cable (Aluminium Conductors)

Standard: As per ASTM B230, B231, B232, B498, ICEA-S-66-524 (NEMA WC7)

Uses: Outdoor Cable

Application:

Pre-assembled Cross Linked Polyethylene insulated Aluminium Cables supported by a bare ACSR messenger wire will be used as aerial single phase and three phase service drop cables.



BREB Item No.	Conductor Code Name		Number of Phase	Conductor Stranding & Wire Diameter			XLPE Insulation Thickness	Overall Diameter		Maximum DC Resistance at 20 deg C		Approx. Cable Weight
	Phase	Neutral		Phase		Steel		Phase	Neutral	Phase	Neutral	
				Al	Al							
-	-	-	-	no./mm	no./mm	no./mm	mil/mm	mm	mm	ohm/km	ohm/km	kg/km
D-11	PEACHBELL	TURKEY	1	7/1.56	6/1.68	1/1.68	45/1.143	6.97	5.04	2.169	2.1526	114
D-12	LILY	SWALLOW	1	7/2.20	6/2.38	1/2.38	45/1.143	8.89	7.14	1.0709	1.074	212
D-14	LILY	SWALLOW	3	7/2.20	6/2.38	1/2.38	45/1.143	8.89	7.14	1.0709	1.074	420
D-15	POPPY	RAVEN	3	7/3.12	6/3.37	1/3.37	60/1.524	12.41	10.11	0.5344	0.5344	835
D-20	ROSE	SWAN	3	7/1.96	6/2.12	1/2.12	45/1.143	8.17	6.36	1.3551	1.3522	340
D-24	OXLIP	PENGUIN	3	7/4.42	6/4.77	1/4.77	60/1.524	16.31	14.31	0.2667	0.2667	1580
D-25	PEACHBELL	TURKEY	3	7/1.56	6/1.68	1/1.68	45/1.143	6.91	5.04	2.169	2.157	230

Bare Copper Cable for Earthing/Grounding

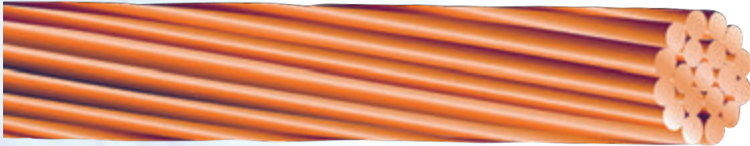
Type: Bare Copper

Standard: BS-6004/84

Uses: Underground Earthing Cable

Construction:

Plain Annealed/Non Annealed Copper Conductor, Non Insulated Single Core Cable. Suitable for use in indoors, outdoors, underground Earthing/Grounding Work



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
					In Conduit at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	kg/km	amp	amp
1 × 10 rm	1/3.60	1.83	3.60	91	52	63
1 × 10 rm	7/1.35	1.83	4.05	94	52	63
1 × 16 rm	1/4.53	1.15	4.62	145	70	85
1 × 16 rm	7/1.71	1.15	5.13	150	70	85
1 × 16 rm	19/1.05	1.15	5.25	154	70	85
1 × 25 rm	1/5.66	0.727	5.66	225	91	110
1 × 25 rm	7/2.14	0.727	6.45	235	91	110
1 × 25 rm	19/1.30	0.727	6.50	235	91	110
1 × 35 rm	19/1.53	0.524	7.65	326	112	136
1 × 50 rm	19/1.83	0.387	9.15	466	136	164
1 × 70 rm	19/2.16	0.268	10.80	650	173	207
1 × 70 rm	27×7/0.68	0.268	12.52	641	173	207
1 × 95 rm	19/2.52	0.193	12.60	885	216	253
1 × 120 rm	37/2.03	0.153	14.25	1118	244	291
1 × 150 rm	37/2.27	0.124	15.95	1398	-	333
1 × 150 rm	61×7/0.68	0.124	16.10	1400	-	333
1 × 185 rm	37/2.52	0.0991	17.70	1723	-	381
1 × 240 rm	61/2.24	0.0754	20.20	2244	-	452
1 × 300 rm	61/2.50	0.0601	22.60	2795	-	526
1 × 400 rm	61/2.89	0.0470	26.10	3735	-	639
1 × 500 rm	61/3.23	0.0366	29.10	4666	-	752
1 × 630 rm	61/3.54	0.0283	31.86	5604	-	855

Bare/Insulated Copper Conductor

Type: Copper Jumper Wire

Standard: ASTM B3 & B193

Uses: Indoor/Outdoor

Construction:

Bare annealed Copper Wire for use as Jumper Wire on Electrical Distribution Lines



BREB Item Code	Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Minimum Breaking Load	Approx. Conductor Diameter	Approx. weight of Cable
	mm ²	no./mm	ohm/km	mm	kg	mm	kg/km
D-6	13.298	1/4.1148	1.4040	-	346	4.1148	118.4

Type: MHD Copper Conductor (Insulated)

Standard: ASTM B2, B8 & B193, IEC-60502-1

Uses: Indoor/Outdoor Cable

Construction:

Insulated Medium Hard Drawn Copper Wires are to be used on Electrical Distribution Lines

Color of Insulation : Black



BREB Item Code	Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Minimum Breaking Load	Approx. Conductor Diameter	Approx. weight of Cable
	mm ²	no./mm	ohm/km	mm	kg	mm	kg/km
D-16	27.24	3/3.40	0.6820	1.52	715	19.60	280

Type: MHD Copper Conductor
Standard: ASTM B2, B8 & B193
Uses: Indoor/Outdoor Cable

Construction:

Bare Medium Hard Drawn Copper Wires are to be used on Electrical Distribution Lines



BREB Item Code	Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Minimum Breaking Load	Approx. Conductor Diameter	Approx. weight of Cable
	mm ²	no./mm	ohm/km	mm	kg	mm	kg/km
D-7	26.668	3/3.3655	0.6829	-	1070	7.239	240
D-8	53.488	7/3.1191	0.3442	-	2155	9.347	486
D-9	107.26	7/4.417	0.16591	-	3694	13.259	956
DS-9	107.156	19/2.679	0.1731	-	4371	13.398	973
D-10	67.425	7/3.502	0.2750	-	2694	10.510	616
DS-10	67.766	19/2.131	0.2712	-	2166	10.655	613
DS-37	177.291	37/2.47	0.1010	-	5662	17.290	1620
DS-38	253.064	37/2.951	0.0700	-	10231	20.657	2297

PVC Insulated Duplex/Quadruplex Service Drop Cable

Type: Service Drop Cable (Copper)

Standard: IEC-60502-1 (2014)

Voltage: 600/1000 Volts

Uses: Outdoor Cable

Construction:

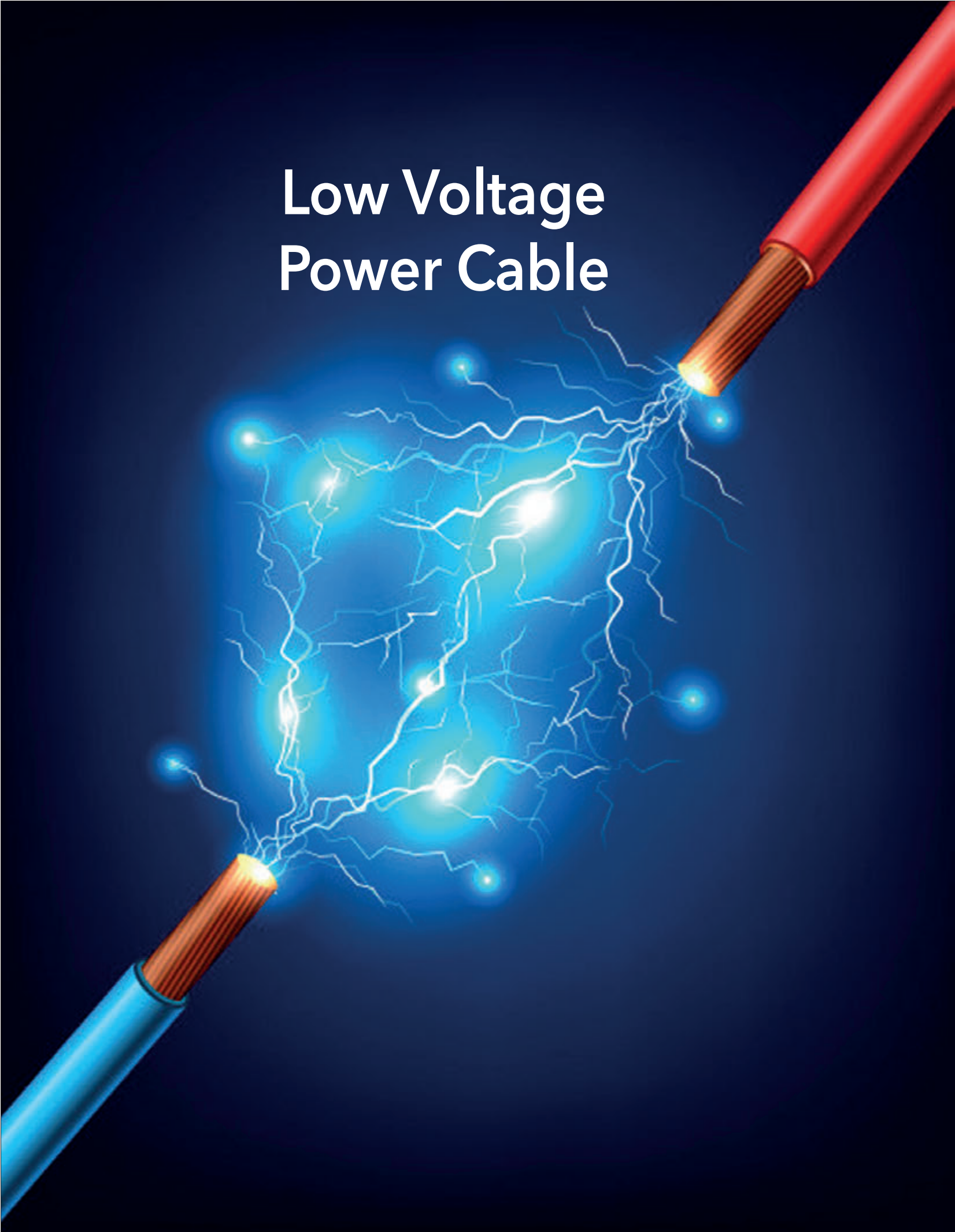
Plain annealed Copper Conductor, PVC Insulated & Twisted Cable. Suitable for use in outdoors for continuous permissible service voltage of 600/1000 Volts.

Color of Insulation : Phase Conductor is Black & Neutral Conductor is Green



Conductor Assembly	Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Approx. Conductor Diameter	Approx. weight of Cable	Current Rating in Air at 35 deg C
	no. × mm ²	no./mm	ohm/km	mm	mm	kg/km	amp
Duplex	4/4 rm	7×0.85 / 0.85	4.61/4.61	1.6	12.20	132	35
Duplex	6/6 rm	7×1.05 / 1.05	3.08/3.08	1.6	14.24	186	45
Quadruplex	3×6/6 rm	7×1.05 / 7×1.05	3.08 / 3.08	1.6	14.24	370	41
Quadruplex	3×10/10 rm	7×1.35 / 7×1.35	1.83 / 1.83	1.6	19.60	530	56
Quadruplex	3×16/16 rm	7×1.71 / 7×1.71	1.15 / 1.15	1.6	20.20	792	75
Quadruplex	3×25/25 rm	7×2.14 / 7×2.14	0.727 / 0.727	1.6	21.60	1180	98

Low Voltage Power Cable



PVC Insulated Non Sheathed Single Core Unarmored Copper Cable

Type: BYA

Standard: BDS 900/2010, BS-6004/84

Voltage: 450/750 Volts

Uses: Indoor Cable

1. Conductor : Copper

2. Insulation : PVC (Red/Black)

Construction:

Plain annealed Copper Conductor, PVC Insulated Non Sheathed Single Core Cable. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 450/750 Volts.



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
						In Conduit at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	kg/km	amp	amp
1 × 2.5 rm	7/0.67	7.41	0.8	3.7	34	22	28
1 × 4.0 rm	7/0.85	4.61	0.8	4.3	50	30	37
1 × 4.5 rm	7/0.91	4.01	0.8	4.5	56	35	41
1 × 6 rm	7/1.05	3.08	0.8	4.9	71	38	47
1 × 10 rm	7/1.35	1.83	1.0	6.2	117	52	63
1 × 16 rm	7/1.71	1.15	1.0	7.3	178	70	85
1 × 16 rm	19/1.05	1.15	1.0	7.4	180	70	85
1 × 25 rm	7/2.14	0.727	1.2	9.0	280	91	110
1 × 25 rm	19/1.30	0.727	1.2	9.1	282	91	110
1 × 35 rm	19/1.53	0.524	1.2	10.3	373	112	136
1 × 50 rm	19/1.83	0.387	1.4	12.2	535	136	164
1 × 70 rm	19/2.16	0.268	1.4	13.9	735	173	207
1 × 95 rm	19/2.52	0.193	1.6	16.0	985	216	253
1 × 120 rm	37/2.03	0.153	1.6	17.6	1225	244	291
1 × 150 rm	37/2.27	0.124	1.8	19.7	1530	-	333
1 × 150 rm	61×7/0.68	0.124	1.8	20.5	1535	-	335
1 × 185 rm	37/2.52	0.0991	2.0	21.8	1882	-	381
1 × 240 rm	61/2.24	0.0754	2.2	24.9	2445	-	452
1 × 300 rm	61/2.50	0.0601	2.4	27.6	3024	-	526
1 × 400 rm	61/2.89	0.0470	2.6	31.5	4030	-	639
1 × 500 rm	61/3.23	0.0366	2.8	35.0	5010	-	752
1 × 630 rm	61/3.54	0.0283	2.8	38.8	6280	-	855

PVC Insulated Non Sheathed Single Core Unarmored Aluminium Cable

Type: BAYA (BYA-Aluminium)

Standard: BDS 900/2010, BS-6004/84

Voltage: 450/750 Volts

Uses: Indoor Cable

Construction:

Plain Aluminium Conductor, PVC Insulated Non Sheathed Single Core Cable. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 450/750 Volts.

1. Conductor : Aluminium

2. Insulation : PVC (Black)



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
						In Conduit at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	kg/km	amp	amp
1 × 2.5 rm	7/0.67	12.10	0.8	3.7	19	14	17
1 × 4.0 rm	7/0.85	7.41	0.8	4.3	26	18	23
1 × 4.5 rm	7/0.91	6.50	0.8	4.5	28	21	25
1 × 6 rm	7/1.05	4.61	0.8	4.9	34	23	29
1 × 10 rm	7/1.35	3.080	1.0	6.2	53	32	40
1 × 16 rm	7/1.71	1.910	1.0	7.3	77	43	52
1 × 16 rm	19/1.05	1.910	1.0	7.4	78	43	52
1 × 25 rm	7/2.14	1.200	1.2	9.0	116	56	68
1 × 25 rm	19/1.30	1.200	1.2	9.1	117	56	68
1 × 35 rm	19/1.53	0.868	1.2	10.3	153	69	84
1 × 50 rm	19/1.83	0.641	1.4	12.2	216	84	101
1 × 70 rm	19/2.16	0.443	1.4	13.9	283	106	127
1 × 95 rm	19/2.52	0.320	1.6	16.0	390	133	155
1 × 120 rm	37/2.03	0.253	1.6	17.6	470	150	179
1 × 150 rm	37/2.27	0.206	1.8	19.7	590	-	205
1 × 185 rm	37/2.52	0.164	2.0	21.8	725	-	234
1 × 240 rm	61/2.24	0.125	2.2	24.9	965	-	278
1 × 300 rm	61/2.50	0.100	2.4	27.6	1170	-	323
1 × 400 rm	61/2.89	0.0778	2.6	31.5	1530	-	392
1 × 500 rm	61/3.23	0.0605	2.8	35.0	1900	-	462
1 × 630 rm	61/3.54	0.0469	2.8	38.8	2350	-	525

PVC Insulated Multi Core Unarmored Copper Cable

Type: BYM

Standard: BDS 900/2010, BS-6004/84, IEC 60227

Voltage: 450/750 Volts

1. Conductor : Copper

2. Insulation : PVC (RGB/BBG)

3. Common Cover : PVC (Black)

4. Sheath : PVC (Gray)

Uses: Indoor Cable

Construction:

Plain annealed Copper Conductor, PVC insulated Single/Two, Three or Four cores laid up, PVC Inner covering (For Multicore cables) & PVC sheathed overall. Suitable for use in Fixed installation in dry or damp premises clipped direct to a surface or on a cable tray unenclosed and for use in conduit enclosed for continuous permissible service voltage of 450/750 Volts.



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Nominal Thickness of Sheath (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
							Under Ground at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	mm	kg/km	amp	amp
2 × 2.5 rm	7/0.67	7.41	0.8	1.2	11.3	182	22	26
2 × 4.0 rm	7/0.85	4.61	0.8	1.2	12.4	235	30	33
2 × 6.0 rm	7/1.05	3.08	0.8	1.2	13.8	295	37	43
2 × 10 rm	7/1.35	1.83	1.0	1.4	17.0	480	50	60
2 × 16 rm	7/1.71	1.15	1.0	1.4	19.0	655	66	80
2 × 16 rm	19/1.05	1.15	1.0	1.4	19.0	655	66	80
2 × 25 rm	7/2.14	0.727	1.2	1.4	23.0	980	75	88
2 × 25 rm	19/1.30	0.727	1.2	1.4	23.0	980	75	88
2 × 35 rm	19/1.53	0.524	1.2	1.6	27.0	1250	92	108
3 × 2.5 rm	7/0.67	7.41	0.8	1.2	12.3	245	20	22
3 × 4.0 rm	7/0.85	4.61	0.8	1.2	13.5	310	27	30
3 × 6.0 rm	7/1.05	3.08	0.8	1.4	15.3	400	33	37
3 × 10 rm	7/1.35	1.83	1.0	1.4	18.0	595	46	51
3 × 16 rm	7/1.71	1.15	1.0	1.4	20.0	840	58	67
3 × 16 rm	19/1.05	1.15	1.0	1.4	20.0	840	58	67
3 × 25 rm	7/2.14	0.727	1.2	1.6	24.5	1250	66	77
3 × 25 rm	19/1.30	0.727	1.2	1.6	24.5	1250	66	77
4 × 2.5 rm	7/0.67	7.41	0.8	1.2	12.8	265	20	22
4 × 4.0 rm	7/0.85	4.61	0.8	1.4	14.5	365	27	30
4 × 6.0 rm	7/1.05	3.08	0.8	1.4	16.2	480	33	37
4 × 10 rm	7/1.35	1.83	1.0	1.4	19.5	720	46	51
4 × 16 rm	7/1.71	1.15	1.0	1.4	22.5	1045	58	67
4 × 16 rm	19/1.05	1.15	1.0	1.4	22.5	1045	58	67
4 × 25 rm	7/2.14	0.727	1.2	1.6	27.5	1590	66	77
4 × 25 rm	19/1.30	0.727	1.2	1.6	27.5	1590	66	77

PVC Insulated & PVC Sheathed Single Core Unarmored Copper Cable

Type: NYY

Standard: VDE-0271/3.69, IEC-60502-1 (2014)

Voltage: 0.6/1.0(1.2) kV

Uses: Outdoor Cable

Construction:

Plain annealed Copper Conductor, PVC Insulated, PVC Sheathed, Single Core Cable. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 600/1000V up to 11 kV

1. Conductor : Copper

2. Insulation : PVC (Black)

3. Sheath : PVC (Black)



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Nominal Thickness of Sheath (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
							Under Ground at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	mm	kg/km	amp	amp
1 × 4 rm	7/0.85	4.61	1.0	1.8	8.3	113	47	39
1 × 6 rm	7/1.05	3.08	1.0	1.8	8.8	140	59	50
1 × 10 rm	7/1.35	1.83	1.0	1.8	9.8	190	78	69
1 × 16 rm	7/1.71	1.15	1.0	1.8	10.8	262	100	94
1 × 16 rm	19/1.04	1.15	1.0	1.8	11.0	268	100	94
1 × 25 rm	7/2.14	0.727	1.2	1.8	12.6	375	130	125
1 × 25 rm	19/1.30	0.727	1.2	1.8	12.8	385	130	125
1 × 35 rm	19/1.54	0.524	1.2	1.8	13.0	482	155	160
1 × 50 rm	19/1.84	0.387	1.4	1.8	14.7	660	185	195
1 × 70 rm	19/2.17	0.268	1.4	1.8	16.4	870	225	245
1 × 95 rm	19/2.53	0.193	1.6	1.8	19.6	1145	270	300
1 × 120 rm	37/2.04	0.153	1.6	1.8	21.7	1400	310	350
1 × 150 rm	37/2.28	0.124	1.8	1.8	24.2	1735	350	405
1 × 185 rm	37/2.53	0.0991	2.0	2.0	27.0	2130	390	460
1 × 240 rm	61/2.24	0.0754	2.2	2.0	29.8	2735	450	555
1 × 300 rm	61/2.51	0.0601	2.4	2.0	33.5	3342	515	640
1 × 400 rm	61/2.89	0.0470	2.6	2.2	37.7	4430	585	770
1 × 500 rm	61/3.24	0.0366	3.0	2.2	41.0	5500	680	900
1 × 630 rm	61/3.54	0.0283	3.0	2.2	42.9	6810	800	1030

PVC Insulated & PVC Sheathed Single Core Unarmored Aluminium Cable

Type: NAYY (NYY-Aluminium)

Standard: VDE-0271/3.69, IEC-60502-1 (2014)

Voltage: 0.6/1.0(1.2) kV

1. Conductor : Aluminium

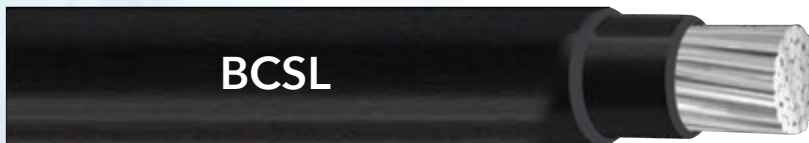
2. Insulation : PVC (Black)

3. Sheath : PVC (Black)

Uses: Outdoor Cable

Construction:

Plain Aluminium Conductor, PVC Insulated, PVC Sheathed, Single Core Cable. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 600/1000V up to 11 kV



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Nominal Thickness of Sheath (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
							Under Ground at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	mm	kg/km	amp	amp
1 × 4 rm	7/0.85	7.41	1.0	1.8	8.3	88	36	32
1 × 6 rm	7/1.05	4.61	1.0	1.8	8.8	102	44	40
1 × 10 rm	7/1.35	3.08	1.0	1.8	9.8	126	59	56
1 × 16 rm	7/1.71	1.91	1.0	1.8	10.8	158	75	72
1 × 25 rm	7/2.14	1.20	1.2	1.8	12.6	216	97	99
1 × 35 rm	19/1.53	0.868	1.2	1.8	13.9	262	120	120
1 × 50 rm	19/1.83	0.641	1.4	1.8	15.8	342	145	150
1 × 70 rm	19/2.17	0.443	1.4	1.8	17.8	425	170	185
1 × 95 rm	19/2.52	0.32	1.6	1.8	20.0	542	205	215
1 × 120 rm	37/2.03	0.253	1.6	1.8	21.6	638	250	260
1 × 150 rm	37/2.27	0.206	1.8	1.8	23.7	790	285	294
1 × 185 rm	37/2.52	0.164	2.0	2.0	26.3	954	325	333
1 × 240 rm	61/2.24	0.125	2.2	2.0	29.3	1194	368	382
1 × 300 rm	61/2.5	0.1000	2.4	2.0	32.2	1451	407	431
1 × 400 rm	61/2.89	0.0778	2.6	2.2	36.0	1880	455	496
1 × 500 rm	61/3.23	0.0605	3.0	2.2	40.3	2320	483	534
1 × 630 rm	61/3.63	0.0469	3.0	2.2	44.2	2775	538	610

PVC Insulated PVC Sheathed Multi Core Unarmored Copper Cable

Type: NYY-M

Standard: IEC-60502-1 (2014), VDE-0271/3.69

Voltage: 0.6/1.0(1.2) kV

1. Conductor : Copper

2. Insulation : PVC (RGB/BBG)

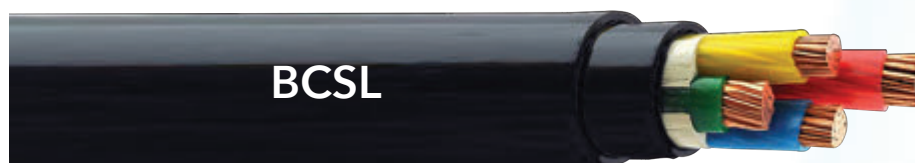
3. Common Covering : PVC (Black)

4. Sheath : PVC (Black)

Uses: Outdoor Cable

Construction:

Plain annealed Copper Conductor, PVC insulated Two, Three or Four cores laid up, PVC Inner covering & PVC sheathed overall. Suitable for use in indoor, outdoor and water for continuous permissible service voltage of 600/1000 Volts.



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Nominal Thickness of Sheath (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
							Under Ground at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	mm	kg/km	amp	amp
2 × 2.5 rm	7/0.67	7.41	0.9	1.8	13.4	245	34	27
2 × 4.0 rm	7/0.85	4.61	1.0	1.8	15.1	320	44	35
2 × 6.0 rm	7/1.05	3.08	1.0	1.8	16.3	400	55	45
2 × 10 rm	7/1.35	1.83	1.0	1.8	18.1	550	74	62
2 × 16 rm	7/1.71	1.15	1.0	1.8	20.2	720	97	84
2 × 25 rm	7/2.14	0.727	1.2	1.8	24.5	1050	125	110
2 × 35 rm	19/1.53	0.524	1.2	2.0	27.4	1350	150	140

3 × 2.5 rm	7/0.67	7.41	0.9	1.8	14.0	275	30	23
3 × 4.0 rm	7/0.85	4.61	1.0	1.8	15.8	376	38	32
3 × 6.0 rm	7/1.05	3.08	1.0	1.8	17.0	465	48	41
3 × 10 rm	7/1.35	1.83	1.0	1.8	19.0	650	64	56
3 × 16 rm	7/1.71	1.15	1.0	1.8	21.9	900	83	75
3 × 25 rm	7/2.14	0.727	1.2	2.0	25.8	1360	110	98

4 × 2.5 rm	7/0.67	7.41	0.9	1.8	14.8	360	30	23
4 × 4.0 rm	7/0.85	4.61	1.0	1.8	17.0	460	38	32
4 × 6.0 rm	7/1.05	3.08	1.0	1.8	18.4	600	48	41
4 × 10 rm	7/1.35	1.83	1.0	1.8	20.6	820	64	56
4 × 16 rm	7/1.71	1.15	1.0	1.8	24.0	1150	83	75
4 × 25 rm	7/2.14	0.727	1.2	2.0	28.5	1730	110	98

XLPE Insulated & PVC Sheathed Single Core Copper Cable

Type: 2xY

Standard: IEC-60502-1 (2014)

Voltage: 0.6/1.0(1.2) kV

Uses: Outdoor Cable

1. Conductor : Copper

2. Insulation : XLPE

3. Sheath : PVC (Black)

Construction:

Plain annealed Copper Conductor, XLPE Insulated, PVC Sheathed, and Single Core Cable. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 600/1000V up to 11 kV



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Nominal Thickness of Sheath (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
							Under Ground at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	mm	kg/km	amp	amp
1 × 4 rm	7/0.85	4.61	0.7	1.4	7.1	85	59	50
1 × 6 rm	7/1.05	3.08	0.7	1.4	7.8	107	78	69
1 × 10 rm	7/1.35	1.83	0.7	1.4	8.7	152	100	94
1 × 16 rm	7/1.71	1.15	0.7	1.4	9.8	220	130	125
1 × 16 rm	19/1.04	1.15	0.7	1.4	9.8	220	130	125
1 × 25 rm	7/2.14	0.727	0.9	1.4	11.0	324	155	160
1 × 25 rm	19/1.30	0.727	0.9	1.4	11.0	324	155	160
1 × 35 rm	19/1.54	0.524	0.9	1.4	12.6	404	185	195
1 × 50 rm	19/1.84	0.387	1.0	1.4	15.0	523	225	245
1 × 70 rm	19/2.17	0.268	1.1	1.4	16.3	754	270	300
1 × 95 rm	19/2.53	0.193	1.1	1.5	18.3	974	310	350
1 × 120 rm	37/2.04	0.153	1.2	1.5	20.5	1245	350	405
1 × 150 rm	37/2.28	0.124	1.4	1.6	22.6	1553	390	460
1 × 185 rm	37/2.53	0.0991	1.6	1.6	24.9	1902	450	555
1 × 240 rm	61/2.24	0.0754	1.7	1.7	27.5	2448	515	640
1 × 300 rm	61/2.51	0.0601	1.8	1.8	30.2	3035	585	770
1 × 400 rm	61/2.89	0.0470	2.0	1.9	34.2	4005	680	900
1 × 500 rm	61/3.24	0.0366	2.2	2.0	37.9	4988	800	1030
1 × 630 rm	61/3.54	0.0283	2.4	2.2	41.8	6269	945	1160

XLPE Insulated & PVC Sheathed Single Core Aluminium Cable

Type: A2xY (2xY-Aluminium)

Standard: IEC-60502-1

Voltage: 0.6/1.0(1.2) kV

Uses: Outdoor Cable

Construction:

Plain Aluminium Conductor, XLPE Insulated, PVC Sheathed, Single Core Cable. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 600/1000V up to 11 kV

1. Conductor : Aluminum

2. Insulation : XLPE

3. Sheath : PVC (Black)



Nominal Cross Sectional Area of Conductor	No. and Nominal diameter of Wires	Max. DC Resistance of Conductor at 20 deg C	Nominal Thickness of Insulation (min)	Nominal Thickness of Sheath (min)	Approx. Overall Diameter	Approx. weight of Cable	Current Rating	
							Under Ground at 30 deg C	In Air at 35 deg C
no. × mm ²	no./mm	ohm/km	mm	mm	mm	kg/km	amp	amp
1 × 4 rm	7/0.85	7.41	0.7	1.4	7.1	58	44	39
1 × 6 rm	7/1.05	4.61	0.7	1.4	7.8	69	58	52
1 × 10 rm	7/1.35	3.08	0.7	1.4	8.7	88	75	70
1 × 16 rm	7/1.71	1.91	0.7	1.4	9.8	115	94	97
1 × 16 rm	19/1.04	1.91	0.7	1.4	9.8	116	94	97
1 × 25 rm	7/2.14	1.2	0.9	1.4	11.4	160	120	120
1 × 25 rm	19/1.30	1.2	0.9	1.4	11.4	162	120	120
1 × 35 rm	19/1.54	0.868	0.9	1.4	12.7	200	145	150
1 × 50 rm	19/1.84	0.641	1.0	1.4	14.4	262	170	185
1 × 70 rm	19/2.17	0.443	1.1	1.4	16.2	342	205	215
1 × 95 rm	19/2.53	0.32	1.1	1.5	18.3	438	250	260
1 × 120 rm	37/2.04	0.253	1.2	1.5	20.2	538	285	294
1 × 150 rm	37/2.27	0.206	1.4	1.6	22.5	665	325	333
1 × 185 rm	37/2.52	0.164	1.6	1.7	24.7	800	368	382
1 × 240 rm	61/2.24	0.125	1.7	1.8	27.7	1016	407	431
1 × 300 rm	61/2.50	0.1	1.8	1.9	30.6	1245	455	496
1 × 400 rm	61/2.89	0.0778	2.0	2.0	34.6	1616	483	534
1 × 500 rm	61/3.24	0.0605	2.2	2.2	38.6	1988	538	610
1 × 630 rm	61/3.54	0.0469	2.4	2.2	42.7	2500	588	698

TECHNICAL INFORMATION FOR LT POWER CABLE USER'S GUIDELINE

CURRENT CARRYING CAPACITY OF CABLES MADE ACCORDING TO IEC 60502-1

DEFINED CONDITIONS:

The basis of the current ratings has been so Chosen that they, without considering any multiplication factor, are suitable for cable laid in our country under the following Defined conditions.

Indication For calculation:

a) Cable Lying in Ground.

- 1) Temperature of the soil at the depth of laying = 30°C
- 2) Depth of laying = 70 cm
- 3) Cable way is covered with layers of sand and brick.
- 4) Thermal resistivity of the soil at continuous full loading of the cables = 120°C cm/W.
- 5) One single core d.c. cable installed separately, or one multi core cable installed separately. Or three single core cables in three phase system installed in flat formation with clearance of 7 cm. or in trefoil formation. Touching each other.
- 6) The cable way is through a pipe of length more than 6 meters.

b) Cables lying in air.

- 1) Ambient air temperature = 35°C
- 2) One single core d.c. cable installed separately free in air or one multi core cable-installed separately free in air, or, one three phase system, comprising cable three single core cables installed separately free in air in flat information with a clearance of one diameter between individual single-core cables or in trefoil formation each individual single core cable being in touch with each other.
- 3) One single core d.c. cable. One multi core cable or one three phase system of three single core cables installed free in air with minimum clearance of.
 - a) 2 cm from floor, wall or roof of the room.
 - b) Twice the cable diameter between two cables and four times the cables diameter between two systems.
 - c) 30 cm vertically between layers installed one above the other.
 - d) Cables is protected against radiation of heat from sun or any other source

Key Information for Current Carrying capacity of cable.

- # Radiation of heats and solar influence must be taken into consideration, where a good air circulation is needed.
- # A sufficient large distance is to be retained between the cables and the heating elements, because badly insulated heating.
 - # elements often raise additionally the temperature of the cable.
 - # Distance between the cable and the wall, floor or ceiling = 2 cm.
 - # Distance between the cables being laid one above the other = 2×D
 - # Distance between the cable systems being laid on above the other = 20 cm.
 - # Distance between the cable systems being laid side by side = 2×D
 - # Approx. Value of Specific Ground Thermal Resistivity
 - Very moist area = 70°C cm/w
 - Moist area = 100°C cm/w
 - Dry area = 200°C cm/w
 - Very dry area = 300°C cm/w

DEVIATED CONDOTIONS FOR UNDERGROUND

If the actual conditions of cable laying are not same as normal conditions, the current rating value of cables are to be multiplied with rating factors given in the following tables:

Variation of specific thermal resistivity of soil for Cables: Factor A

	Specific thermal resistivity of soil on` C cm/W						
	70	100	120	150	200	250	300
25 mm ² & Below	1.18	1.07	1	0.93	0.83	0.77	0.71
36 mm ² to 95mm ²	1.22	1.08	1	0.93	0.82	0.75	0.69
120 mm ² to 240mm ²	1.23	1.08	1	0.93	0.82	0.74	0.69
300 mm ² & Above	1.25	1.09	1	0.93	0.82	0.74	0.69

Variation of specific thermal resistivity of soil for Cables : Factor B

Voltage E/Eo KV		Specific thermal resistivity of soil on` C cm/W						
		70	100	120	150	200	250	300
3 and 4 core cable	1/0.6	1	1	1	1	1	1	1
Twin core cable	1/0.6	0.97	0.99	1	1	1.01	1.01	1.02
Single core D.C	1/0.6	0.97	0.99	1	1	1.01	1.01	1.02
3core cable with each core shielded	6/3.5 10/5.8	0.96	0.99	1	1.01	1.02	1.03	1.04
3 unarmored single core cable	1/0.6 6/3.5 10/5.8	1.01	1	1	0.98	0.97	0.97	0.96

For Variation of specific Thermal resistivity of soil. PVC Cables from 120 C cm/W and current rating values in following Tables are to be multiplied by both the factor A and B to obtain the actual rating.

Variation factors for Ambient Temperature of Cables Laid in Underground

		Ambient Temperature °C								
Voltage E/Eo kV		18	20	25	30	35	40	45	50	55
Rating Factor	0.6/1.0	1.18	1.12	1.07	1.00	0.95	0.87	0.79	0.70	0.60

Group Rating Factors for Single core Cables in Three-phase System in the Ground

Condition of Laying	No. of Systems or Cables		
	2	3	4
Cables laid direct in the ground in flat formation, clearance 7 cm between systems and also between individual cables in each system	0.82	0.74	0.68
Cables laid direct in the ground in trefoil formation, touching each other, clearance 7 cm between systems.	0.85	0.77	0.72

DEVIATED CONDITIONS FOR AIR

Rating factors for Variation of Ambient Temperature for Cables Laid in Air.

		Ambient Temperature °C						
Voltage E/Eo kV		25	30	35	40	45	50	55
Rating Factor	0.6/1.0	1.13	1.06	1.00	0.93	0.84	0.76	0.65

DEVIATED CONDITIONS:

A . CABLES DIRECT IN GROUND

a) Correction factors for variation in ground Temperature:

Ground Temperature (C)	15	20	25	30	35	40	45
Rating Factor	1.04	1.00	0.96	0.93	0.89	0.85	0.81

b) Correction factors for Variation in Thermal resistivity of soil:

Thermal resistivity of soil (C.cm/W)	100	120	150	200	250	300
Rating Factor	1.00	0.94	0.84	0.75	0.68	0.62

c) Correction factors for various depth of Laying:

Depth of Laying (CM)	Up to 6/10 KV	8.7/15 KV
90	1.00	-
105	0.99	1.00
120	0.98	0.99
150	0.96	0.97
180 & above	0.95	0.96

Group Rating Factors for Single core Cables in Three phase System in the Ground

Condition of Laying	No. of Systems Cables		
Cables laid direct in the ground in flat formation, clearance 7 cm between systems and also between individual cables in each system	0.82	0.74	0.68
Cables laid direct in the ground in trefoil formation, touching each other, clearance 25cm between systems.	0.85	0.77	0.72

DEVIATED CONDITIONS FOR AIR:

Rating Factors for Variation of Ambient Temperature for Cables Laid In Air

	Voltage (E ₀ /E kV)	Ambient Temperature °C						
		25	30	35	40	45	50	55
Rating Factor	0.6/1.0	1.13	1.06	1.00	0.93	0.84	0.76	0.65

ADVANTAGES OF XLPE INSULATED CABLES

1. Does not soften beyond the normal range of conductor operating temperatures and is called 'Thermosetting' insulation.
2. Due to greater capacity to withstand heat, the permissible maximum continuous conductor operating temperature is 90°C and for momentary short circuits the permissible temperature is 250°C
3. Higher strength and superior mechanical properties allow lower insulation thickness. The insulation resistance value of the cable does not appreciably change with conductor operating temperature.
4. XLPE insulation dissipates heat from conductors much faster as its thermal resistivity is 3.5°C m/W.
5. Heat generation in the insulation itself is low due to very low "loss angle"
6. Due to the foregoing reasons, an XLPE cable can carry 15% to 30% higher current than a PVC cable with the same conductor size.
7. Density of XLPE is 0.920 to 0.940 gm/cm³ and due to lower insulation thickness, XLPE insulated cables are lighter and easier to install.
8. Jointing and terminating of XLPE insulated cables does not require any special techniques.

XLPE vs PVC. COMPARATIVE PROPERTIES SUMMARY

PROPERTIES	XLPE	PVC
Chemical Structure	Thermosetting Plastic	Thermoplastic
Polymer Structure	Partial Crystalline	Amorphous
Temperature Rating (°C)		
a) Operating	90	70
b) Emergency overload	130	90
c) Short Circuit	250	160
Cable Installation Job	Easy due to less or weight. Less diameter and less or bending radius.	-
Current Carrying Capacity	30% Higher than PVC.	-
Dielectric Strength (KV/mm)	550	350
Volume Resistivity (ohm-cm)	10.4	100
Thermal Resistivity (C/cm/watt)	350	730
Dielectric loss factor (at 50 Hz & 20°C)	0.0004	0.50 to 0.07
Low Temperature Brittleness (C)	0.40	0.15
Moisture Resistance	Excellent	Good
Oil Resistance	Excellent	Fair
Solvent Resistance	Excellent	Poor
Acid Resistance	Excellent	Fair
Alkali Resistance	Excellent	Good

PHYSICAL & ELECTRICAL PROPERTIES OF COPPER & ALUMINIUM

	Property	Unit	Copper		Aluminium	
			Hard-drawn	Annealed	Hard-drawn	Annealed
Physical properties	Melting point	°C	1883	1083	658	658
	Density	gm/cm ³	8.89	8.89	2.703	2.703
	Tensile strength	Kg/mm ²	34-47	20-28	15-20	7-14
	Co-efficient of liner expansion	/°C	17 × 10 ⁻⁷	17 × 10 ⁻⁷	23 × 10 ⁻⁷	23 × 10 ⁻⁷
	Thermal Conductivity	W/°C.cm	3.86	3.86	2.39	2.39
	Specific heat	j/°C.cm ³	3.4	3.4	2.4	2.4
Electrical properties	Electrical Resistivity at 20°C	Ohm.mm ² /m	0.017770	0.017241	0.02873	0.02820
	Electrical Conductivity at 20°C	%IACS	97	100	60	61
	Temperature Co-efficient of resistance at 20°C, per unit of cons. Mass.	-	0.00393	0.00393	0.00103	0.00403



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