HIGH TENSION **XLPE** CABLES

www.polycab.com

POLYCAB

Connection Zindagi Ka

Year 2020


POLYCAB
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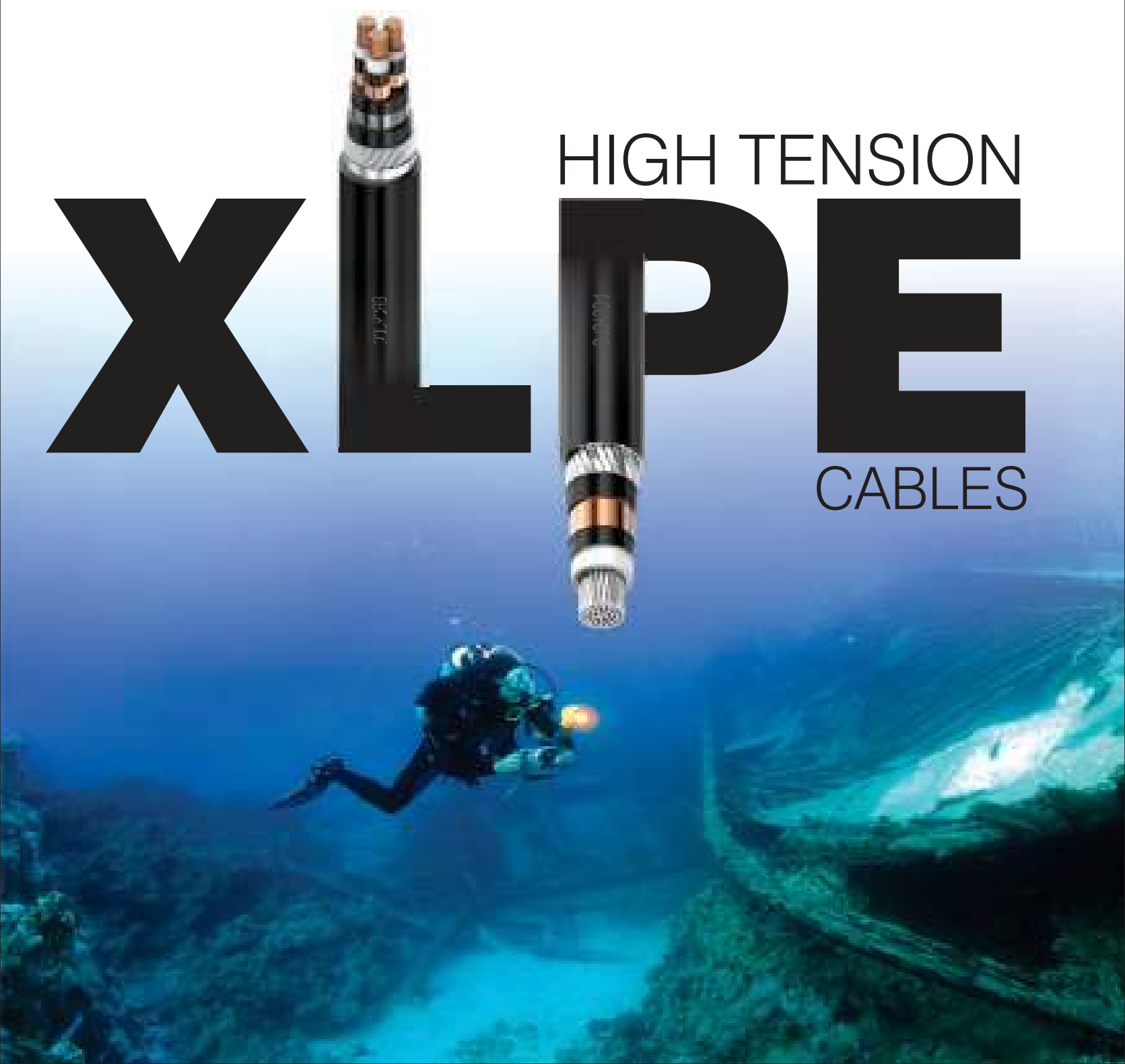
Connection Zindagi Ka

HIGH TENSION XLPE CABLES



COMPANY PROFILE

POLYCAB AN ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007 COMPANY IS INDIA'S NO.1 CABLES & WIRES COMPANY WITH A GLORIOUS TRACK RECORD OF OVER 4 DECADES. OUR MANUFACTURING FACILITIES AT HALOL (VADODARA), DAMAN, NASHIK AND ROORKEE IN INDIA, ADDRESSES TO THE SPECIFIC NEEDS WITH STATE-OF-THE-ART MACHINERY AND TECHNOLOGY.

POLYCAB'S TURNOVER HAS CROSSED INR 6000 CRORE'S IN THE FISCAL YEAR 2016-17. POLYCAB DERIVES ITS STRENGTH FROM ITS CUSTOMERS AND THOSE BEING IN SECTORS LIKE UTILITIES, POWER GENERATION, TRANSMISSION & DISTRIBUTION, PETROLEUM & OIL REFINERIES, OEMs, EPC CONTRACTORS, STEEL & METAL, CEMENT, CHEMICAL, ATOMIC ENERGY, NUCLEAR PLANTS, AS WELL AS GOVERNMENT PARTNERS LIKE BSNL, RAILWAYS AND PRIVATE TELECOM OPERATORS LIKE RELIANCE, VODAFONE, AIRTEL, AIRCEL, TATA, IDEA AND MANY MORE.

THINGS YOU DIDN'T KNOW ABOUT POLYCAB

BETWEEN ITS FACILITIES IN DAMAN, HALOL (VADODARA), NASHIK AND ROORKEE THE COMPANY HAS 3.5 MILLION SQUARE FEET OF MANUFACTURING SPACE.

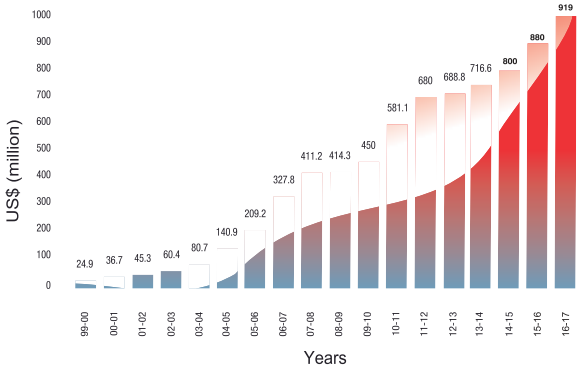
POLYCAB MANUFACTURES ENOUGH CABLE EACH YEAR TO CIRCUMNAVIGATE THE EARTH THREE AND A HALF TIMES AND ENOUGH WIRE TO GO TO THE MOON AND COME BACK - FOUR TIMES.

POLYCAB HAS INCREASED ITS TURNOVER 100 TIMES IN SIXTEEN YEARS.

OVER 300 AUTHORISED DISTRIBUTORS SERVICE ITS INDIA NEEDS AND ITS OVERSEAS INTERESTS.

POLYCAB OFFERS A VARIETY OF SERVICES:

- COMMERCIALLY REASONABLE PRICES
- RELIABLE & CONSISTENT QUALITY
- PRODUCT DEVELOPMENT AS PER MARKET
- A TARGET STOCKING POLICY
- TECHNICAL SUPPORT FOR APPLICATION



CHAIRMAN'S MESSAGE

The journey of over four decades would not have been as exciting and fulfilling without the unconditional support of all our customers & our sales partners, I would like to express our deep gratitude to you, as you have made Polycab one of the outstanding companies in our industry.

Despite our rapid growth and elevation to the leadership position in the industry, the simplicity in Polycab's flexibility and openness to new market trends and changing technology continue to be our driving force. The core values of, simplicity, team work, trust amongst people, customer focus and meeting commitments have given us a unique position and respectability among the Indian industry.

Gearing up for the future and to keep winning in tomorrow's world, we have a well recognized market presence with a strong product & portfolio, streamlined and efficient manufacturing capabilities to withstand the winds of change. But we will need to be even more proactive, agile and customer centric. We will need to anticipate the future and be ready with solutions, even before the customer asks for them.

There are many new challenges the cable industry is facing with new market opportunities and product developments. Automation in all sphere's of business processing is becoming very important and innovation in this segment is inevitable. Polycab is extending its product range in the segment to meet your growing needs and many new products for specific applications will be introduced soon.

Polycab's business model is evolving. We are enhancing our key internal operations to ensure a consistent and positive experience for our customers. Our business processes will begin and end with the customers. We have identified focus areas of growth over the next 5 years and beyond. Polycab aspires to be a RS.10000+ crore company within the next 4 years.

We take this opportunity to thank you and convey our gratitude for the unabated support and trust you have always reposed on Polycab and encouraged it to move ahead confidently. We are confident that this will keep us ahead in our constant endeavour to be your preferred brand.

We hope to improve each day to serve you better.

HAPPY CABLING!!!

INDER T. JAISINGHANI
Chairman & Managing Director

QUALITY & RELIABILITY

Our aim is to achieve the highest level of product quality, reliability and safety, but we also know that this must be achieved at the lowest practical cost.

QUALITY ASSURANCE AND QUALITY MANUFACTURING

Quality assurance is intrinsic to Polycab. We confirm to ISO 9001:2008 standards in our manufacturing processes and overall company operation. Our management system has been defined by experienced personnel who develop, implement and monitor quality assurance procedures. The same rigour is applied to the monitoring of materials and services provided by the venders so that these also meet our quality system standards.

QUALITY PEOPLE

No quality is possible without the right people to carry through on the program. Everyone, from administrative staff to expert engineers, are committed to constant improvement. This commitment is backed by intensive training and education within an environment of Trust, Respect, Participation and Recognition.

MISSION

To build a strong brand and maintain superior quality for customer satisfaction

VISION

"Our Vision is to improve the quality of life and bring greater happiness to our customers. We will do so through reliable, safe, sustainable and best in class products and services, while enhancing stake holder value continuously".

QUALITY POLICY

POLYCAB

QUALITY POLICY

We at Polycab, shall continually strive to provide best quality products on-time, at optimum cost with an objective of enhancing Customer Satisfaction.

We shall achieve operational excellence by continually improving the skills of our associates, keeping their morale high and improving the effectiveness of established Quality Management System.

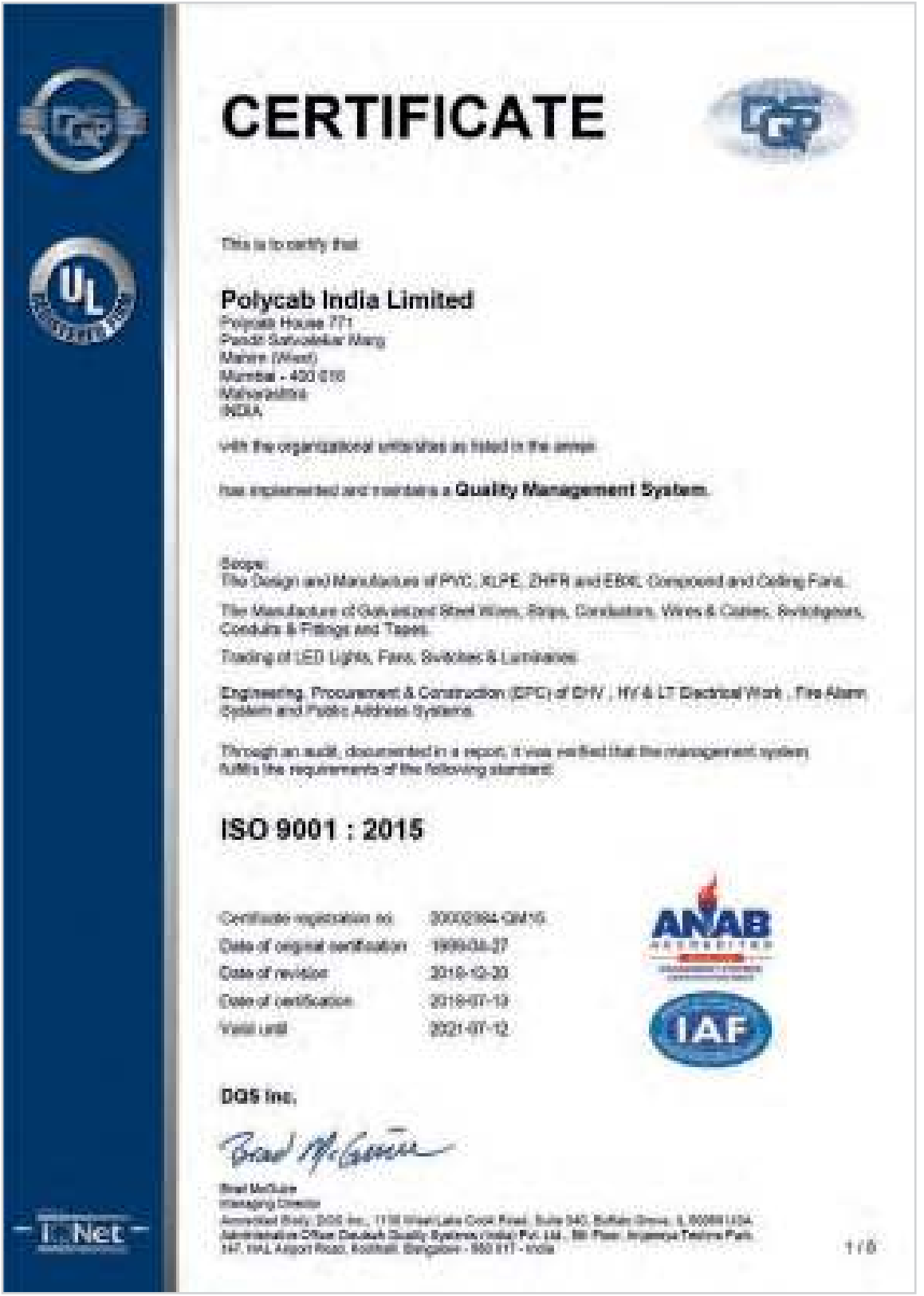
I. T. JAISINGHANI
Chairman & Managing Director

R. RAMAKRISHNAN
Vice Chairman, Joint MD
and Group CEO

Mumbai
12/04/2012

ISO 9001 : 2015

QUALITY MANAGEMENT SYSTEM



CERTIFICATE

This is to certify that

Polycab India Limited
Polycab House 771
Pandit Sahasrabuddhe Marg
Mahim (West)
Mumbai - 400 016
Maharashtra
INDIA

with the organizational units/sites as listed in the annex

has implemented and maintains a **Quality Management System.**

Scope:
The Design and Manufacture of PVC, XLPE, ZHFR and EB/E Compound and Coating Plant.

The Manufacture of Galvanized Steel Wires, Strips, Conductors, Wires & Cables, Switchgears, Conduits & Fittings and Tapes.

Trading of LED Lights, Fans, Switches & Luminaires.

Engineering, Procurement & Construction (EPC) of EHV , HV & LT Electrical Work , Fire Alarm System and Public Address Systems.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2015

Certificate registration no.	20002884 QM15
Date of original certification	1999-08-27
Date of revision	2018-12-20
Date of certification	2018-07-19
Valid until	2021-07-12

DQS Inc.

Brad McGuire
Managing Director
Accredited Body: DQS Inc., 1130 West Lake Cook Road, Suite 340, Buffalo Grove, IL 60089 USA
Administrative Office: Deutsch Quality Systems (India) Pvt. Ltd., 8th Floor, Imperial Technic Park, 147, HAL Airport Road, Kodihalli, Bangalore - 560 017 - India

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ISO 14001 : 2015

ENVIRONMENTAL MANAGEMENT SYSTEM

CERTIFICATE

This is to certify that:

Polycab India Limited
Polycab House 771
Pandit Sahasikar Marg
Mahim (West)
Mumbai - 400 016
Maharashtra
INDIA

with the organizational units/sites as listed in the annex

has implemented and maintains an **Environmental Management System**.

Scope:
The Environmental activities and supporting processes associated with the Design and Manufacture of PVC and XLPE compound.

The Environmental activities and supporting processes associated with the Manufacture of Conductors, Wires and Cables.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 14001 : 2015

Certificate registration no.	20002364 EM
Date of original certification	2015-06-22
Date of revision	2018-12-20
Date of certification	2018-07-13
Valid until	2021-07-12

DQS Inc.

Brad McGuire
Managing Director

Accredited Body: DQS Inc., 1130 West Lake Cook Road, Suite 320, Buffalo Grove, IL 60089 USA
Administrative Office: Deutsch Quality Systems (India) Pvt. Ltd., 8th Floor, Anjaneya Techno Park, 147, HAL Airport Road, Kodihalli, Bangalore - 560 017 - India

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BS OHSAS 18001 : 2007

OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

CERTIFICATE

This is to certify that

Polycab India Limited
Polycab House 771
Pandit Satyadekar Marg
Mahim (West)
Mumbai - 400 016
Maharashtra
INDIA

with the organizational units/sites as listed in the annex

has implemented and maintains an
Occupational Health and Safety Management System

Scope:
The Occupational Health & Safety activities and supporting processes associated with the Design and Manufacture of PVC and XLPE compound.

The Occupational Health & Safety activities and supporting processes associated with the manufacture of Conductors, Wires and Cables.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

BS OHSAS 18001 : 2007

Certificate registration no.	20002384 BSOH
Date of original certification	2010-09-22
Date of revision	2018-12-20
Date of certification	2018-07-13
Valid until	2021-03-12

DQS Inc.

Brad McGuire
Managing Director

Accredited Body: DQS Inc., 1130 West Lake Cook Road, Suite 340, Buffalo Grove, IL 60089 USA
Administrative Office: DeuZert Quality Systems (India) Pvt. Ltd., 8th Floor, Anjaneya Techno Park, 147, HAL Airport Road, Kodihalli, Bangalore - 560 017 - India

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CPRI TEST REPORT

CENTRAL POWER RESEARCH INSTITUTE

CPRI

TEST REPORT

Test Report Number	: CDD-2021 **Dated** : 07.09.2016
Name & Address of the Customer	: M/s Polycab Wires Pvt. Ltd. (Unit 4), Plot No. 67-72, Nurpura, Tal Halol, Dist. Panchmahal - 389350, Gujarat.
Name & Address of the Manufacturer	: M/s Polycab Wires Pvt. Ltd. (Unit 4), Plot No. 67-72, Nurpura, Tal Halol, Dist. Panchmahal - 389350, Gujarat.
Particulars of sample tested	: 1 X 400 mm², 19/33 kV XLPE Cable
Condition of the sample on receipt	: New
Type	: A2XA2Y- XLPE insulated HDPE Sheathed Cable
Designation	: Conductor Material : Aluminium No. of cores : One Size : 400 mm² Insulation: XLPE (TR-XLPE as Declared) Metallic Sheath : Corrugated Aluminium Outer sheath : HDPE (ST7) Voltage Rating : 19/33 kV(E) Embossing : 2016 POLYCAB ELECTRIC 19/33kV(E) GRADE XLPE 1C X 400 SQ MM A2XA2Y "OPTCL-[illegible]"
Serial Number	: Drum No. [illegible]
Number of Samples tested	: One
Date(s) of Test(s)	: 29.07.2016 to 02.09.2016
CPRI Sample Code no(s)	: [illegible]
Particulars of test conducted	: Type Test as per IS 7098 Part II
Test in accordance with Standard /Specification	: In General Accordance with IS 7098 Part II: 2011, Amd-2015.
Sampling plan	: Not Applicable
Customer's requirement	: Nil
Deviation if any	: Nil
Name of the witnessing persons	
Customer's representatives	: Nil
Other than customer's representatives	: None
Test subcontracted with address of the laboratory	: Nil
Documents constituting this Report (in words)	
Number of sheets	: Eight
Number of oscillograms	: Four (One Page)
Number of graphs	: Nil
Number of photos	: Nil
Number of test circuit diagrams	: Nil
Number of drawings	: Nil

(Thirumurthy)
Test Engineer

Dr. [illegible]
Additional Director

Sheet 1 of 8

BASEC PCR


BASEC
CERTIFICATION SCHEDULE


BASEC
CERTIFICATE OF CONFORMITY
Polycab India Limited
Has implemented and maintains a
Product Management System
BASEC Product Certification Requirements


BASEC
CERTIFICATION SCHEDULE

BASEC PCR


BASEC
Product Certification Schedule
BASEC


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Product Certification Schedule
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Product Certification Schedule
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BASEC PCR


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Product Certification Schedule
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BASEC
Table of Product Certificate Schedules


BASEC
Product Certification Licence

CE CERTIFICATE

FIRST QUALITY CERTIFICATION

FQC

FIRST QUALITY CERTIFICATION

CERTIFICATE

This certificate is granted to the organisation, MANUFACTURER

POLYCAB WIRES PVT. LTD

H.O : Polycab House, 771, Pandit Satawalekar Marg, Mahim (W), Mumbai - 400 016, India.
Works: 74/B-11, Daman Industrial Area, Village Kadaiya, Daman - 396210, UT
Survey No. 67-69, 71-72, 105, 106, Halol, Gujarat, INDIA

Products Description:

7. Panel Board Wiring Cables
8. LV Power & Control Cables
9. MV & HV Power Cables
10. Flame Retardant / Fire Resistant Cables
11. Instrumentation & Signaling Cables
12. Co- Axial, LAN & Communication Cables
13. Optical Fibre Cable

The following harmonized standards and/or technical specifications applied:

First Quality Certification
Product Certificate Approved

NABL - CERTIFICATE OF ACCREDITATION

National Accreditation Board for Testing and Calibration Laboratories

(A Constituent Board of Quality Council of India)

NABL

QCI

CERTIFICATE OF ACCREDITATION

POWER CABLE TEST LABORATORY, POLYCAB WIRES PVT. LTD.

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

General Requirements for the Competence of Testing & Calibration Laboratories

for its facilities at

Plot No. 67-69, 71-72, 105-108, Kumpura Road, Baska Halol, Dist. Panchmahal Halol, Gujarat

in the field of

TESTING

Certificate Number

Issue Date

Valid Until

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance of the above standard & the relevant requirements of NABL

Signed for and on behalf of NABL

N. Venkateswaran
Program Director

Anil Rana
Chief Executive Officer

IPH BERLIN

Independent, accredited testing station · Member laboratory of STL and LOVAG

TYPE TEST REPORT

NO. 03661-16-0555

Polycab Wires Pvt. Ltd. (Unit iV) 66-72, Noorpura, Tal, Panchamahal HALOL 36935 INDIA			CLIENT
Polycab Wires Pvt. Ltd. Unit 4, Ploy No. 66-72, Narpura, Taluka - Halol, District - Panchamahal Gujarat □389 350 INDIA			MANUFACTURER
33 kV XLPE power cable			TEST OBJECT
3Cx 300 mm² CU/SC/XLPE/SC/CTS/PVC/SWA/PVC 33 kV			TYPE
Test sample			SERIAL NO.
Rated voltage	U_0	19 kV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
	U	33 kV	
Maximum value of the highest system voltage	U_m	36 kV	
Rated cross-section of conductor		300 mm²	
IEC 60502-2 Edition 3.0: 2014-02 "Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1.2 kV) up to 30 kV (U_m = 36 kV) – Part 2: Cables for rated voltages from 6 kV (U_m = 7.2 kV) up to 30 kV (U_m = 36 kV)"			NORMATIVE DOCUMENT
- Type tests, electrical - Type tests, non-electrical			RANGE OF TESTS PERFORMED
15 February up to 29 August 2016			DATE OF TEST
The test object meets the requirements defined in normative document specified above. The type tests have been PASSED.			TEST RESULT

H. ZINNBAUER
Head of Centre of Competence
High-Power/High-Voltage

D. JEGUST
Test engineer in charge

Berlin, 09 January 2017

Independent test laboratory accredited by the German Accreditation Body DAkkS, Deutsche Akkreditierungsstelle GmbH, in the fields of high-voltage switchgear and their components, cables and conductors as well as industrial low-voltage apparatus.
IPH Institut □Prüffeld für elektrische Hochleistungstechnik□ GmbH (IPH Berlin) is a subsidiary of CESI S.p.A, Milan.

MANUFACTURING PROCESS – AT POLYCAB

POLYCAB HV XLPE cables are manufactured at its most modern manufacturing setup in HALOL and DAMAN. Manufacture of HV XLPE CABLES requires great care and skill at all stages of processing. Work on HV cables has shown to raise the electric stress of XLPE cables it is essential that the extruded insulation is of high cleanliness without any imperfection, free of contamination, voids and manufacturing defects, and that the screen interface is smooth. In addition an integrated extrusion plant employing a Continuous Catenary Vulcanizing (CCV) process line (Dry Curing Line) is required. Polycab easily met these two criteria by carefully selecting imported insulating materials and by installing 6 CCV lines sourced from world renowned manufacturers. (Fig 1)

The cable core is triple extruded and crosslinked in the fully enclosed process in which the inner "semi-conducting" screen, the XLPE insulation and the outer semi conducting screen are applied simultaneously (Fig 2) to the pre-heated cable conductor. Specialized in-line inspection techniques using X-rays are employed to monitor the dimensional accuracy of the extruded core. These examinations confirm the correct levels of dimensional accuracy.

The final stage of HV cable manufacture is the high voltage test, which comprises an HV withstand, and a partial discharge detection test. These tests take place in Polycab's sophisticated HV Test Lab (Fig 3). The tests are of short duration, typically 30 minutes, and are capable of detecting the defects that initiate partial discharges, as small as one "pico-coulomb". Such defects lead to gradual deterioration of the XLPE and eventually breakdown may occur.

Figure 1 :
6 Nos. CCV (DRY CURE) LINES

Figure 2 :
Three Layer Comon Triple Extrusion Method

Figure 3 :
Ultra Modern Hv Testing Lab

FLOW CHART

Conductor

Quality Checks
No. of Wires, Size, Conductor Resistance, Surface Finish, Diameter of Conductor

Continuous Triple Extrusion
Inner Semicon, XLPE Insulation Outer Semicon

Quality Checks
Type of Compounds, Batch No. details, Thickness, Core Dia, Electricity, Surface Finish, Hot Set Test

Copper Taping

Quality Checks
Size & Type of Tape, Market /Lot No., Overlap, Dia over tape, Continuity, Tape Jointing, Core Identification

Laying –Up / Twisting

Quality Checks
Core Sequence, No of Cores, Laylength., Binder /Roundness

Inner Sheathing (Extrusion*)

Quality Checks
Type of PVC, Batch/Lot No., Thickness of Sheath, Dia over Sheath

Armouring

Quality Checks
Armour Dimensions, No. of Armour, Coverage, Armour Joint

Outer Sheathing

Quality Checks
Type of PVC, Batch/Lot No., Thickness of Sheath, Dia over Sheath, Color, Surface Finish

Final Testing

Quality Checks
Conductor Resistance, High Voltage Test, Partial Discharge Test

Packing / Marking

Quality Checks
Marking Details, Lagging Coverage

Storage / Dispatch

Cables with FR-LSH / Zero Halogen Outer Sheath can be supplied against specific requirement.

POLYCAB GUIDELINES FOR SELECTION OF CABLES

Power Cables are generally selected considering the application. However, following factors are important for selection of suitable cable construction required to transport electrical energy from one end to the other.

1) Maximum operating voltage grade
2) Maximum fault current and its duration under fault condition
3) Load to be carried.
4) Possible overloading duration & magnitude.
5) Route length and voltage drop.
6) Mode of installation considering installation environment such as ambient & ground temperature chemical & physical properties of soil.
7) Requirement of fire performance in cable

All sizes of POLYCAB XLPE cables are designed to standard operating conditions in India and abroad. The standards adopted are considering the geographical/climatical conditions and general applications of power for utilities, distribution and
generation purposes.

The cables are manufactured conforming to Indian & International cables specifications for XLPE Insulated cables. Customer specific requirements can also be met.

Polycab is manufacturing wide range of cables, so it is important that while placing enquiries or orders, as much information as possible shall be given to Polycab, so that the enquiries and orders are dealt quickly and efficiently.

1) Voltage Grade :- 3.6 / 6 (7.2)kV **OR** 3.8 / 6.6 (7.2)kV, 6 / 10 (12)kV **OR** 6.35 / 11 (12)kV,

8.7 / 15 (17.5)kV **OR** 8.7 / 15 (17.5)kV, 12 / 20 (24)kV **OR** 12.7 / 22 (24)kV, 18 / 30 (36)kV **OR** 19 / 33 (36)kV

2) International standard :- Year or International standard – IEC-60502 (Part-2), BS-6622 & BS:7835.

3) Number of cores. :- Single & Three.

4) Conductor :- Size - 35 Sq.mm to 1000 Sq.mm in Single Core Cables & 35 Sq.mm to 630 Sq.mm in

3 Core cables.

5) Conductor Material :- Copper / Aluminum

6) Type of Insulation :- XLPE

7) Type of Inner Sheathing :- PVC Extruded / PVC / Flame Retardant / Flame Retardant Low Smoke / Zero Halogen (LSOH).

8) Type of Armour :- Unarmoured / Strip Armoured / Round Wire Armored / Tape Armored.

9) Type of Outer Sheath :- PVC / Flame Retardant / Flame Retardant Low Smoke / Zero Halogen (LSOH).

10) Length of cable required and drum length.

DESIGN OF HT CABLES AND CONSTRUCTIONS WITH SPECIAL FEATURES

1. Conductor

Stranded compacted class 2 circular conductors of Annealed Copper/ Aluminium to carry continuous load and short circuit current. All Conductors shall comply with the requirement of IEC 60228/ BS 6360.

2. Conductor Screen

This is a layer of cross linkable semiconducting compound extruded directly over the conductor. It not only eliminates any sharp points on conductor surface but also nullifies the chance of electric discharge at the interface between conductor & insulation.

3. Insulation

The insulation is of natural, Cross Linked Polyethylene (XLPE) extruded over conductor screen. XLPE Insulation is capable of operation continuously at 90°C. Thickness of insulation shall as per IEC:60502 Part – 2, BS:6622, BS:7835.

4. Non-Metallic Insulation Screen

This is a layer of cross linkable semiconducting compound extruded directly over the Insulation at the same time when conductor screen and insulation are extruded. These are extruded in one operation by TRIPLE EXTRUSION which eliminates the formation of micro voids during the extrusion and curing resulting in longer life of cables.

5. Metallic Insulation Screen

The metallic Screen can be helically applied copper tape or a number of copper wires applied over semiconducting screen to carry fault current. This ensures that the surface of insulation is at ground potential and hence no surface discharge and electric field will be radial in nature.

6. Laying up

In case of three core cable, insulated cores are laid up together with PVC* or Polypropylene Fiber fillers to maintain circularity of cable. The core identification of three core cable is done either by coloured strips / numbered applied on the cores.

7. Inner Sheath

Polyvinyl Chloride (PVC) or Polyethylene (PE) compound is extruded over the laid up cores. The laid up cores shall be provided with inner sheath applied either by extrusion or by wrapping as per customer requirement. It shall be ensured that the shape is as circular as possible.

8. Armour

Galvanized steel wires applied over the inner sheath in case of three core cables and for single core cables, non-magnetic armouring is applied over the inner sheath. The direction of lay of armouring shall be left hand. The purpose of armour is to give mechanical protection to cables. It also acts as a return path for earth fault current.

9. Outer Sheath

This is an extruded layer of polyvinyl chloride (PVC) or Polyethylene (PE) is extruded over armour. For single core unarmoured cables the outer sheath is extruded over the non-magnetic metallic part of insulation screen.

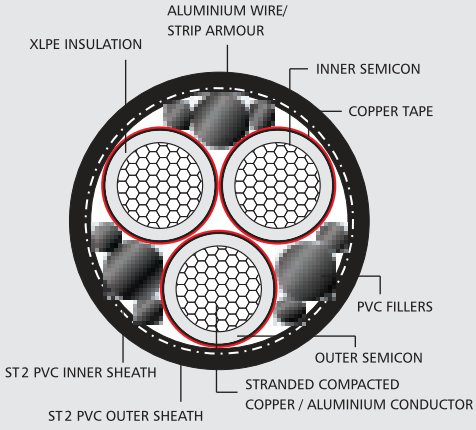
* Weights given in the table are with PVC fillers.

SPECIAL FEATURES

Other than above design, elements can vary in a number of ways to meet the specific customer requirements. Some of the examples are listed below.

- Longitudinal and radial water blocking of conductor, cable cores and complete cable.
- Lead alloy metallic sheath.
- Water tree retardant XLPE insulation.

Polycab manufactures following voltage grade cables as per IEC-60502 part-2 and BS-6622 & BS:7835

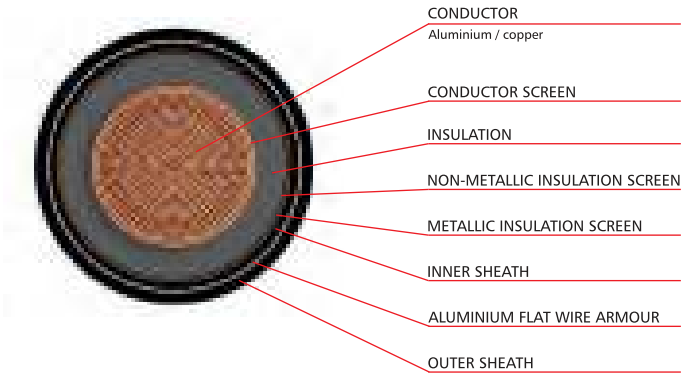


- 3.6 / 6 (7.2)kV **OR** 3.8 / 6.6 (7.2)kV
- 6 / 10 (12)kV **OR** 6.35 / 11 (12)kV
- 8.7 / 15 (17.5)kV **OR** 8.7 / 15 (17.5)kV
- 12 / 20 (24)kV **OR** 12.7 / 22 (24)kV
- 18 / 30 (36)kV **OR** 19 / 33 (36)kV

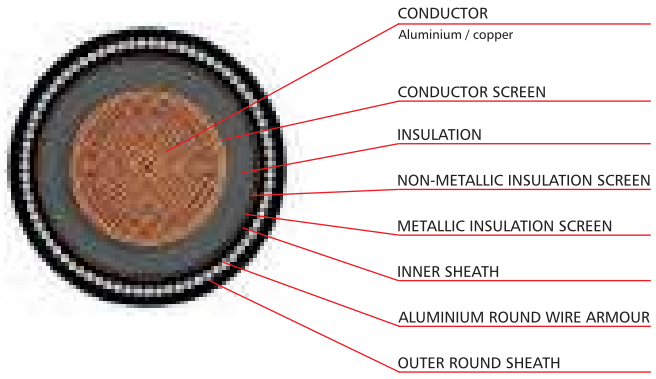
SIZES:

- 35 Sq.mm up to 1000 Sq.mm in Single Core Cables.
- 35 Sq.mm to 630 Sq.mm in Multi Cores Cables.

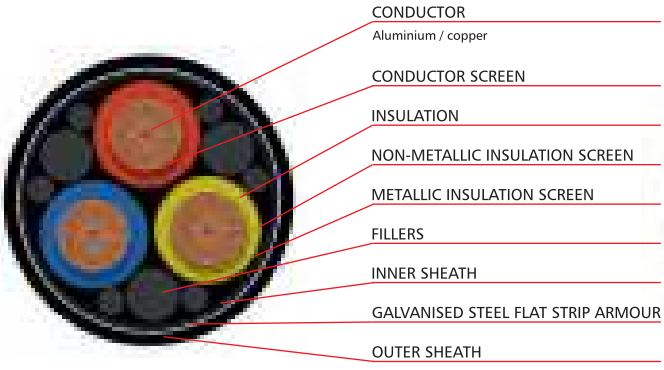
SINGLE CORE CABLE WITH FLAT STRIP ARMOUR



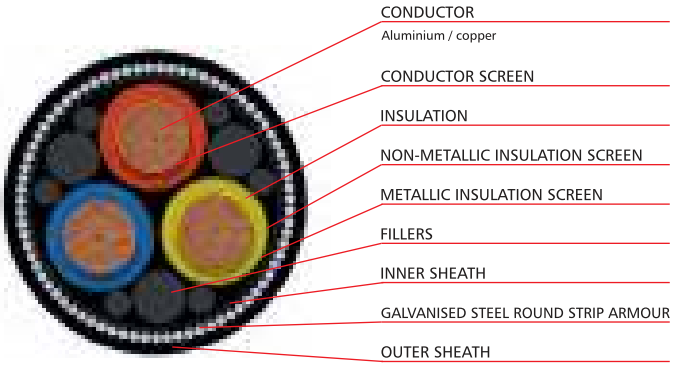
SINGLE CORE CABLE WITH ROUND STRIP ARMOUR



THREE CORE CABLE WITH FLAT STRIP ARMOUR



THREE CORE CABLE WITH ROUND STRIP ARMOUR



QUALITY ASSURANCE

Polycab's goal is to have satisfied customers. Quality assurance consisting of rigorous inspection followed by meticulous process and quality control in all phases, guarantees the superior quality of Polycab's products. Up-to-date laboratory facilities ensure that quality control requirements are met in full. Polycab XLPE Cables are tested to ensure high reliability in performance. Continuous process monitoring and post manufacturing tests ensure the compliance to Indian and International Standards. The assurance of quality is further ensured by ISI certification on cables and ISO 9001 certification by UL, USA, A-7913.

QUALITY ASSURANCE TESTING

Polycab is self sufficient to carry out all Routine & Type Tests in its own laboratory. It has world class Testing facilities for Routine & Type Tests. Routine Tests IEC:60502, BS:6622, BS:7835

- Partial Discharge Test
- High Voltage Test
- Conductor Resistance Test. Routine Tests are performed on each manufactured length of cable in Routine Test Laboratory.

TYPE TEST

IEC:60502, BS:6622, BS:7835

a) Electrical Type Tests
b) Non-Electrical Type Tests
c) Special Tests.

The cable samples are type tested in-house to ensure conformance as to various standards. Polycab cables of various voltage grades are type tested at CPRI Bangalore & ERDA Vadodara. Short circuit tests on cable conductor and armour are successfully carried at CPRI Bhopal & ERDA Vadodara.

Impulse Test Set Up

Non Electrical Type Test Laboratory

FLAME RETARDANT LOW SMOKE CABLES

The behaviour of Electric Cables in presence of fire has been a matter of great concern to all Electrical Engineers involved in Generation, Transmission and Utilisation of electric power. Normally all XLPE Cables have an outer sheath of PVC. Although PVC by itself is flame retarding, it does produce highly toxic and corrosive fumes in the event of fire.

As a matter of fact, in closed and crowded places such as power stations, subways, railways with long sections in tunnels, road tunnels, ships, hospitals, schools, hotels, cinema theatres, museums and public premises in general, besides the obvious danger represented by fire propagation, also fume toxicity and opacity are particularly important as they may cause, with equally serious consequences for human safety, suffocation intoxication and panic due to reduced visibility.

FR-LSH PVC compound should ensure the following :

1) Minimum smoke emission.
2) Very low toxic and corrosive fumes emission.
3) Fire Retardant characteristics.

Our laboratory is well equipped with latest test equipments to carry out following test requirements.

a) The oxygen index and temperature index of sheath as per ASTM-D 2863.

b) Flammability characteristics of cable as per IEC 60332 (Pt. I) & IEC 60332 (Pt. III)

c) Determination of the amount of halogen acid gas evolved during combustion of outersheath materials as per per IEC 60754 (Pt. I & II).

d) Determination of smoke generation of outersheath material under fire as per applicable BS Standards and IEC : 61034(Part-2)

e) The measurement of smoke density as per ASTM D2843

CONDUCTOR RESISTANCE

The details to the above Guidelines are given in tables.

TABLE - 1 *Conductor Technical Information for Single Core and Multicore cables conforming to IEC 60228 Latest (Stranded-Class-2) Copper & Aluminium Conductors

Nominal size of conductor (sq.mm)	Minimum No. of Wires in the conductor		Maximum D.C. Resistance at 20° C		Maximum A.C Resistance at 90° C	
	Circular Compacted or Shaped Conductor		Plain Copper (ohm/Km)	Aluminium (ohm/Km)	Plain Copper (ohm/Km)	Aluminium (ohm/Km)
	Plain Copper	Aluminium				
25	6	6	0.7270	1.2000	0.927	1.54
35	6	6	0.5240	0.8680	0.668	1.11
50	6	6	0.3870	0.6410	0.494	0.822
70	12	12	0.2680	0.4430	0.342	0.568
95	15	15	0.1930	0.3200	0.247	0.411
120	18	15	0.1530	0.2530	0.196	0.325
150	18	15	0.1240	0.2060	0.159	0.265
185	30	30	0.0991	0.1640	0.128	0.211
240	34	30	0.0754	0.1250	0.0982	0.161
300	34	30	0.0601	0.100	0.0792	0.130
400	53	53	0.0470	0.0778	0.0632	0.102
500	53	53	0.0366	0.0605	0.0509	0.0801
630	53	53	0.0283	0.0469	0.0414	0.0634
800	53	53	0.0221	0.0367	0.0349	0.0513
1000	53	53	0.0176	0.0291	0.0306	0.0426

* Conductor meeting requirements of IEC-60228 and BS 6360 can also be manufactured.

TABLE - 2 Short Circuit Rating for 1 Second Duration for Copper and Aluminium XLPE Cables (Current In K. AMPS)

Short Circuit Current rating in KA/Sec		
Nominal size of conductor (sq.mm)	XLPE Insulated	
	Copper	Aluminium
25	3.58	2.35
35	5.01	3.29
50	7.15	4.70
70	10.01	6.58
95	13.59	8.93
120	17.16	11.28
150	21.45	14.10
185	26.46	17.39
240	34.32	22.56
300	42.90	28.20
400	57.20	37.60
500	71.50	47.00
630	90.09	59.22
800	114.40	75.20
1000	143.00	94.00

MEDIUM VOLTAGE CABLE (MULTI -CORE)

Voltage Grade (kv)	Nominal Cross Section (min^2)	Nominal Thickness of Insulation (mm)	Nominal Dia of Steel Wire Armour (mm)	Nominal Thickness of Over Sheath (mm)	Approx Overall Dia (mm)	Approx. Weight (Kg/Km)
3.6/6 (7.2)	3 x 50	2.5	2.5	2.5	45.0	4040
	3 x 70	2.5	2.5	2.6	49.0	4930
	3 x 95	2.5	2.5	2.7	52.0	5890
	3 x 120	2.5	2.5	2.8	56.0	6900
	3 x 150	2.5	2.5	2.9	59.0	7890
	3 x 185	2.5	2.5	3.0	64.0	9320
	3 x 240	2.6	2.5	3.2	70.0	11380
	3 x 300	2.8	3.15	3.5	77.0	14440
	3 x 400	3.0	3.15	3.8	86.0	17790
	3 x 500	3.2	3.15	4.0	94.0	21920
	3 x 630	3.2	3.15	4.2	103.0	26950
6/10 (12)	3 x 50	3.4	2.5	2.6	50.0	4480
	3 x 70	3.4	2.5	2.7	53.0	5370
	3 x 95	3.4	2.5	2.9	57.0	6390
	3 x 120	3.4	2.5	3.0	61.0	7420
	3 x 150	3.4	2.5	3.1	64.0	8440
	3 x 185	3.4	2.5	3.2	68.0	9890
	3 x 240	3.4	3.15	3.4	75.0	12750
	3 x 300	3.4	3.15	3.6	80.0	14890
	3 x 400	3.4	3.15	3.8	88.0	18110
	3 x 500	3.4	3.15	4.0	95.0	22090
	3 x 630	3.4	3.15	4.3	104.0	27180
8.7/15 (17.5)	3 x 50	4.5	2.5	2.8	55.0	5110
	3 x 70	4.5	2.5	2.9	58.0	5980
	3 x 95	4.5	2.5	3.0	62.0	7010
	3 x 120	4.5	2.5	3.1	66.0	8060
	3 x 150	4.5	2.5	3.2	69.0	9110
	3 x 185	4.5	3.15	3.4	75.0	11420
	3 x 240	4.5	3.15	3.6	80.0	13570
	3 x 300	4.5	3.15	3.7	85.0	15720
	3 x 400	4.5	3.15	4.0	93.0	19040
	3 x 500	4.5	3.15	4.2	100.0	23050
	3 x 630	4.5	3.15	4.4	109.0	28150
12/20 (24)	3 x 50	5.5	2.5	2.9	60.0	5630
	3 x 70	5.5	2.5	3.1	63.0	6600
	3 x 95	5.5	2.5	3.2	67.0	7650
	3 x 120	5.5	3.15	3.3	72.0	9430
	3 x 150	5.5	3.15	3.4	75.0	10590
	3 x 185	5.5	3.15	3.6	80.0	12130
	3 x 240	5.5	3.15	3.7	85.0	14290
	3 x 300	5.5	3.15	3.9	90.0	16530
	3 x 400	5.5	3.15	4.1	98.0	19910
	3 x 500	5.5	3.15	4.3	105.0	23950
	3 x 630	5.5	3.15	4.6	114.0	29150
18/30 (36)	3 x 50	8.0	3.15	3.4	73.0	7980
	3 x 70	8.0	3.15	3.5	77.0	9020
	3 x 95	8.0	3.15	3.6	80.0	10130
	3 x 120	8.0	3.15	3.7	84.0	11310
	3 x 150	8.0	3.15	3.8	87.0	12490
	3 x 185	8.0	3.15	4.0	92.0	14180
	3 x 240	8.0	3.15	4.1	97.0	16420
	3 x 300	8.0	3.15	4.3	102.0	18720
	3 x 400	8.0	3.15	4.5	110.0	22190
	3 x 500	8.0	3.15	4.7	117.0	26350
	3 x 630	8.0	3.15	5.0	126.0	31700

Standard: IEC 60502 & BS 6622 (Wherever applicable)

Conductor: Circular Stranded Compact Copper Conductor

Conductor Screen: Extruded Layer of semi Conducting Material

Insulation : XLPE

Insulation Screen: Extruded Layer of Stripable / Bonded Semi-conducting Material

Metallic Screen: Copper Tape

Bedding: Extruded PVC over non-hygroscopic filler.

Armouring: Single Layer of galvanised Steel Wire, however steel tape & Flat wire armour can be offered

Sheathing: Extruded PVC

Operating Temperature: 90°C for continuous operation and 250 C for short circuit conditions.

Note :

1) Cables are also available with Aluminium conductors, Copper wire Screen and LSF Outersheath.
2) Cables can be offered with BS & VDE Specification.

MEDIUM VOLTAGE CABLE (1CORE)

Voltage Grade (kv)	Nominal Cross Section (mm^2)	Nominal Thickness of Insulation (mm)	Nominal Dia. of Aluminium Wire Armour (mm)	Nominal Thickness of Over Sheath (mm)	Approx Overall Dia (mm)	Approx. Weight (Kg/Km)
3.6/6 (7.2)	1 x 50	2.5	1.6	1.8	24.0	960
	1 x 70	2.5	1.6	1.8	26.0	1190
	1 x 95	2.5	1.6	1.9	27.0	1480
	1 x 120	2.5	1.6	1.9	29.0	1750
	1 x 150	2.5	1.6	2.0	30.0	2040
	1 x 185	2.5	2.0	2.0	33.0	2500
	1 x 240	2.6	2.0	2.1	36.0	3110
	1 x 300	2.8	2.0	2.2	38.0	3760
	1 x 400	3.0	2.0	2.3	42.0	4660
	1 X 500	3.2	2.5	2.5	47.0	6000
	1 X 600	3.2	2.5	2.6	51.0	7500
	1 X 800	3.2	2.5	2.7	55.0	9270
	1 X 1000	3.2	2.5	2.9	60.0	11390

Voltage Grade (kv)	Nominal Cross Section (mm^2)	Nominal Thickness of Insulation (mm)	Nominal Dia. of Aluminium Wire Armour (mm)	Nominal Thickness of Over Sheath (mm)	Approx Overall Dia (mm)	Approx. Weight (Kg/Km)
6/10 (12)	1 x 50	3.4	1.6	1.8	26.0	1040
	1 x 70	3.4	1.6	1.9	28.0	1290
	1 x 95	3.4	1.6	1.9	29.0	1570
	1 x 120	3.4	1.6	2.0	31.0	1850
	1 x 150	3.4	2.0	2.1	33.0	2230
	1 x 185	3.4	2.0	2.1	35.0	2620
	1 x 240	3.4	2.0	2.2	37.0	3220
	1 x 300	3.4	2.0	2.2	39.0	3840
	1 x 400	3.4	2.0	2.4	43.0	4730
	1 X 500	3.4	2.5	2.5	47.0	6030
	1 X 600	3.4	2.5	2.6	52.0	7550
	1 X 800	3.4	2.5	2.7	56.0	9300
	1 X 1000	3.4	2.5	2.9	60.0	11430

Voltage Grade (kv)	Nominal Cross Section (mm^2)	Nominal Thickness of Insulation (mm)	Nominal Dia. of Aluminium Wire Armour (mm)	Nominal Thickness of Over Sheath (mm)	Approx Overall Dia (mm)	Approx. Weight (Kg/Km)
8.7/15 (17.5)	1 x 50	4.5	1.6	1.9	28.0	1160
	1 x 70	4.5	1.6	1.9	30.0	1400
	1 x 95	4.5	2.0	2.0	32.0	1770
	1 x 120	4.5	2.0	2.1	34.0	2070
	1 x 150	4.5	2.0	2.1	35.0	2360
	1 x 185	4.5	2.0	2.2	37.0	2780
	1 x 240	4.5	2.0	2.3	40.0	3390
	1 x 300	4.5	2.0	2.3	42.0	4010
	1 x 400	4.5	2.5	2.5	47.0	5080
	1 X 500	4.5	2.5	2.6	50.0	6230
	1 X 600	4.5	2.5	2.7	54.0	7770
	1 X 800	4.5	2.5	2.8	58.0	9580
	1 X 1000	4.5	2.5	3.0	63.0	11720

MEDIUM VOLTAGE CABLE (1CORE)

Voltage Grade (kv)	Nominal Cross Section (min²)	Nominal Thickness of Insulation (mm)	Nominal Dia of Steel Wire Armour (mm)	Nominal Thickness of Over Sheath (mm)	Approx Overall Dia (mm)	Approx. Weight (Kg/Km)
12/20 (24)	1 x 50	5.5	1.6	2.0	30.0	1280
	1 x 70	5.5	2.0	2.0	33.0	1590
	1 x 95	5.5	2.0	2.1	34.0	1900
	1 x 120	5.5	2.0	2.1	36.0	2190
	1 x 150	5.5	2.0	2.2	37.0	2510
	1 x 185	5.5	2.0	2.2	39.0	2920
	1 x 240	5.5	2.0	2.3	42.0	3540
	1 x 300	5.5	2.5	2.4	45.0	4320
	1 x 400	5.5	2.5	2.5	49.0	5250
	1 x 500	5.5	2.5	2.6	52.0	6440
	1 x 630	5.5	2.5	2.8	56.0	7980
	1 x 800	5.5	2.5	2.9	60.0	9800
	1 x 1000	5.5	2.5	3.0	65.0	11940

Standard: IEC 60502 & BS 6622 / BS 7835 (Wherever applicable)

Conductor: Circular Stranded Compact Copper Conductor

Conductor Screen: Extruded Layer of semi Conducting Material

Insulation: XLPE

Insulation Screen: Extruded Layer of Stripable Semi-conducting Material

Metallic Screen: Copper Tape

Bedding: Extruded PVC over non-hygroscopic filler

Armouring: Single Layer of Aluminium Steel Wire, however Aluminum tape & Flat Aluminium armour can be offered

Sheathing: Extruded PVC

Operating Temperature: 90 C For continuous operation and 250 C for short circuit conditions

Voltage Grade (kv)	Nominal Cross Section (min²)	Nominal Thickness of Insulation (mm)	Nominal Dia of Steel Wire Armour (mm)	Nominal Thickness of Over Sheath (mm)	Approx Overall Dia (mm)	Approx. Weight (Kg/Km)
18/30 (36)	1 x 50	8.0	2.0	2.2	36.0	1680
	1 x 70	8.0	2.0	2.2	38.0	1950
	1 x 95	8.0	2.0	2.3	40.0	2270
	1 x 120	8.0	2.0	2.3	41.0	2570
	1 x 150	8.0	2.5	2.4	44.0	3040
	1 x 185	8.0	2.5	2.5	46.0	3490
	1 x 240	8.0	2.5	2.5	48.0	4110
	1 x 300	8.0	2.5	2.6	51.0	4820
	1 x 400	8.0	2.5	2.7	54.0	5750
	1 x 500	8.0	2.5	2.8	57.0	6970
	1 x 630	8.0	2.5	2.9	62.0	8530
	1 x 800	8.0	2.5	3.1	66.0	10420
	1 x 1000	8.0	2.5	3.2	71.0	12590

TABLE 7 CURRENT RATINGS FOR SINGLE-CORE CABLES WITH XLPE INSULATION-RATED VOLTAGE 3.6/6 kV TO 18/30 kV COPPER CONDUCTOR

Nominal Area of Conductor (mm²)	Buried Direct in the Ground		In a Buried Duct		In Air		
	Trefoil (A)	Flat Spaced (A)	Trefoil Ducts (A)	Flat Touching Ducts (A)	Trefoil (A)	Flat Touching Ducts (A)	Flat Spaced
16	109	113	103	104	125	128	150
25	140	144	132	133	163	167	196
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	504	510	735	739	846
400	590	572	564	571	845	837	938

Maximum Conductor Temperature : 90 °C
Ambient Air Temperature : 30 °C
Ground Temperature : 20 °C
Depth of Laying : 0.8 m
Thermal Resistivity of Soil : 1.5 K.m/W
Thermal Resistivity of Earthenware Ducts : 1.2 K.m/W

TABLE 8 CURRENT RATINGS FOR SINGLE-CORE CABLES WITH XLPE INSULATION-RATED VOLTAGE 3.6/6 kV TO 18/30 kV ALUMINIUM CONDUCTOR

Nominal Area of Conductor (mm^2)	Buried Direct in the Ground		In a Buried Duct		In Air		
	Trefoil (A)	Flat Spaced (A)	Trefoil Ducts (A)	Flat Touching Ducts (A)	Trefoil (A)	Flat Touching Ducts (A)	Flat Spaced
16	84	88	80	81	97	99	116
25	108	112	102	103	127	130	153
35	129	134	122	123	154	157	185
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769

Maximum Conductor Temperature : 90 °C
Ambient Air Aemperature : 30 °C
Ground Temperature : 20 °C
Depth of Laying : 0.8 m
Thermal Resistivity of Soil : 1.5 K.m/W
Thermal Resistivity of Earthenware Ducts : 1.2 K.m/W

TABLE 9 CURRENT RATINGS FOR THREE-CORE CABLES WITH XLPE CABLE-RATED VOLTAGE 3,6/6 kV TO 18/30kV - COPPER CONDUCTOR, ARMOURED AND UNARMOURED

Nominal Area of Conductor (mm^2)	Buried direct in the Ground		In a Buried Duct		In air	
	Buried Direct in Ground (A)	In a Buried Duct (A)	In Air (A)	Buried Direct in Ground (A)	In a Buried Duct I (A)	Flat Touching Flat Spaced (A)
16	101	87	109	101	88	110
25	129	112	142	129	112	143
35	153	133	170	154	134	172
50	181	158	204	181	158	205
70	221	193	253	220	194	253
95	262	231	304	263	232	307
120	298	264	351	298	264	352
150	334	297	398	332	296	397
185	377	336	455	374	335	453
240	434	390	531	431	387	529
300	489	441	606	482	435	599
400	553	501	696	541	492	683

Maximum Conductor Temperature : 90 °C
Ambient Air Temperature : 30 °C
Ground Temperature : 20 °C
Depth of laying : 0.8 m
Thermal Resistivity of Soil : 1.5 K.m/W
Thermal Resistivity of Earthenware Ducts : 1.2 K.m/W

TABLE 10 CURRENT RATING FOR THREE-CORE CABLES WITH XLPE INSULATED CABLE-RATED VOLTAGE 3,6/6 kV TO 18/30 kV-ALUMINIUM CONDUCTOR, ARMOURED AND UNARMOURED

Nominal Area of Conductor (mm^2)	Buried Direct in the Ground		In a Buried Duct		In Air	
	Buried Direct in Ground (A)	In a Buried Duct (A)	In Air (A)	Buried Direct in Ground (A)	In a Buried Duct I (A)	Flat Touching Flat Spaced (A)
16	78	67	84	78	68	85
25	100	87	110	100	87	111
35	119	103	132	119	104	133
50	140	122	158	140	123	159
70	171	150	196	171	150	196
95	203	179	236	204	180	238
120	232	205	273	232	206	274
150	260	231	309	259	231	309
185	294	262	355	293	262	354
240	340	305	415	338	304	415
300	384	346	475	380	343	472
400	438	398	552	432	393	545

Maximum Conductor Temperature : 90 °C
Ambient Air Temperature : 30 °C
Ground Temperature : 20 °C
Depth of Laying : 0.8 m
Thermal Resistivity of Soil : 1.5 K.m/W
Thermal Resistivity of Earthenware Ducts : 1.2 K.m/W

TABLE 11 CORRECTION FACTORS FOR AMBIENT AIR AEMPERATURE OTHER THAN 30°C

Maximum Conductor Temperature (°C)	Ambient Air Temperature (°C)							
	20	25	35	40	45	50	55	60
90	1.08	1.04	0.96	0.91	0.87	0.82	0.76	0.71

TABLE 12 CORRECTION FACTORS FOR AMBIENT GROUND TEMPERATURE OTHER THAN 20°C

Maximum Conductor Temperature (°C)	Ground Temperature (°C)							
	10	15	25	30	35	40	45	50
90	1.07	1.04	0.96	0.93	0.89	0.85	0.8	0.76

EHV CABLES

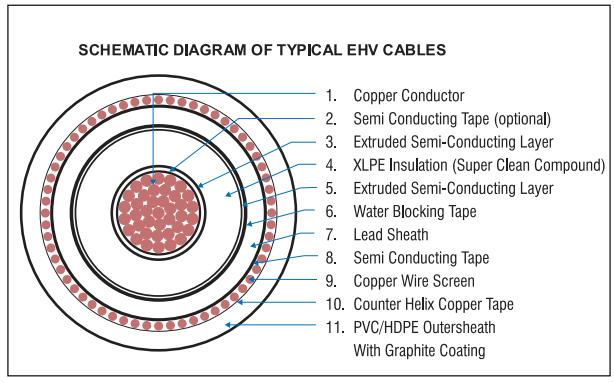
EHV cables can be used in a lot of industries like utilities, builders, government organizations, mining industries, state electricity boards, under ground railways and so on. Analysts say EHV under ground power transmission is the only solution for meeting today's growing power demand. This EHV cables will replace high voltage tower cables, which pose a risk of irreparable failure at any time and therefore will be in huge demand over the next decade.

The EHV cables can more or less survive all natural calamities and the installation can even withstand floods and earthquakes. This is huge contrast to the areas with overhead network, which are susceptible to strong flood and earthquake and have a possibility of pulling down the towers, which can be quite dangerous. EHV cables also have the following advantages as compared to others.

- More secured supply even during bad weather conditions
- Loss of transmission is lower
- Does not cause noise or air pollution
- Is underground and therefore saves space and is much better for urban transmission of electricity

Salient features of Polycab's EHV / XLPE line

- The only manufacturer in the country to have 6 CCV lines. These are sourced from reputed international manufacturer & technology providers
- Highly sophisticated extruders for conductor shield, insulation and insulation shield, employing a three layer single head triple extrusion method to eliminate contaminants in the insulating layers
- Microprocessor based equipment control all the parameters required for the process within the specified limits to maintain eccentrically
- Separate pressurised rooms for semicon shield & XLPE insulation compounds to avoid contamination and handling by vacuum loaders
- Air systems with air showers on doors to eliminate dust entry



Metallic Sheath

Metallic Sheath is must for cables above 33 kV as the cable of voltage grade 66 kV & above are working with dielectric stress of above 6 kV / mm & at this level of dielectric stress presence of water triggers tree formation in the insulation resulting in cable failure.

Water can enter the cable longitudinally as well as radially. Longitudinal water entry can be blocked by using water swellable tape on the core. Lead sheath and Corrugated Aluminium (Seam welded) sheath can block the entry in radial direction.

Lead sheath is extruded by continuous lead extruder which is equipped with micro-processor based temperature controllers & drives to achieve uniform thickness, better concentricity. Lead sheath in addition to other electrical & manufacturing advantages has a life span of minimum 40 to 45 years.

Aluminium shrips in the range of 1.6 to 4mm thickness are folded around the cable with a set up of rolls .The strips edges are trimmed to correct dimensions and welded longitudinally forming a tube. The welding is made with lesser welding method .The tube like sheath is corrugated after welding to improve the flexibility.

Cable selection / Design parameters

Cable design mainly depends on

• System voltage • Impulse level • Fault level & duration • Ground & air temperature • Thermal resistivity of soil

Breakthrough in EHV cables Polycab has already designed, manufactured, type tested and supplied their 132 kv cable to customers in the Indian origin. Our 132 kv sample is successfully type tested for qualifying the electrical & other critical tests that are carried out at CPRI Bangaluru to establish the good quality of a product. We now move forward with enthusiasm to continuously improve and evolve our manufacturing processes and technology acumen so that our journey to the next higher voltage grade of cables is easier, smooth, and faster.

IMPORTANT FORMULAE

IMPORTANT FORMULAE * TO CALCULATE VARIOUS ELECTRICAL PARAMETERS OF CABLES

1) Inductance :

$$L = K + 0.2 \log_e \frac{2S}{d} \text{ (mH/km)}$$

where K = Constant for different stranded conductors
S = Axial Spacing between Cables Conductors in mm.
d = Conductor Diameter

No. of wires in Conductor	K
7	0.0642
19	0.0554
37	0.0528
61 and above	0.0514
1(Solid)	0.0500

2) Reactance:

$X = 2\pi f \times L \times 10^{-3}\ \Omega/km$

where f = frequency
L = Inductance

3) Impedance :

$Z = (R^2 + X^2)^{1/2}\ \Omega/km$

where R = A.C Resistance at operating temperature Ω/km
X = Reactance

4) Charging Current :

$A = Uo \times 2\pi \times f \times C \times 10^{-6}$ Amp/km

C = Cable capacitance in μf/km

Uo= Voltage in Voltes

5) Voltage Drop :

For 3 Core Cables : $\sqrt{3} \times Z$ mv/A/mtr

For 1 Core Cables : 2 x Z mv/A/mtr

where Z = Impedance in ohm/km

6) Capacitance:

$$C = \frac{Er}{18 \log_e (D/d)} \text{ (μf / km)}$$

where Er = Relative Permitivity for XLPE : 2.3
D = Dia over Insulation in mm
d = Dia over conductor screen in mm

7) Dielectric loss in watts per km/phase:

$2\pi f \times C \times Uo2 \tan \cdot 10\text{-}6$ (watt / km per phase)

where C = Capacitance in μf/km
Uo = Power frequency voltage between conductor & earth -V
Tanδ = Dielectric power factor
= 0.004 for XLPE

8) Voltage Induced in Sheath :

$E_s = I\ Xm$

where I = conductor current (A)
Xm = $2\pi fM \times 10\text{–}3$ (Ω / km)
M = $0.2 \log_e \frac{2S}{dm}$ (mH/km)
S = Distance between Cable Centres,
dm = Mean Diameter of Sheath

9) Short Circuit Rating:

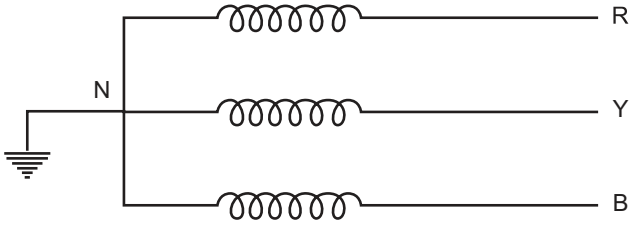
$$I^2 = \frac{K^2 S^2}{T} \log_e \left(\frac{\theta_1 + \beta}{\theta_0 + \beta} \right)$$

where I = Short circuit (R.M.S over duration) in Amps.
T = Duration of short circuit in second
K = Constant – 226 for Copper, 148 for Aluminium, 78 for Steel
S = Area of Conductor in mm2
θ_1 = Final Temperature of Conductor or Armour
θ_0 = Initial Temperature of Conductor or Armour
β = Reciprocal of the temperature coefficient of resistance of the conductor per ° C at 0° C (228 for Aluminium, 202 for Steel, & 234.5 for Copper)

* Source BICC handbook

EARTHED SYSTEM:

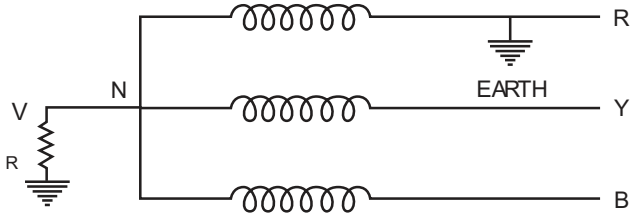
In the initial years, the generators and transformers were having capacities of few MVA and hence fault current was also less. The star point or neutral point was solidly grounded and this is called earthed system.



In this system if an earth fault occurs on any of the phases, the voltages of other two healthy phases with respect to the earth remain the same.

UNEARTHED SYSTEM:

Today generators of 500 MVA capacity are incommercial use. More over several mega power stations are connected to grid. Due to this, the fault level has increased tremendously. In case of an earth fault, a heavy current flows in to the fault and this may damage the costly generators and power transformers.



In this case if an earth fault occurs on R phase, the voltage of the faulty phase with respect to the earth (R) appears across the current limiting resistance or reactance in the earth circuit of the star point and as a result the voltage of the star point which was at earth potential under normal conditions rises to VR. Due to this the voltages of other two healthy phases (B and Y) with respect to the earth rises by 1.7 times (Vector sum of VR and VB). If the insulation of these phases are not designed for these increased voltages they may develop earth fault. This is called Unearthed System.

* source BICC handbook

* Source BICC handbook

POWER

OIL & PETROLEUM

EPC CONTRACTORS

CONSTRUCTION

IT PARKS

INFRASTRUCTURE

STEEL METAL & NON METAL

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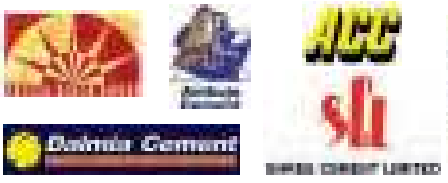

OTHERS

Notes

POLYCAB

Connection Zindagi Ka

Regional & Branch Offices:

EAST

BHUBANESWAR : A-167, Unit No. 102, First Floor, The Metropolis, Near Sparsh Hospital, Saheed Nagar, Bhubaneswar - 751007, Odisha. Tel. 0674 2549960

GUWAHATI : 4th Floor, Mayur Garden, Near ABC Bus Stop, G.S. Road, Guwahati - 781005, Assam, India.

KOLKATA : Unit No. 1108, 11th Floor, Godrej Genesis, Plot-XI, Block EP & GP Salt Lake, Sector - V, Kolkata - 700091.

PATNA : L-302, 303, Dumraon Palace, 3rd Floor, Fraser Road, Near Dakbangla Crossing, Patna - 800001.

RANCHI : Panchwati Tower Unit No. 3, Gr. Floor Harmu Road, Ranchi - 834001. Tel. 0651 2284040

NORTH

CHANDIGARH : S.C.O. 10-11-12, 1st Floor, Sec 17 B, Chandigarh - 160017. Tel. 0172 5001548, 49

LUCKNOW : Shalimar Square, Office No - 09, 126/31, B. N. Road, Lalbagh, Hazratganj, Lucknow - 226001. Tel. 0522 4022324

NOIDA : B9, 1st Floor Sector - 3, Near Bajaj Bhawan, Noida - 201301. Tel. 0120 4848550

DEHRADUN : 57 GDG Tower Adjoining Hotel Calista Patel Nagar Dehradun, Uttrakhand - 248001 Tel. 0135 2728758

JAIPUR : 501 & 502, 5th Floor, K.J City Tower, Plot No. E-2, Ashok Marg, Near Ahinsha Circle, C-Scheme, Jaipur, Rajasthan - 302001. Tel. 0141 2216097

WEST

AHMEDABAD : 102-1st Floor, Hrishikesh, Nr. IDBI Bank Cross Road, Gulbai Tekra, Ahmedabad - 380006. Tel. 079 26301655

INDORE : B-12, New Siyaganj, Patthar Godam Road, Indore - 452003. Tel. 0731 4033357

WEST

PUNE : Off No. 36, Sangam Project Phase 2, Near RTO Pune, Near Sangam Bridge, Pune - 411001.
Tel. 020 26058277

RAIPUR : 506, 5th Floor, Wallfort Ozone, Near Fafadih Chowk, Raipur - 492001, Tel. 0771 2582925, 4221686

NAGPUR : Shree Ganesh Enclave, Plot No. 12, 1st Floor, Near ST Stand, Ganeshpeth, Nagpur - 440018

SOUTH

KOCHI : 34/138 C, NH By-Pass Road, Edappally, Kochi - 682024. Tel. 0484 2803285

BENGALURU : B-78, No. 18, 4th Main Road, KSSIDC Industrial Estate, 6th Block, Rajajinagar, Bangalore - 560010.
Tel. 080 23102172 / 8354

HUBLI : Shop No. 99 to 119, 4th floor, Satellite Complex, Koppikar Road, Hubli - 580020, Tel. 0836 4259866

COIMBATORE : Kaanchan, Gr. Floor, No. 9, North Huzur Road, Coimbatore - 641018. Tel. 0422 2305339

CHENNAI : Gee Gee Universal, 8th Floor, No. 2, Mc Nichols Road, 3rd Lane, Near Metha Hospital, Chetpet, Chennai - 600 031.
Tel. 044 42817272

SECUNDERABAD : 208-209, 2nd Floor Bhuvana Towers, S. D. Road, Secunderabad - 500003, Tel. 040 66326228

VIJAYAWADA : Plot No. 77, House No. 40-5/7-6, 3rd Cross, Municipal Employees Colony, Vijayawada - 520010.
Tel. 0866 6601666

VISAKHAPATNAM : 3rd Floor, Krishna Enclave, Seethammapeta Main Road, Visakhapatnam - 530016.

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HT XLPE Cable / Jan / 2020