EXTRA-HIGH VOLTAGE CABLES

TORRENT GROUP

The Torrent Group, founded by the late Shri U. N. Mehta in 1959 and currently led by Mr. Samir Mehta, is a driving force dedicated to transforming life.

Six decades ago, Shri U.N. Mehta embarked on a journey called Torrent for a simple cause and a unique sense of purpose: 'Happiness for All'. A medical representative with an exemplary vision, he ventured out independently by making niche marketing his core competency. And the rest, as they say, is history.

Today, the Torrent Group spreads care, hope, and happiness, empowers people, and lights up their lives.

Torrent Pharma, the flagship company of Torrent Group, is a leader in niche therapeutic segments, including cardiovascular, central nervous system and women's healthcare. With a presence in over 50 countries, Torrent Pharma holds the largest market share among Indian companies in Brazil and Germany.

Torrent Power is a leading brand in the Indian power sector, specializing in power generation, transmission, and distribution. The company has a generation capacity of approximately 5,000 MW, which includes both thermal and renewable energy sources. With an extensive network for transmission and distribution, Torrent Power operates efficiently across various regions. It serves over 4.5 million customers in its distribution areas, which include Gujarat, Maharashtra, and Uttar Pradesh.

Torrent Group is committed to transforming lives by meeting the essential needs of the community through its City Gas Distribution business. Operating in 17 geographical areas across 34 districts, Torrent Gas aims to promote socio-economic development by ensuring the widespread availability of natural gas. This initiative helps reduce pollution and offers substantial cost savings for consumers.

Torrent Electricals Limited embodies the Group's spirit of innovation. With over 3 decades of experience, we are a leading manufacturer of power cables and wires, catering to a diverse clientele across the private and public sectors. We offer a comprehensive range of wires and cables, from low-tension (LT) to extra-high voltage (EHV), constantly expanding our portfolio to include cutting-edge solutions like E-beam and specialty cables. Our 82-acre manufacturing facility is strategically located at Nadiad NH-8 Gujarat and is equipped with the latest technology.

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TORRENT ELECTRICALS LIMITED

With over 30 years of industry leadership, Torrent Electricals has been a trusted partner to private and public sectors, delivering a comprehensive range of high-performance cables since its establishment in 1989. Renowned for elevating customer expectations and setting new benchmarks in quality, Torrent Electricals continues to innovate and excel in the power cable industry.

Backed by Torrent Power's unparalleled expertise in transmission and distribution, Torrent Electricals ensures consistent and exceptional experiences for its clients. As a proud member of the Torrent Group, we uphold core values of excellence, innovation, and a commitment to transforming lives.

As the first cable manufacturer in India to achieve ISO 9001:2000 certification, Torrent Electricals has demonstrated an unwavering dedication to quality and adaptability, establishing itself as a symbol of trust and reliability. Our products consistently exceed customer expectations, solidifying our reputation as an industry leader.

Specializing in Extra-High-Voltage (EHV), High-Tension (HT) XLPE, and Low-Tension (LT) XLPE/PVC Power Cables, Control Cables, Housing Wires, and Flexible Multicore Cables, Torrent Electricals maintains rigorous testing protocols, including Routine, Type, Acceptance, and Special Tests, to guarantee unmatched safety and reliability.

Our products, designed with precision and robust construction, deliver exceptional performance with minimal defects and seamlessly function across diverse geographical conditions.

As we explore new opportunities beyond the power cable industry, we are excited about our strategic expansion into the Business-to-Consumer (B2C) segment. This move not only allows us to diversify our offerings but also reinforces our commitment to delivering reliable, safe, and innovative solutions across various fields. We aim to enhance the quality of life for our customers by providing products and services that prioritize their safety and satisfaction while identifying and embracing emerging trends in technology and design.

At Torrent Electricals, we believe that our growth is rooted in our ability to listen to our customers and adapt to their evolving preferences, ensuring that we remain at the forefront of delivering quality and value in every interaction.

MANUFACTURING
UNIT SPREAD OVER 82 ACRES

APPROVALS AND CERTIFICATIONS

TÜVNORD

Certificate

Management system as per

ISO 9001:2015

The Certification Body TÜV NORD CERT GmbH, hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

TORRENT ELECTRICALS PRIVATE LIMITED
Yoginagar, Mission Road,
Nadiad – 387 002,
Gujarat,
India

operates a management system in accordance with the requirements of ISO 9001 : 2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope

Design, Development, Manufacture and Supply of Cross Linked Polyethylene Insulated PVC / Thermoplastic Sheathed Cables for Working Voltages up to to and Including 132 KV, PVC Insulated Cables for Working Voltages up to to and Including 11 KV and Manufacture of PVC Compounds.

Certificate Registration No. **44 100 114097**
Audit Report No. **2.5-5019/2011**
Valid from **12.06.2024**
Valid until **11.06.2027**
Initial certification **11.01.1997**

Visit our database to verify the validity of this certificate.

Mumbai, **27.05.2024**
Certification Body at TÜV NORD CERT GmbH

TÜV NORD CERT GmbH
Am TÜV 1, 45307,
Essen
www.tuev-nord-cert.com

TUV INDIA PVT. LTD.
801, Raheja Plaza 1, L.B.S Marg,
Ghatkopar (W) Mumbai – 400 086,
India
www.tuv-nord.com/in

TÜVNORD

Certificate

Management system as per

ISO 14001:2015

The Certification Body TÜV NORD CERT GmbH, hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

TORRENT ELECTRICALS PRIVATE LIMITED
Yoginagar, Mission Road,
Nadiad – 387 002,
Gujarat,
India

operates a management system in accordance with the requirements of ISO 14001 : 2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope

Design, Development and Manufacture of Cross Linked Polyethylene Insulated PVC / Thermoplastic Sheathed Cables for Working Voltages up to to and Including 132 KV, PVC Insulated Cables for Working Voltages up to to and Including 11 KV and Manufacture of PVC Compounds.

Certificate Registration No. **44 104 15390653**
Audit Report No. **2.5-5019/2011**
Valid from **12.06.2024**
Valid until **11.06.2027**
Initial certification **06.07.2015**

Visit our database to verify the validity of this certificate.

Mumbai, **27.05.2024**
Certification Body at TÜV NORD CERT GmbH

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Ghatkopar (W) Mumbai – 400 086,
India
www.tuv-nord.com/in

TÜVNORD

Certificate

Management system as per

ISO 45001:2018

The Certification Body TÜV NORD CERT GmbH, hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

TORRENT ELECTRICALS PRIVATE LIMITED
Yoginagar, Mission Road,
Nadiad – 387 002,
Gujarat,
India

operates a management system in accordance with the requirements of ISO 45001 : 2018 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope

Design, Development and Manufacture of Cross Linked Polyethylene Insulated PVC / Thermoplastic Sheathed Cables for Working Voltages up to to and Including 132 KV, PVC Insulated Cables for Working Voltages up to to and Including 11 KV and Manufacture of PVC Compounds.

Certificate Registration No. **44 126 15390653**
Audit Report No. **2.5-5019/2011**
Valid from **12.06.2024**
Valid until **11.06.2027**
Initial certification **06.07.2015 (BS OHSAS 18001)**

Visit our database to verify the validity of this certificate.

Mumbai, **27.05.2024**
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For any other communication

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BUREAU OF INDIAN STANDARDS

Attachment to Licence No. CM/L- 3843570

CM/L-	Name of the Licensee with the Factory Address	Name of the Product	Indian Standard No.
3843570	TCL Cables Private Limited, YOGINAGAR,MISSION ROAD, NADIAD 3827002. DIST KHEDA., Indl. NADIAD, 387002,	Cross-linked polyethylene insulated thermoplastic sheathed cables: Part 3 For working voltages from 66 kV upto and including 220 kV	IS 7098 : PART 3:1993

Endorsement No. 13 **Dated 08-04-2024**

Consequent to the change in the firm, the name of licensee in the schedule of the licence has been changed to

Torrent Electricals Private Limited with effect from **08-04-2024**

Other terms and conditions of licence remain the same.

Name Rahul Pushkar

Designation Sc.-C/Dy. Director

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002. ,9 Bahadur Shah Zafar Marg, ,DELHI,110002

Contact No: +91 11 23230131, 23233375, 23239402 **Fax:** +91 11 23234062, 232 **Email:** info@bis.gov.in

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EHV CABLES

ALUMINIUM
CORRUGATED SHEATH
66 kV

ALUMINIUM
CORRUGATED SHEATH
110 kV

ALUMINIUM
CORRUGATED SHEATH
132 kV

COPPER WIRE SCREEN
POLY-AL-POLY SHEATH
66 kV

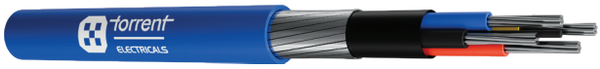
COPPER WIRE SCREEN
POLY-AL-POLY SHEATH
110 kV

COPPER WIRE SCREEN
POLY-AL-POLY SHEATH
132 kV

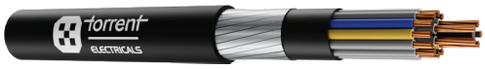
OTHER PRODUCT RANGE

HV CABLES,
LV POWER CABLES,
CONTROL CABLES,
INDUSTRIAL FLEXIBLE
AND
INSTRUMENTATION
CABLES

Copper Power Cables

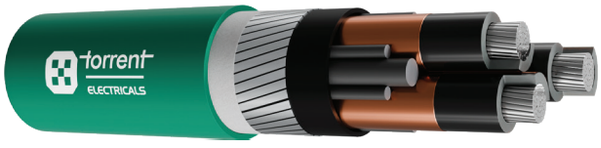


Aluminium Power Cables



Copper Control Cable

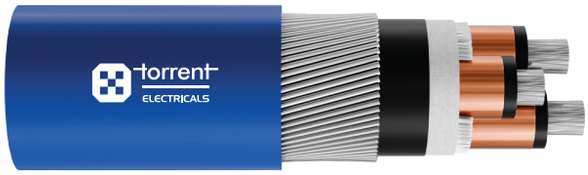
Aluminium Power Cables For Solar



3C Medium Voltage Aluminium Power Cables

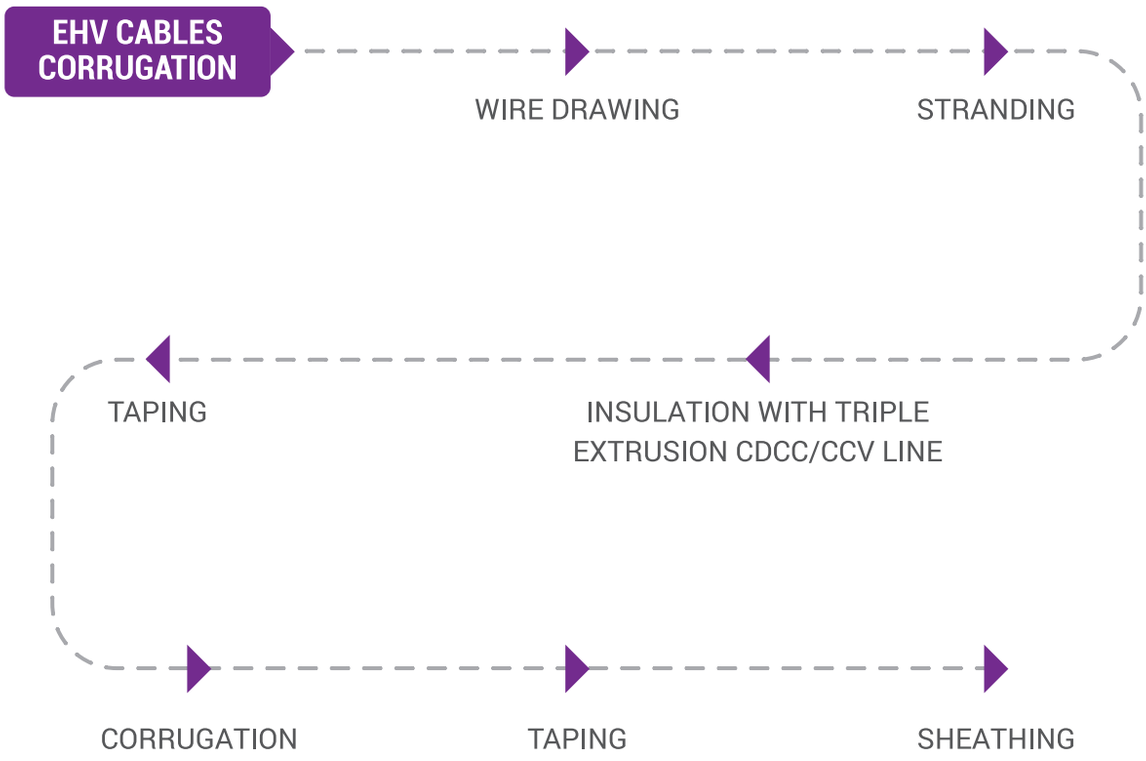
3C Medium Voltage Aluminium Power Cables

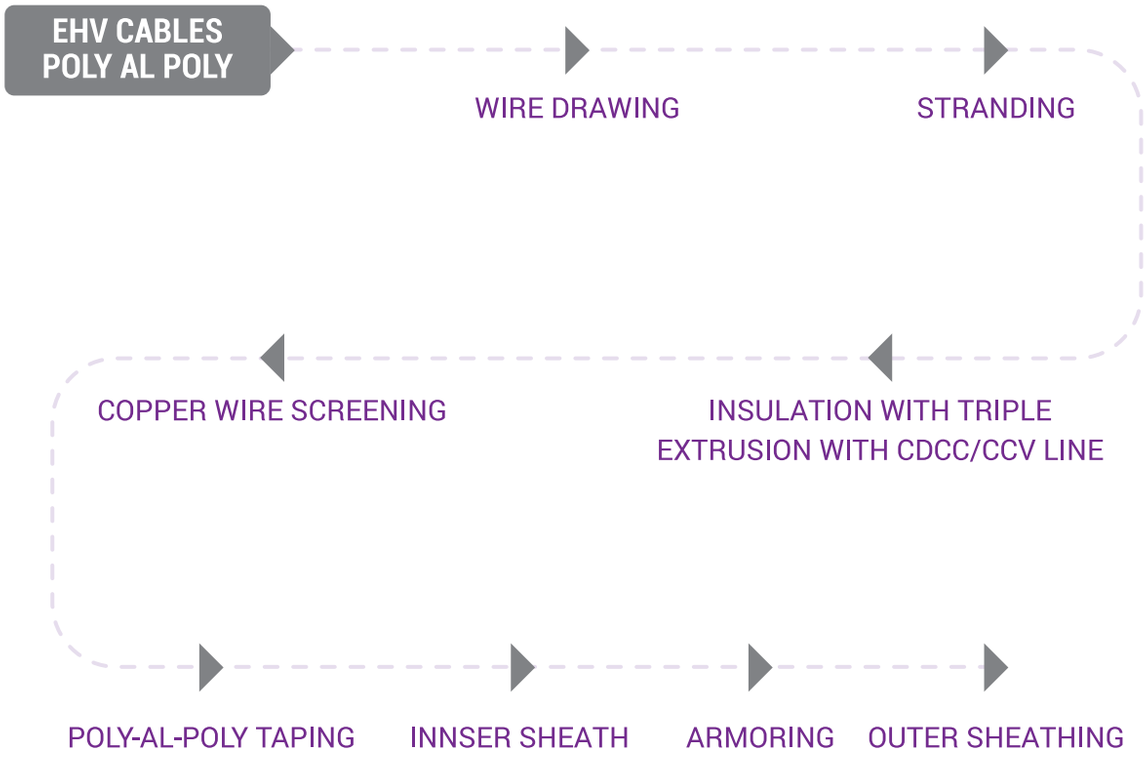
Low Voltage Aluminium Power Cables



3C Medium Voltage Power Cables With Wire Armoured

MANUFACTURING PROCESS





TECHNICAL SPECIFICATIONS

The XLPE Cable has Aluminium or Copper conductor, insulated with super clean cross-linked polyethylene and then metallic screen with copper wires or corrugated Aluminium sheath and covered by PVC or PE.

1. CONDUCTOR

The conductor is made of annealed copper (Cu) or hard-drawn aluminium (Al). The wires are stranded and arranged in compacted circular shape, where multiple individual wires are twisted together and compressed to form tight, uniform bundle. The conductor has a circular shape and is ideal for high current carrying applications.

Material:

Annealed Copper (Cu) or Hard-Drawn Aluminium (Al)

Stranding and Compaction:

Stranding: Multiple individual wires twisted together

Compaction: Individual wires compressed to form a tight, uniform bundle

Physical Characteristics:

Circular shape

2. CORE EXTRUSION (TRIPLE EXTRUSION)

The conductor screen, insulation and insulation screen are manufactured simultaneously in a triple extrusion process using a single cross-head with a CCV line and dry cure dry cool crosslinking technology. This process ensures a proper bond between the semi-conductive layers and insulation.

Advantages:

Better bonding between the semi-conductive layers and insulation

- This will avoid possibility of material getting weak over long time
- Improved efficiency and reduced overall production costs

2A. CONDUCTOR SCREEN

The conductor screen is made of a semi-conducting compound that prevents electrical discharge and pressure concentration between the conductor and insulation. This helps in electrical discharge prevention, eliminating the risk of discharge when there's a potential difference between materials and smooth interface, reducing stress concentrations developed due to defects or irregularities.

Additionally, a layer of semi-conducting tapes can be applied as per requirement for extra protection, improving the conductor's performance and reliability. This design ensures ideal performance, durability and reliability of the conductor.

The use of a conductor screen with one or two additional semi-conducting layers provides reliable solution for preventing electrical discharge and stress concentration at the interface between the conductor and insulation. This design helps to ensure improved performance, durability and reliability of the conductor.

2B. INSULATION

The insulation material used is cross-linked polyethylene (XLPE), applied over a conductor screen in controlled conditions. A cross-linking process using dry nitrogen gas, commonly known as curing, is done to protect the insulation's electrical properties from degradation. This ensures the reliable performance of the conductor and overall electrical system over long duration of time.

2C. INSULATION SCREEN

The insulation screen is created by extruding a semi-conductive compound concentrically over the insulation to prevent ionization on the dielectric surface. The extruded compound is a thermoset material that is bonded to the insulation. A semi-conductive non-woven water-swellable tape is then applied over the extruded layer.

3. METALLIC SCREEN

Provides additional protection for the cable against environmental factors such as moisture and electromagnetic interference (EMI).

The metallic screen consists of either:

- Corrugated aluminum sheath
- Copper wire screen

3A. CORRUGATED ALUMINIUM SHEATH

The corrugated aluminium sheath of a cable serves two purposes: it acts as a metallic screen to shield against high earth fault current and act as a radial moisture barrier to prevent water entry. This sheath provides mechanical protection, hence additional armor is not required, which also makes it cost-effective. Additionally, corrosion protection is applied to ensure long-term reliability and maintain the technical properties of the cable.

3B. COPPER WIRE SCREEN

A copper wire screen is required for additional protection. It is applied directly over the insulation screening layer. This reduces earth fault current.

To further improve the wire screen, an additional layer or layers of an appropriate separator tape can be applied helically over the copper wire screen as per technical requirement.

3C. POLY-AL LAMINATE SHEATH

The Poly-Al laminate sheath is another type of moisture barrier, in addition to lead sheath and corrugated aluminium sheath. The lamination process involves bonding the Poly-Al material with an overlying PE (polyethylene) sheath, forming a composite sheath that provides radial water protection.

Since the thickness of the aluminium tape used in this type of sheath is low, additional copper wire screening is used to make sure that the cable can carry earth fault current safely. This additional screening provides an extra layer of protection against electrical faults.

3D. LONGITUDINAL WATER BARRIER

Water swellable tapes, also known as water-blocking tapes or water-tight tapes, are used in cables to prevent longitudinal water penetration along the cable, mostly between the core and the metallic sheath. The main purpose of such an arrangement is to ensure that water does not seep into the cable, causing damage or affecting its electrical performance.

Longitudinal water tightness is achieved along the conductor by using water-tight conductors. These are designed to prevent moisture from entering the conductor. This is important in applications where the cable is exposed to harsh environmental conditions, such as underwater or in areas with high humidity.

4. OUTER SHEATH

The metallic sheath of a cable is covered with a thermoplastic compound, such as PVC or PE, to protect it from corrosion. This thermoplastic layer provides a barrier between the metal and the surrounding environment, preventing corrosion that could damage the cable. A conductive layer is also applied over the outer sheath to facilitate voltage testing. This test is important to ensure the physical properties of the cable, as it allows for the detection of any defects or weaknesses in the outer sheath. By applying a voltage to the conductive layer and measuring the response, technicians can identify any damage to the outer sheath, allowing for immediate maintenance/replacement if necessary.

CABLE CONSTRUCTION

EHV Cable - Wire Armour

1. Aluminium Conductor
2. Semiconducting Tape
3. Conductor Screen
4. XLPE Insulation
5. Insulation Screen
6. Semiconducting Water Swellable Tapes
7. Lapped Copper Wire Metallic Screening
8. Semiconducting Water Swellable Tape
9. Poly-Al-Poly Tape
10. Extruded HDPE Inner Sheath
11. Aluminum Round Wire
12. Plain Water Swellable Tape
13. Outer Sheath PVC (ST-2, FR, FRLS)/HDPE
14. Graphite Coating (Optional)

EHV Cable - Al. Corrugated

1. Aluminum Conductor
2. Semiconducting Tape
3. Conductor Screen
4. XLPE Insulation
5. Insulation Screen (Semiconducting Compound)
6. Plain Water Swellable Tape and Copper Woven Tape
7. Aluminum Corrugation
8. Anti Corrosive Bitumen Tape
9. Outer Sheath PVC (ST-2, FR, FRLS)/HDPE

SPECIAL FEATURES OF EHV XLPE MANUFACTURING LINE

Highly sophisticated Dry Cure Dry Cool (DCDC) Triple Extrusion process.

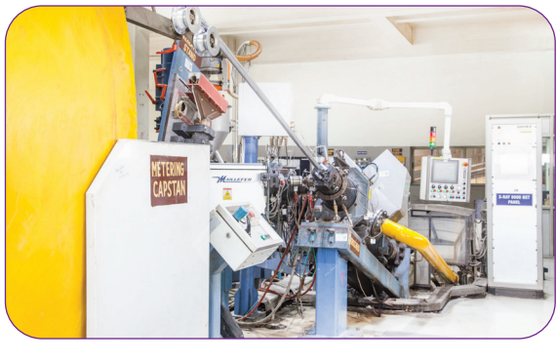
Unique CCV Line equipped with EHT system for perfect concentricity.

Computerized vulcanizing & cooling systems as well as extruder heating control system.

In-line metal detectors for Semicon & XLPE materials which ensure removal of ferrous & non-ferrous metallic impurities from compound before extrusion.

In-line fine dust separator for XLPE insulation to have homogenous & extra clean insulation.

Separate pressurized rooms for Semicon screening & XLPE insulation compound to avoid contamination.



ALUMINUM CORRUGATED SHEATH
66 kV

CONSTRUCTIONAL FEATURES:
INSULATION THICKNESS: 11.0 MM (NOMINAL)

Particular	Details
Conductor	Aluminium/Copper Stranded Compacted circular conductor or Segmental Stranded Milliken conductor (Class-2)
Separator tape	Semiconducting/semiconducting water swellable tape
Conductor screen	Extruded semiconducting compound
Insulation	Extruded XLPE Insulation
Insulation screen (Non-metallic)	Extruded semiconducting compound
Separator tape (Non-metallic)	Semiconducting water swellable tape/ semiconducting Bulky water swellable tape
Additional tape (Optional)	Copper woven tape
Metallic sheath part	Aluminium corrugated sheath
Anti-corrosive layer	Wrapped Bitumen Tape
Optional Binder tape	Plain water swellable tape/Cotton textile tape
Outer sheath	Extruded High Density Polyethylene/PVC
Semiconductive layer	By Graphite coating/Extruded semiconduting coating
Core Size Range (sq.mm)	For Aluminium - From 1C X 300 To 1C X 2500 Sq.mm
	For Copper - From 1C X 300 To 1C X 630 Sq.mm
Type of Cable	HDPE = “A2XA2Y” OR “2XA2Y”, PVC = “A2XAY” OR “2XAY”
Rated Voltage Range	38/66 kV (72.5 kV)
Specification (IS Details which we comply)	IS: 7098 (PT-3) 1993, IEC 60228, IEC: 60840
Application	For external & burial application for Extra High Voltage Power Transmission Network system

DATA SHEET

Nominal C/S Area	Aluminium Corrugated Sheath	Outer sheath	Overall Diameter (Approx.)	Approx. Cable Weight		Capacitance Approx.
	Thickness	Thickness		Aluminium Conductor	Copper Conductor	
Sq.mm	mm	mm	mm	Kgs/m	Kgs/m	Micro F/Km
300	2.1	2.8	68.0	4.0	6.0	0.20
400	2.1	3.0	71.5	4.4	7.0	0.22
500	2.1	3.0	74.5	5.0	8.1	0.25
630	2.1	3.2	78.5	5.6	9.7	0.27
800	2.0	3.4	83.5	6.4	-	0.29
1000	2.0	3.4	87.5	7.3	-	0.32
1200	2.0	3.6	92.5	8.3	-	0.35
1400	2.0	3.6	99.0	8.8	-	0.35
1600	2.0	3.8	102.5	10.0	-	0.39
2000	2.0	4.0	108.5	11.5	-	0.42
2500	2.0	4.0	115.5	13.4	-	0.46

Nominal C/S Area	Trefoil SPB/CB		Flat SPB/CB		Trefoil SPB/CB		Flat SPB/CB	
	Aluminium Ground	Aluminium Air	Aluminium Ground	Aluminium Air	Copper Ground	Copper Air	Copper Ground	Copper Air
Sq.mm	Amp	Amp	Amp	Amp	Amp	Amp	Amp	Amp
300	345	510	365	570	442	667	470	770
400	395	600	420	690	500	760	535	900
500	445	690	480	805	561	870	605	1035
630	506	805	550	935	630	1000	685	1195
800	570	920	615	1080	690	1125	765	1300
1000	630	1030	690	1230	770	1260	845	1500
1200	698	1180	755	1385	841	1455	936	1700
1400	741	1305	812	1545	883	1570	988	1895
1600	784	1390	860	1650	921	1655	1035	2010
2000	8461	535	936	1845	974	1795	1102	2210
2500	9741	749	1129	2131	1196	2207	1404	2549

ALUMINUM CORRUGATED SHEATH
110 kV

CONSTRUCTIONAL FEATURES:
INSULATION THICKNESS: 16.0 MM (NOMINAL)

Particular	Details
Conductor	Aluminium/Copper Stranded Compacted circular conductor or Segmental Stranded Milliken conductor (Class-2)
Separator tape	Semiconducting/semiconducting water swellable tape
Conductor screen	Extruded semiconducting compound
Insulation	Extruded XLPE Insulation
Insulation screen (Non-metallic)	Extruded semiconducting compound
Separator tape (Non-metallic)	Semiconducting water swellable tape/ semiconducting bulky water swellable tape
Additional tape (Optional)	Copper woven tape
Metallic sheath part	Aluminium corrugated sheath
Anti-corrosive layer	Wrapped Bitumen Tape
Optional Binder tape	Plain water swellable tape/Cotton textile tape
Outer sheath	Extruded High Density Polyethylene/PVC
Semiconductive layer	By Graphite coating/Extruded semiconduting coating
Core Size Range (sq.mm)	For Aluminium - From 1C X 300 To 1C X 2500 Sq.mm
	For Copper - From 1C X 300 To 1C X 630 Sq.mm
Type of Cable	HDPE = “A2XA2Y” OR “2XA2Y”, PVC = “A2XAY” OR “2XAY”
Rated Voltage Range	64/110 kV (123 kV)
Specification (IS Details which we comply)	IS: 7098 (PT-3) 1993, IEC 60228, IEC: 60840
Application	For External & burial application for Extra High voltage Power Transmission Network system

DATA SHEET

Nominal C/S Area	Aluminium Corrugated Sheath	Outer sheath	Overall Diameter (Approx.)	Approx. Cable Weight		Capacitance Approx.
	Thickness	Thickness		Aluminium Conductor	Copper Conductor	
Sq.mm	mm	mm	mm	Kgs/m	Kgs/m	Micro F/Km
300	2.0	3.2	78.5	5.0	6.5	0.16
400	2.0	3.4	82.0	5.5	7.4	0.17
500	2.0	3.4	85.5	6.0	8.5	0.18
630	2.0	3.6	89.5	6.8	10.4	0.20
800	2.0	3.8	94.5	7.6	-	0.22
1000	2.0	3.8	98.5	8.6	-	0.23
1200	2.0	4.0	103.5	9.8	-	0.26
1400	2.0	4.0	109.5	10.4	-	0.28
1600	2.0	4.0	113.0	11.5	-	0.29
2000	2.0	4.0	118.5	13.2	-	0.32
2500	2.0	4.0	125.5	15.0	-	0.34

Nominal C/S Area	Trefoil SPB/CB		Flat SPB/CB		Trefoil SPB/CB		Flat SPB/CB	
	Aluminium Ground	Aluminium Air	Aluminium Ground	Aluminium Air	Copper Ground	Copper Air	Copper Ground	Copper Air
Sq.mm	Amp	Amp	Amp	Amp	Amp	Amp	Amp	Amp
300	347	505	366	555	442	665	470	745
400	394	605	418	675	499	765	532	865
500	447	700	475	785	561	875	603	995
630	513	810	546	910	641	1010	694	1155
800	575	925	618	1055	713	1140	779	1325
1000	641	1040	689	1200	779	1255	855	1490
1200	689	1170	746	1345	827	1425	912	1665
1400	732	1280	793	1480	869	1540	960	1810
1600	770	1355	836	1575	903	1615	1002	1915
2000	831	1505	907	1755	960	1760	1069	2100
2500	969	1725	1127	2074	1113	1885	1344	2360

ALUMINUM CORRUGATED SHEATH
132 kV

CONSTRUCTIONAL FEATURES:
INSULATION THICKNESS: 18.0 MM (NOMINAL)

Particular	Details
Conductor	Aluminium/Copper Stranded Compacted circular conductor or Segmental Stranded Milliken conductor (Class-2)
Separator tape	Semiconducting/semiconducting water swellable tape
Conductor screen	Extruded semiconducting compound
Insulation	Extruded XLPE Insulation
Insulation screen (Non-metallic)	Extruded semiconducting compound
Separator tape (Non-metallic)	Semiconducting water swellable tape/semi conducting bulky water swellable tape
Additional tape (Optional)	Copper woven tape
Metallic sheath part	Aluminium corrugated sheath
Anti-corrosive layer	Wrapped Bitumen Tape
Optional Binder tape	Plain water swellable tape/Cotton textile tape
Outer sheath	Extruded High Density Polyethylene/PVC
Semiconductive layer	By Graphite coating/Extruded semiconduting coating
Core Size Range (sq.mm)	For Aluminium - From 1C X 300 To 1C X 2500 Sq.mm (For 132 kV)
	For Copper - From 1C X 300 To 1C X 630 Sq.mm (For 132 kV)
Type of Cable	HDPE = “A2XA2Y” OR “2XA2Y”, PVC = “A2XAY” OR “2XAY”
Rated Voltage Range	76/132 kV (145 kV)
Specification (IS Details which we comply)	IS: 7098 (PT-3) 1993, IEC 60228, IEC: 60840
Application	For External & burial application for Extra High Voltage Power Transmission Network system

DATA SHEET

Nominal C/S Area	Aluminium Corrugated Sheath	Outer sheath	Overall Diameter (Approx.)	Approx. Weight		Capacitance Approx.
	Thickness	Thickness		Aluminium Conductor	Copper Conductor	
Sq.mm	mm	mm	mm	Kgs/m	Kgs/m	Micro F/Km
300	2.0	3.4	84.0	5.5	7.5	0.15
400	2.0	3.6	87.0	6.1	8.7	0.16
500	2.0	3.6	90.5	6.7	9.7	0.17
630	2.0	3.8	94.5	7.5	11.4	0.18
800	2.0	3.8	99.0	8.4	-	0.20
1000	2.0	4.0	103.5	9.4	-	0.21
1200	2.0	4.0	108.3	10.4	-	0.24
1400	2.0	4.0	114.0	11.0	-	0.26
1600	2.0	4.0	117.5	12.3	-	0.27
2000	2.0	4.0	123.0	13.8	-	0.28
2500	2.0	4.0	130.0	15.8	-	0.30

Nominal C/S Area	Trefoil SPB/CB		Flat SPB/CB		Trefoil SPB/CB		Flat SPB/CB	
	Aluminium Ground	Aluminium Air	Aluminium Ground	Aluminium Air	Copper Ground	Copper Air	Copper Ground	Copper Air
Sq.mm	Amp	Amp	Amp	Amp	Amp	Amp	Amp	Amp
300	-	-	-	-	445	665	485	730
400	394	594	420	655	495	755	530	840
500	447	690	470	765	555	865	600	975
630	508	795	535	900	630	1005	685	1140
800	570	920	610	1040	705	1140	775	1305
1000	636	1040	685	1190	785	1305	850	1490
1200	700	1160	740	1320	825	1425	900	1630
1400	732	1265	789	1450	865	1540	950	1775
1600	765	1345	831	1545	898	1615	988	1880
2000	827	1490	903	1730	955	1760	1055	2065
2500	967	1715	1124	2051	1110	1875	1340	2330

COPPER WIRE SCREEN
POLY-AL-POLY SHEATH 66 kV

CONSTRUCTIONAL FEATURES:
INSULATION THICKNESS: 11.0 MM (NOMINAL)

Particular	Details
Conductor	Aluminium/Copper Stranded Compacted circular conductor or Segmental Stranded Milliken conductor (Class-2)
Separator tape	Semiconducting/semiconducting water swellable tape
Conductor screen	Extruded semiconducting compound
Insulation	Extruded XLPE Insulation
Insulation screen (Non-metallic)	Extruded semiconducting compound
Separator tape (Non-metallic)	Semiconducting water swellable tape
Metallic screen part	Copper wire screend with Helically copper tape
Separator tape (Non-metallic)	Semiconducting water swellable tape
Radial water sealing	Poly-Al-Poly laminated tape
Inner sheath	Extruded High Density Polyethylene/PVC
Armour (For armoured cables)	Aluminium (Non-magnetic) round wire
Outer sheath	Extruded High Density Polyethylene/PVC
Semiconductive layer	By Graphite coating/Extruded semiconduting coating
Core Size Range (sq.mm)	For Aluminium - From 1C X 300 To 1C X 2500 Sq.mm
	For Copper - From 1C X 300 To 1C X 630 Sq.mm
Type of Cable	HDPE = “A2XCWa2Y” OR “2XCWa2Y”, PVC = “A2XCWaY” OR “2XCWaY”
Rated Voltage Range	38/66 kV (72.5 kV)
Specification (IS Details which we comply)	IS: 7098 (PT-3) 1993, IEC 60228, IEC: 60840
Application	For External & burial application for Extra High Voltage Power Transmission Network system

DATA SHEET

Nominal C/S Area	Outer sheath Min. Thickness	Overall Diameter (Approx.)	Approx. Weight		Capacitance Approx.
			Aluminium Conductor	Copper Conductor	
Sq.mm	mm	mm	Kgs/m	Kgs/m	Micro F/Km
300	2.36	64.5	5.5	7.3	0.19
400	2.52	68.0	5.9	8.3	0.21
500	2.52	72.5	6.7	9.5	0.23
630	2.68	76.5	7.3	11.0	0.25
800	2.84	82.0	8.3	-	0.29
1000	2.84	86.0	9.1	-	0.28
1200	3.00	92.5	10.5	-	0.31
1400	3.00	98.5	11.1	-	0.36
1600	3.00	102.0	12.4	-	0.38
2000	3.00	108.0	13.9	-	0.42
2500	3.00	115.0	15.7	-	0.46

Nominal C/S Area	Trefoil SPB/CB		Flat SPB/CB		Trefoil SPB/CB		Flat SPB/CB	
	Aluminium Ground	Aluminium Air	Aluminium Ground	Aluminium Air	Copper Ground	Copper Air	Copper Ground	Copper Air
Sq.mm	Amp	Amp	Amp	Amp	Amp	Amp	Amp	Amp
300	345	510	365	570	442	667	470	770
400	395	600	420	690	500	760	535	890
500	445	690	480	805	561	870	605	1035
630	506	805	550	935	630	1000	685	1195
800	570	920	615	1080	690	1125	765	1300
1000	630	1030	690	1230	770	1260	845	1500
1200	698	1180	755	1385	841	1455	936	1700
1400	741	1305	812	1545	883	1570	988	1895
1600	784	1390	860	1650	921	1655	1035	2010
2000	946	1665	1057	2070	1096	1940	1276	2510
2500	1120	1981	1212	2330	1356	2397	1355	2549

COPPER WIRE SCREEN
POLY-AL-POLY SHEATH 110 kV

CONSTRUCTIONAL FEATURES:
INSULATION THICKNESS: 16.0 MM (NOMINAL)

Particular	Details
Conductor	Aluminium/Copper Stranded Compacted circular conductor or Segmental Stranded Milliken conductor (Class-2)
Separator tape	Semiconducting/semiconducting water swellable tape
Conductor screen	Extruded semiconducting compound
Insulation	Extruded XLPE Insulation
Insulation screen (Non-metallic)	Extruded semiconducting compound
Separator tape (Non-metallic)	Semiconducting water swellable tape
Metallic screen part	Copper wire screend with Helically copper tape
Separator tape (Non-metallic)	Semiconducting water swellable tape
Radial water sealing	Poly-Al-Poly laminated tape
Inner sheath	Extruded High Density Polyethylene/PVC
Armour (For armoured cables)	Aluminium (Non-magnetic) round wire
Outer sheath	Extruded High Density Polyethylene/PVC
Semiconductive layer	By Graphite coating/Extruded semiconduting coating
Core Size Range (sq.mm)	For Aluminium - From 1C X 300 To 1C X 2500 Sq.mm
	For Copper - From 1C X 300 To 1C X 630 Sq.mm
Type of Cable	HDPE = “A2XCWa2Y” OR “2XCWa2Y”, PVC = “A2XCWaY” OR “2XCWaY”
Rated Voltage Range	64/110 kV (123 kV)
Specification (IS Details which we comply)	IS: 7098 (PT-3) 1993, IEC 60228, IEC: 60840
Application	For External & burial application for Extra High Voltage Power Transmission Network system

DATA SHEET

Nominal C/S Area	Outer sheath Min. Thickness	Overall Diameter (Approx.)	Approx. Weight		Capacitance Approx.
			Aluminium Conductor	Copper Conductor	
Sq.mm	mm	mm	Kgs/m	Kgs/m	Micro F/Km
300	2.68	76.5	6.6	8.5	0.15
400	2.84	80.0	7.3	9.5	0.16
500	2.84	83.5	7.9	10.5	0.17
630	3.00	89.5	9.0	12.0	0.19
800	3.00	94.0	10.0	-	0.21
1000	3.00	98.5	11.0	-	0.23
1200	3.00	103.0	12.0	-	0.24
1400	3.00	109.0	12.6	-	0.27
1600	3.00	112.3	13.9	-	0.28
2000	3.00	118.0	15.5	-	0.31
2500	3.00	125.0	17.5	-	0.33

Nominal C/S Area	Trefoil SPB/CB		Flat SPB/CB		Trefoil SPB/CB		Flat SPB/CB	
	Aluminium Ground	Aluminium Air	Aluminium Ground	Aluminium Air	Copper Ground	Copper Air	Copper Ground	Copper Air
Sq.mm	Amp	Amp	Amp	Amp	Amp	Amp	Amp	Amp
300	347	505	366	555	442	665	470	745
400	394	605	418	675	499	765	532	865
500	447	700	475	785	561	875	603	995
630	513	810	546	910	641	1010	694	1155
800	575	925	618	1055	713	1140	779	1325
1000	641	1040	689	1200	779	1255	855	1490
1200	689	1170	746	1345	827	1425	912	1665
1400	732	1280	793	1480	869	1540	960	1810
1600	770	1355	836	1575	903	1615	1002	1915
2000	946	1645	1057	2000	1096	1930	1276	2430
2500	1120	1953	1212	2252	1356	2205	1355	2549

COPPER WIRE SCREEN POLY-AL-POLY SHEATH 132 kV

CONSTRUCTIONAL FEATURES:
INSULATION THICKNESS: 18.0 MM (NOMINAL)

Particular	Details
Conductor	Aluminium/Copper Stranded Compacted circular conductor or Segmental Stranded Milliken conductor (Class-2)
Separator tape	Semiconducting/semiconducting water swellable tape
Conductor screen	Extruded semiconducting compound
Insulation	Extruded XLPE Insulation
Insulation screen (Non-metallic)	Extruded semiconducting compound
Separator tape (Non-metallic)	Semiconducting water swellable tape
Metallic screen part	Copper wire screend with Helically copper tape
Separator tape (Non-metallic)	Semiconducting water swellable tape
Radial water sealing	Poly-Al-Poly laminated tape
Inner sheath	Extruded High Density Polyethylene/PVC
Armour (For armoured cables)	Aluminium (Non-magnetic) round wire
Outer sheath	Extruded High Density Polyethylene/PVC
Semiconductive layer	By Graphite coating/Extruded semiconduting coating
Core Size Range (sq.mm)	For Aluminium - From 1C X 300 To 1C X 2500 Sq.mm
	For Copper - From 1C X 300 To 1C X 630 Sq.mm
Type of Cable	HDPE = “A2XCWa2Y” OR “2XCWa2Y”, PVC = “A2XCWaY” OR “2XCWaY”
Rated Voltage Range	76/132 kV (145 kV)
Specification (IS Details which we comply)	IS: 7098 (PT-3) 1993, IEC 60228, IEC: 60840
Application	For External & burial application for Extra High Voltage Power Transmission Network system.

DATA SHEET

Nominal C/S Area	Outer sheath Min. Thickness	Overall Diameter (Approx.)	Approx. Weight		Capacitance Approx.
			with Aluminium Conductor	with Copper Conductor	
Sq.mm	mm	mm	Kgs/m	Kgs/m	Micro F/Km
300	2.84	81.0	7.3	9.3	0.14
400	3.00	84.5	7.9	10.4	0.15
500	3.00	89.5	8.9	11.9	0.16
630	3.00	93.5	9.7	13.5	0.18
800	3.00	98.4	10.7	-	0.19
1000	3.00	102.5	11.6	-	0.21
1200	3.00	107.0	12.6	-	0.22
1400	3.00	113.0	13.3	-	0.25
1600	3.00	116.3	14.6	-	0.26
2000	3.00	122.0	16.2	-	0.28
2500	3.00	129.0	18.2	-	0.31

Nominal C/S Area	Trefoil SPB/CB		Flat SPB/CB		Trefoil SPB/CB		Flat SPB/CB	
	Aluminium Ground	Aluminium Air	Aluminium Ground	Aluminium Air	Copper Ground	Copper Air	Copper Ground	Copper Air
Sq.mm	Amp	Amp	Amp	Amp	Amp	Amp	Amp	Amp
300	-	-	-	-	445	665	485	730
400	394	594	420	655	495	755	530	840
500	447	690	470	765	555	865	600	975
630	508	795	535	900	630	1005	685	1140
800	570	920	610	1040	705	1140	775	1305
1000	636	1040	685	1190	785	1305	850	1490
1200	700	1160	740	1320	825	1425	900	1630
1400	732	1265	789	1450	865	1540	950	1775
1600	765	1345	831	1545	898	1615	988	1880
2000	827	1490	903	1730	955	1760	1055	2065
2500	967	1715	1124	2051	1110	1875	1340	2330

RATING FACTORS

DE-RATING FACTORS FOR VARIATION IN GROUND & AMBIENT AIR TEMPERATURE

TEMPERATURE °C	25	30	35	40	45	50
RATING FACTOR WHEN LAID IN GROUND	1.04	1	0.95	0.91	0.87	0.81
RATING FACTOR WHEN LAID IN AIR	1.16	1.11	1.05	1	0.94	0.88

DE-RATING FACTORS FOR VARIATION IN DEPTH OF LAYING

DEPTH OF LAYING cm.	90	100	120	150	180	200
RATING FACTOR	1.07	1.06	1.04	1.01	1	0.98

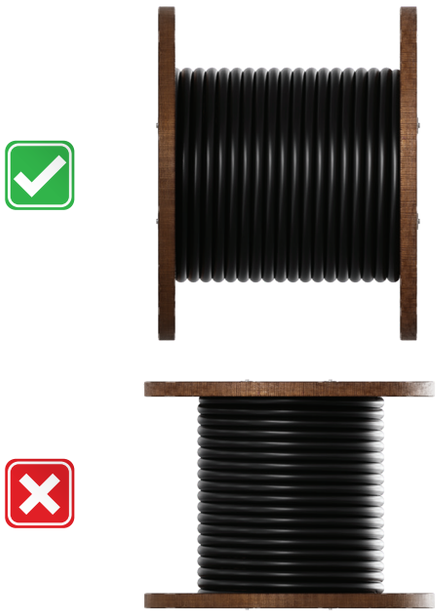
DE-RATING FACTORS FOR THERMAL RESISTIVITY OF SOIL

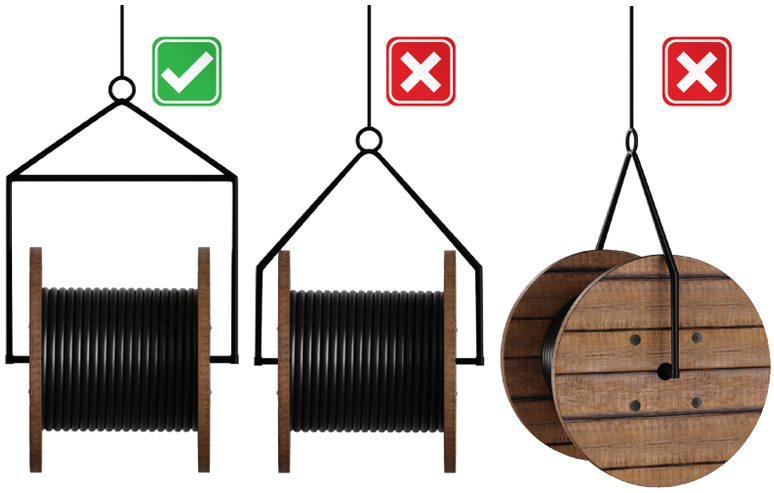
THERMAL RESISTIVITY	100	120	135	150	200	250
RATING FACTOR	1.14	1.05	1	0.96	0.84	0.75

GROUP RATING FACTORS FOR CABLES LAID TREFOIL IN GROUND IN HORIZONTAL FORMATION

	No. of groups (Circuits)		
Axial Distance between groups	**2**	**3**	**4**
150 mm	0.79	0.69	0.63
200 mm	0.81	0.71	0.66
400 mm	0.85	0.77	0.73
600 mm	0.88	0.81	0.78
800 mm	0.9	0.84	0.81
1000 mm	0.96	0.93	0.9

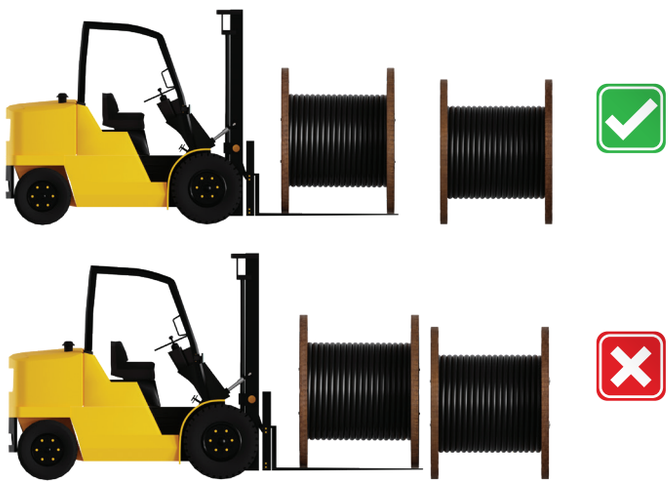
DRUM HANDLING





Cable must to pulled from top with help of screw jack

This is incorrect way of pulling the cable & will cause kinks & twist in cable. Should be avoided.



Do not use the forklift tynes to push cable drums sideways on a truck, tray, or direct on the ground as damage to the flanges can result in the drum being unacceptable to customers.

When storing cable drums for long periods, please take the following guidelines into consideration:

- The drums must always be stored with their flanges vertical
- Leave enough space between stored drums for air circulation
- The bolts should be tightened at regular intervals

TECHNICALS FOR EHV CABLES TERMINATION

SCREEN BONDING METHOD

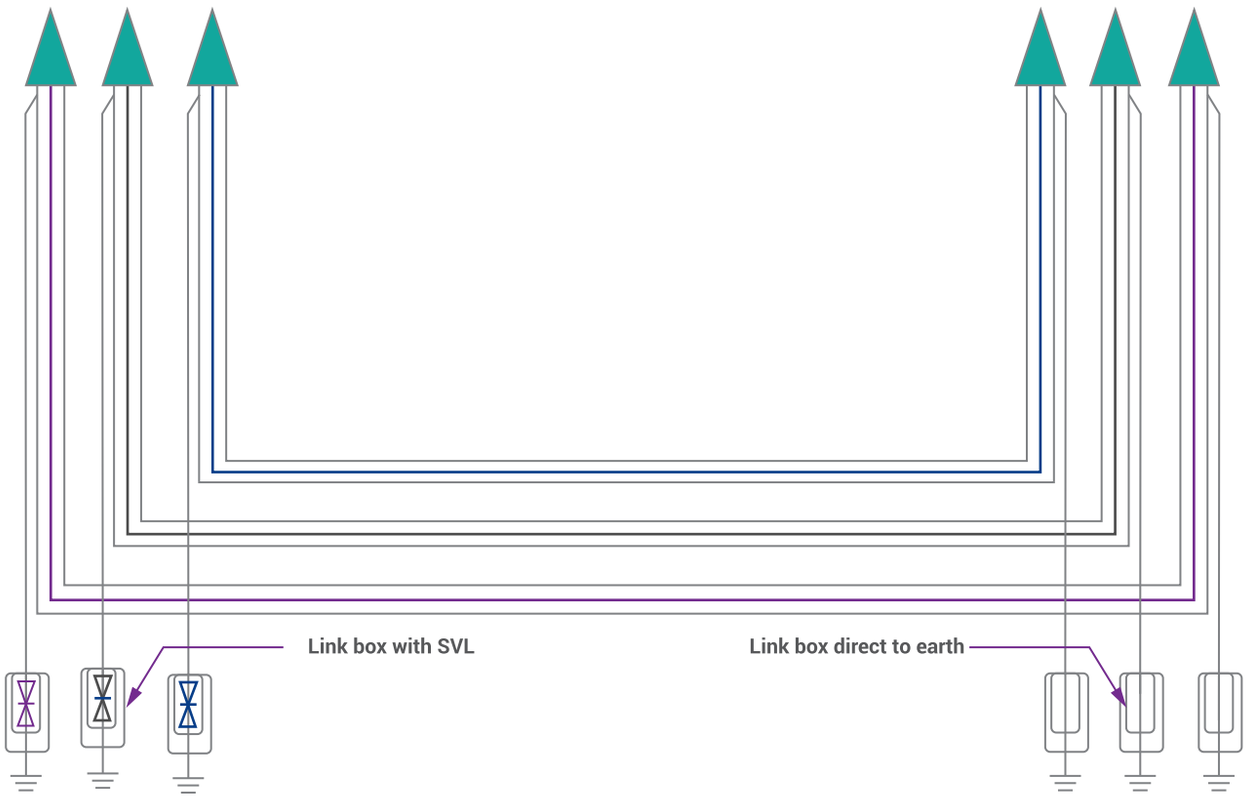
There are normally 3 types of Bonding for EHV Cables.

(1) Single Point Bonded System (2) Both End Bonded System (3) Cross Bonded System

SINGLE POINT BONDED SYSTEM

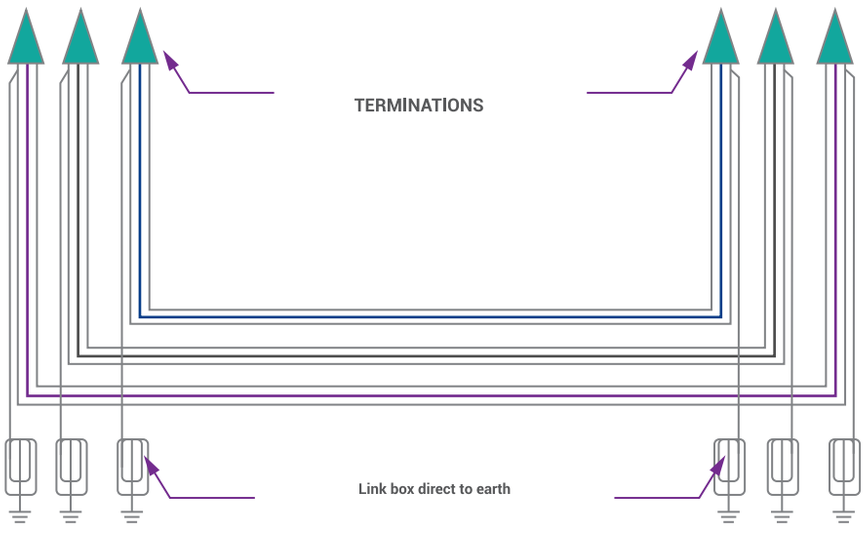
A system is single point bonded if the arrangements are such that the cable sheaths provide no path for the flow of circulating currents or external fault currents. In this connection system, the screens are connected to earth at one end and the other end is isolated from earth by SVLs voltage limiters. In these cases, there may be a need to install a bonding earthing cable to earth continuity for fault currents that normally would return through the screens. The induced voltage is proportional to the length of cable and hence the voltage limitation of this imposes a limitation on the maximum cable length which can be connected in this way.

This is the simplest form of special bonding. The sheaths of the three cable sections are connected and grounded at one point only along their length.



BOTH END BONDED SYSTEM

A system is both ends bonded if the arrangements are such that the cable sheaths provide path for circulating currents at normal conditions. This will cause losses in the screen, which reduce the cable current carrying capacity. These losses are smaller for cables in trefoil formation than in flat formation with separation.



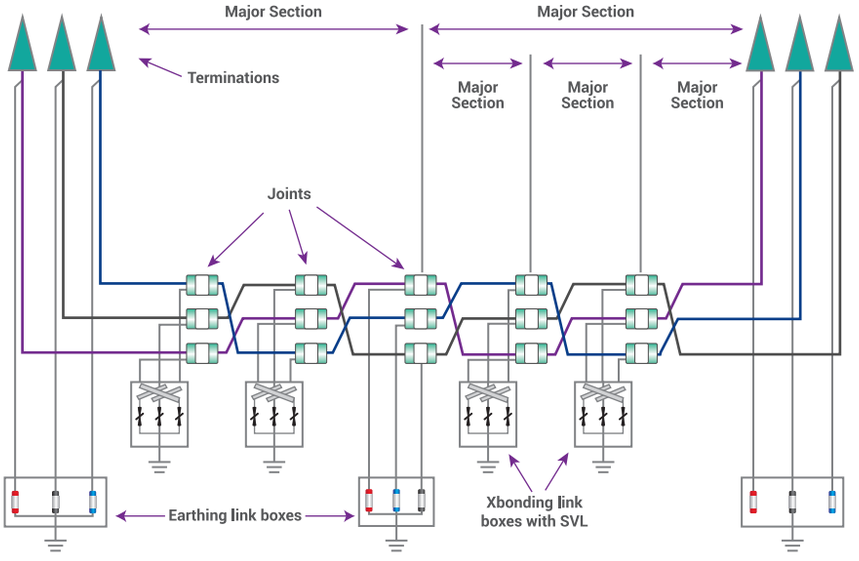
CROSS BONDED SYSTEM

In this connection system, the route is divided into major sections, each of which is divided into three subsections or minor sections.

Every three joints, the screens have to be connected directly to earth and in the two intermediate joints, the screens have to be crossed according to figure above and will be isolated from earth via SVLs.

The three screens connected in series are associated with conductors of different phases and when the cables are installed in a trefoil formation, their currents and consequently, the voltages of the screens have the same magnitude but with a phase shift of 120˚. The overall effect is that the resultant voltage and the current in the three screens are zero.

This connection system does not need an earthing connecting cable, as the screens are continuously connected and only need to be connected at the ends of each major section.



PREVENTING ENVIORNMENTAL HAZARDS

Disposal/Salvage Method for Cables and Cable Pieces.

After the installation of cables, any leftover cable or cable pieces must be disposed of in an environmentally proper manner to prevent harm to the environment, human health and safety. To ensure the proper disposal and salvage of cables and cable pieces, the following procedures may be followed.

METALS (ALUMINIUM, COPPER, STEEL)

1. Segregation: The metal components of the cable or cable piece, such as aluminum, copper and steel, must be separated from other materials for proper recycling.
2. Categorization: The separated metals should be sorted based on their type to ensure that they can be recycled in the right manner.
3. Using the material for recycling: The separated metals should be handed over to an approved agency involved in the recycling process.

XLPE/PVC MATERIAL

1. Separation of residual waste is required to avoid environment contamination.
2. Necessary arrangements are required to deliver this material to appropriate recycling agencies.
3. All regulatory guidelines are to be followed to avoid pollution.

BEST PRACTICES

1. Periodic inspection of cables is required to identify signs of damage/ deterioration.
2. Define SOP to handle damaged/waste cable.

INDUSTRIES & CUSTOMERS WE CATER TO

GOVERNMENT AND SEMI-GOVERNMENT COMPANIES

PRIVATE SECTOR

BRANCH OFFICES

MUMBAI

TORRENT ELECTRICALS LIMITED
The Ruby , 22nd Floor, Kasarwadi,29,
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KOLKATA

TORRENT ELECTRICALS LIMITED
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Kolkata - 700020.

BANGALORE

TORRENT ELECTRICALS LIMITED
No.15 & 16, 5th Floor, Vayudhdoot Chambers,
M. G. Road, Bangalore - 560001.

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TORRENT ELECTRICALS LIMITED
115/116, World Trade Centre, Babar Road,
Connaught Place, New Delhi - 110001.

CHENNAI

TORRENT ELECTRICALS LIMITED
5E, Century Plaza, 56/562, Anna Salai, Teynampet,
Chennai - 600018.

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TORRENT ELECTRICALS LIMITED
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