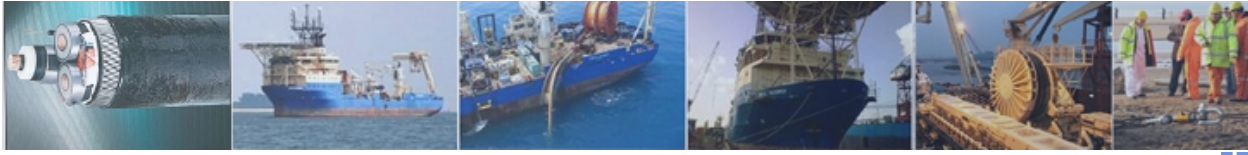




# **SUBMARINE POWER CABLE**





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3.6/6(7.2) kV ---Single Core  
(CU/XLPE/LC/AWA/PVC).....6

6/10 (12) kV---Single Core  
(CU/XLPE/LC/AWA/PVC).....7

8.7/15 (17.5) kV---Single Core  
(CU/XLPE/LC/AWA/PVC).....8

12/20 (24) kV---Single Core  
(CU/XLPE/LC/AWA/PVC).....9

18/30 (36) kV---Single Core  
(CU/XLPE/LC/AWA/PVC).....10

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SHORT CIRCUIT RATING..... 11

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Laying and installation of cables..... 13

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## Introduction:

XWA Cable is the earliest private enterprise in Henan(China) cable business. Our cables are manufactured using the most up-to-date technology. Modern production facilities are backed by a highly qualified work force and experienced engineers, who ensure that only cable of the highest quality leaves our factories.

- **Our customers will receive superior value**
- **Our shareholders will receive ever exceeding returns on their investments**
- **Our business partners will share our success**
- **Our employees will prosper**

Our product range includes general building wires, data and telecommunications cables, industrial rubber cables, overhead conductors together with power cables up to, and including, 35KV.

We constantly get updates and feedbacks on their stated / implied needs and problems. Based on this information we have devised new modalities to provide better service to our valued customers. Thus we not only provide Quality Products but also offer a host of related services before and after the sale.

Cables are manufactured strictly in accordance with the appropriate GB (China) Standard Specifications and to IEC, CE and UL standards and are approved by the relevant Classifications Institutions. Full traceability is maintained by strict adherence to quality policies compliant with ISO9001/2, whilst environmental policies will be maintained by compliance with ISO14001 in no time.

## Products:

Medium Voltage Power Cables up to 19/33(36) KV

Low Voltage Power Cables up to 600/1000V

Control Cables 600/1000V

Bare Conductors for Overhead Lines

Earthing Conductors

PVC or XLPE Insulated Conductors

Domestic Applications / Internal Wiring

LSF Cables & Wires

Lead Sheathed Cables

Enamelled Wires

Telephone communication & Instrumentation Cables

## Quality:

Quality has always been our top priority and to meet customer's expectation has been our prime objective; the very basis on which



we earned the confidence of our clientele. It is this concern and commitment rather than just sell of product has given us a distinct image and competitive advantage.

## Certificates:

**ISO9001:2008 CETIFIED BYRWTUV GERMANY**

**ISO 9001:2008 CETIFIED BY SGS**

**ISO 14001:2009**

**BASEC RANGE OF CERTIFICATES**

We at X W A Cables always aim for the best. While most of the Cable manufacturers in China, we stand out with ISO 9001 which recognizes our ability for Design & Development as well.

As a philosophy, our commitment to Customers does not end with a sale. We also offer a host of related services before and after the sale. These include,

- Application engineering service for selection of appropriate product best suiting the end use.
- An extensive range of cables single core wires flexibile cords bare & insulated conductors manufactured to stringent Quality standards going beyond international specifications.
- Design and Development of products tailored to meet specific requirements of the application.
- To help the customers understand the product intricacies and its performance levels.

## Product range

**voltage grade** : 3.6/6/7.2 kV to 18/30/36 kV (U<sub>o</sub>/U/U<sub>m</sub>) as per IEC-60502-2  
(equivalent 3.8/6.6/7.2 kV to 19/33/36 kV - (U<sub>o</sub>/U/U<sub>m</sub>)  
as per BS 6622)

**conductor** : copper or aluminium

**conductor size** : 25 to 1000 sq mm

**specification** : IEC 60502 part 2, BS 6622, or  
any other international  
specification covering  
above voltage range

- U<sub>o</sub> : nominal phase to earth voltage
- U : nominal phase to phase voltage
- U<sub>m</sub> : maximum phase to phase voltage

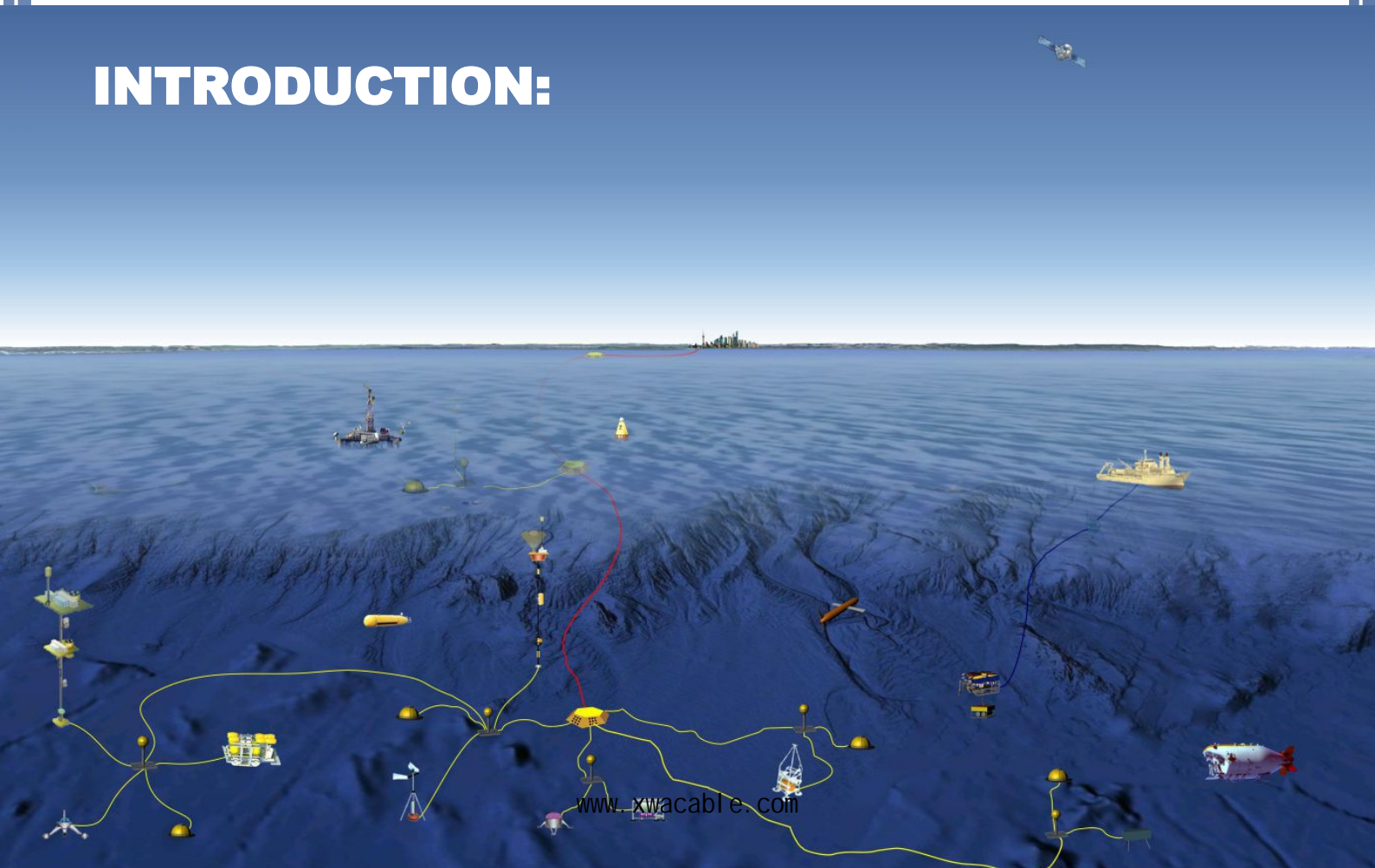


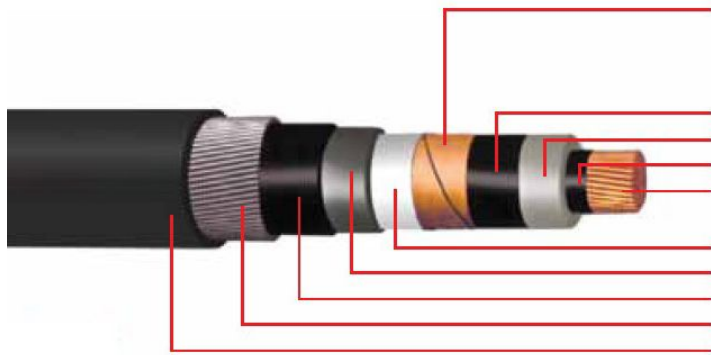
## Special features

XWA can also offer cables with different sheathing, screening, taping & armouring options as per customer's specific requirements .we can also offer cables suitable for superior fire performance characteristics as well as with low smoke & fume (LSF or LOSH/LOZH )properties. special features like longitudinal water sealing of conductors & cu screens, radial water sealing of cu screens as well as different colour of outer sheath can be provided on request.

The cable design in this catalogue conforms to IEC 60502 part 2 & in most cases to BS 6622. however if requested, we can separately offer guaranteed technical particulars for cables as per different international specifications or specific customer needs.

# INTRODUCTION:





**Metallic Copper Screen**

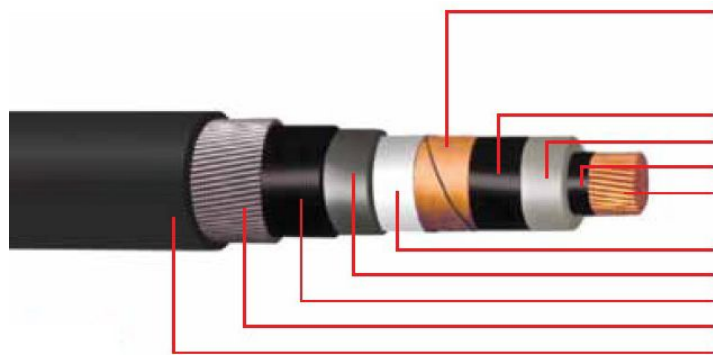
(Copper screen can be of Cu wires + open helix Cu tape or copper tape (The details given in below Table are for copper tape screened cables). For copper wire screened cables the details can be given on specific request).

- Insulation Screen (Semi-conductive)**
- XLPE Insulation**
- Conductor Screen (Semi-conductive)**
- Copper Conductor**

- Bedding**
- Lead Alloy E Sheath**
- Separation Sheath**
- Aluminium Wire Armour**
- Outer She**

**3.6/6(7.2) kV**  
**Single Core Copper Conductor**  
**XLPE Insulated**  
**Aluminium Wire Armoured**  
**To IEC 60502-2**  
**(Suitable for 3.8/6.6 kV**  
**Earthed System)**

Copper conductor			SINGLE CORE, CU/XLPE/LC/AWA/PVC ARMoured CABLES, 3.6/6 kV TO IEC 60502-2														
Sr. No.	Nominal Area of Conductor	mm <sup>2</sup>	25	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
<b>(A) Manufacturing Dimensions</b>																	
1.0	Conductor diameter (Approximate)	mm	5.9	6.9	8.1	9.7	11.4	12.9	14.3	16	18.4	20.6	23.3	26.3	30	34.2	38.2
2.0	Insulation thickness (Nominal)	mm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.8	3	3.2	3.2	3.2	3.2
3.0	Lead sheath thickness (Nominal)	mm	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2
4.0	Separation sheath thickness (Nominal)	mm	1	1	1	1	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.4	1.5	1.5	1.6
5.0	Armour wire diameter (Nominal)	mm	1.6	1.6	1.6	1.6	1.6	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5
6.0	Outer sheath thickness (Nominal)	mm	1.8	1.8	1.9	1.9	2	2.1	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.1
7.0	Cable overall diameter (Approximate)	mm	25.5	26.5	28	29.5	32	34.5	36	38	41	44	49	53	57.5	63	67.5
8.0	Cable weight (Approximate)	kg/km	1585	1820	2045	2365	2865	3320	3785	4300	5210	6165	7690	9205	11240	13755	16345
9.0	Standard drum length (±5% Tolerance)	m	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500	500	500	500
<b>(B) Electrical Parameters</b>																	
<b>(i) Conductor</b>																	
1.0	DC resistance of conductor at 20 °C (Maximum)	ohm/km	0.727	0.524	0.387	0.268	0.193	0.153	0.124	0.0991	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176
2.0	AC resistance of conductor at 90 °C (Approximate)	ohm/km	0.927	0.668	0.494	0.342	0.247	0.196	0.159	0.128	0.098	0.079	0.063	0.05	0.04	0.034	0.029
3.0	Reactance at 50 Hz (Approximate)	ohm/km	0.156	0.148	0.142	0.131	0.126	0.123	0.119	0.115	0.11	0.108	0.106	0.104	0.101	0.098	0.095
4.0	Impedance at 50 Hz (Approximate)	ohm/km	0.94	0.684	0.514	0.366	0.277	0.231	0.199	0.172	0.147	0.134	0.123	0.115	0.109	0.104	0.099
5.0	Voltage drop (Approximate for 3 phase system)	v/amp/km	1.628	1.185	0.89	0.634	0.48	0.4	0.345	0.298	0.255	0.232	0.213	0.199	0.189	0.18	0.171
6.0	Capacitance at 50 Hz (Approximate)	µF/km	0.26	0.29	0.32	0.37	0.42	0.46	0.5	0.54	0.59	0.61	0.64	0.67	0.75	0.86	0.94
7.0	Approximate charging current per phase at U <sub>0</sub> = 3.6 kV and f = 50 Hz	mA/m	0.29	0.33	0.36	0.42	0.48	0.52	0.57	0.61	0.67	0.69	0.72	0.76	0.85	0.97	1.06
8.0	Sustained current ratings (With both end bonding):-																
8.1	Laid direct, ground temp. = 20 °C & Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	137	164	193	234	278	315	349	391	446	495	551	593	646	693	731
8.2	Drawn into earthenware ducts, ground temp. = 20 °C and Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	131	155	183	223	265	301	334	376	430	478	534	578	632	682	721
8.3	Laid in trefoil formation in air, ambient temp. = 30 °C	A	162	196	234	291	353	406	460	524	611	692	788	873	975	1074	1156
9.0	Short circuit current rating of conductor for 1 second	kA	3.58	5.01	7.15	10.01	13.59	17.16	21.45	26.46	34.32	42.9	57.2	71.5	90.09	114.4	143
<b>(ii) Armour</b>																	
1.0	DC resistance at 20 °C (Approximate)	ohm/km	0.49	0.46	0.434	0.4	0.361	0.278	0.263	0.243	0.221	0.202	0.148	0.132	0.122	0.109	0.1
2.0	AC resistance at 80 °C (Approximate)	ohm/km	0.608	0.571	0.539	0.497	0.448	0.345	0.327	0.302	0.274	0.251	0.184	0.164	0.151	0.135	0.124
3.0	Short circuit current rating of armour for 1 second (Approximate)	kA	5.29	5.63	5.97	6.49	7.17	9.34	9.87	10.67	11.74	12.8	17.5	19.59	21.25	23.75	25.84



**Metallic Copper Screen**

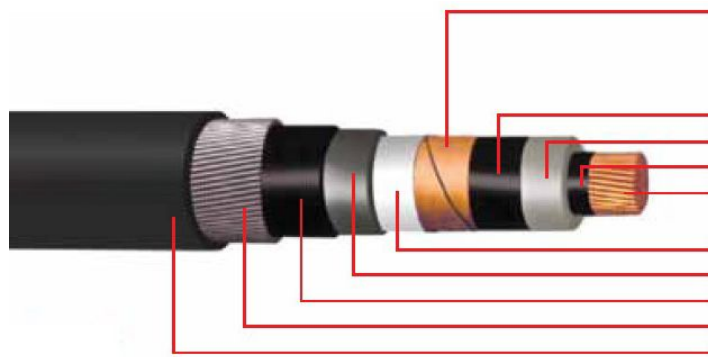
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- Insulation Screen (Semi-conductive)**
- XLPE Insulation**
- Conductor Screen (Semi-conductive)**
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- Bedding**
- Lead Alloy E Sheath**
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- Aluminium Wire Armour**
- Outer Sheath**

**6/10 (12) kV**  
**Single Core Copper Conductor**  
**XLPE Insulated**  
**Aluminium Wire Armoured**  
**To IEC 60502-2**  
**(Suitable for 6.35/11 kV**  
**Earthed System)**

Copper conductor			SINGLE CORE, CU/XLPE/LC/AWA/PVC ARMoured CABLES, 6/10 kV TO IEC 60502-2														
Sr.No.	Nominal Area of Conductor	mm <sup>2</sup>	25	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
(A)	Manufacturing Dimensions																
1	Conductor diameter (Approximate)	mm	5.9	6.9	8.1	9.7	11.4	12.9	14.3	16	18.4	20.6	23.3	26.3	30	34.2	38.2
2	Insulation thickness (Nominal)	mm	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
3	Lead sheath thickness (Nominal)	mm	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.8	1.9	2	2.1	2.2
4	Separation sheath thickness (Nominal)	mm	1	1	1	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6
5	Armour wire diameter (Nominal)	mm	1.6	1.6	1.6	1.6	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5
6	Outer sheath thickness (Nominal)	mm	1.8	1.9	1.9	2	2.1	2.1	2.2	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.1
7	Cable overall diameter (Approximate)	mm	27.5	29	30	32	35	36.5	38	40	42.5	46.5	50	54	58	63	68
8	Cable weight (Approximate)	kg/km	1845	2030	2325	2685	3190	3650	4045	4660	5440	6530	7835	9290	11315	13820	16425
9	Standard drum length (±5% Tolerance)	m	1000	1000	1000	1000	1000	1000	1000	500	500	500	500	500	500	500	500
(B)	Electrical Parameters																
(i)	Conductor																
1	DC resistance of conductor at 20°C(Maximum)	ohm/km	0.727	0.524	0.387	0.268	0.193	0.153	0.124	0.0991	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176
2	AC resistance of conductor at 90°C(Approximate)	ohm/km	0.927	0.668	0.494	0.342	0.247	0.196	0.159	0.127	0.098	0.079	0.062	0.05	0.04	0.034	0.029
3	Reactance at 50Hz(Approximate)	ohm/km	0.16	0.154	0.146	0.136	0.131	0.126	0.123	0.118	0.113	0.111	0.108	0.105	0.101	0.098	0.096
4	Impedance at 50Hz(Approximate)	ohm/km	0.941	0.686	0.515	0.368	0.28	0.233	0.201	0.173	0.15	0.136	0.125	0.116	0.109	0.104	0.1
5	Voltage drop (Approximate for 3 phase system)	v/amp/km	1.63	1.188	0.892	0.637	0.485	0.404	0.348	0.3	0.26	0.236	0.217	0.201	0.189	0.18	0.173
6	Capacitance at 50Hz(Approximate)	µF/km	0.21	0.23	0.25	0.29	0.32	0.35	0.38	0.42	0.47	0.51	0.57	0.63	0.71	0.81	0.89
7	Approximate charging current per phase at Uo=6kV and f=50Hz	mA/m	0.4	0.43	0.47	0.55	0.6	0.66	0.72	0.79	0.89	0.96	1.07	1.19	1.34	1.53	1.68
8	Sustained current ratings (With both end bonding):-																
8.1	Laid direct, ground temp. = 20 °C & Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	137	164	193	234	278	315	349	391	446	495	551	593	646	693	731
8.2	Drawn into earthenware ducts, ground temp. = 20 °C and Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	131	155	183	223	265	301	334	376	430	478	534	578	632	682	721
8.3	Laid in trefoil formation in air, ambient temp. = 30 °C	A	162	196	234	291	353	406	460	524	611	692	788	873	975	1074	1156
9	Short circuit current rating of conductor for 1 second	kA	3.58	5.01	7.15	10.01	13.59	17.16	21.45	26.46	34.32	42.9	57.2	71.5	90.09	114.4	143
(ii)	Armour																
1	DC resistance at 20 °C (Approximate)	ohm/km	0.434	0.41	0.389	0.361	0.27	0.256	0.243	0.226	0.211	0.159	0.145	0.132	0.12	0.109	0.099
2	AC resistance at 80 °C (Approximate)	ohm/km	0.539	0.509	0.483	0.448	0.335	0.318	0.302	0.281	0.262	0.197	0.18	0.164	0.149	0.135	0.123
3	Short circuit current rating of armour for 1 second (Approximate)	kA	5.97	6.32	6.66	7.17	9.6	10.14	10.67	11.47	12.27	16.25	17.92	19.59	21.67	23.75	26.26



**Metallic Copper Screen**

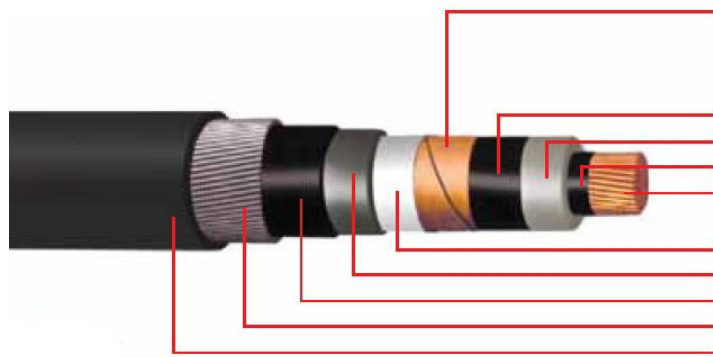
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**8.7/15 (17.5) kV**  
**Single Core Copper Conductor**  
**XLPE Insulated**  
**Aluminium Wire Armoured**  
**To IEC 60502-2**  
**(Suitable for 8.7/15 kV Earthed System)**

Copper conductor			SINGLE CORE, CU/XLPE/LC/AW A/PVC ARMoured CABLES, 8.7/15 kV TO IEC 60502-2														
Sr.No.	Nominal Area of Conductor	mm <sup>2</sup>	25	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
(A)	Manufacturing Dimensions																
1	Conductor diameter (Approximate)	mm	5.9	6.9	8.1	9.7	11.4	12.9	14.3	16	18.4	20.6	23.3	26.3	30	34.2	38.2
2	Insulation thickness (Nominal)	mm	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
3	Lead sheath thickness (Nominal)	mm	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.7	1.8	1.9	1.9	2	2.2	2.3
4	Separation sheath thickness (Nominal)	mm	1	1	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.7
5	Armour wire diameter (Nominal)	mm	1.6	1.6	2	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5
6	Outer sheath thickness (Nominal)	mm	1.9	2	2	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.6	2.7	2.9	3	3.2
7	Cable overall diameter (Approximate)	mm	30	31.5	33.5	35.5	37.5	39	40.5	42.5	46.5	49	53	56	60.5	66	71
8	Cable weight (Approximate)	kg/km	2155	2355	2680	3140	3560	4045	4455	4960	6060	7010	8350	9640	11715	14480	17120
9	Standard drum length (±5% Tolerance)	m	1000	1000	1000	1000	1000	500	500	500	500	500	500	500	500	500	500
(B)	Electrical Parameters																
(i)	Conductor																
1	DC resistance of conductor at 20°C(Maximum)	ohm/km	0.727	0.524	0.387	0.268	0.193	0.153	0.124	0.0991	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176
2	AC resistance of conductor at 90°C(Approximate)	ohm/km	0.927	0.668	0.494	0.342	0.247	0.196	0.159	0.127	0.098	0.078	0.062	0.05	0.04	0.033	0.028
3	Reactance at 50Hz(Approximate)	ohm/km	0.166	0.159	0.153	0.142	0.136	0.13	0.127	0.122	0.118	0.115	0.111	0.107	0.104	0.101	0.099
4	Impedance at 50Hz(Approximate)	ohm/km	0.942	0.687	0.517	0.37	0.282	0.235	0.203	0.176	0.153	0.139	0.127	0.118	0.111	0.106	0.103
5	Voltage drop (Approximate for 3 phase system)	v/amp/km	1.632	1.19	0.895	0.641	0.488	0.407	0.352	0.305	0.265	0.241	0.22	0.204	0.192	0.184	0.178
6	Capacitance at 50Hz (Approximate)	µF/km	0.17	0.19	0.21	0.23	0.26	0.28	0.3	0.33	0.37	0.4	0.45	0.49	0.55	0.63	0.69
7	Approximate charging current per phase at Uo=8.7kV and f=50Hz	mA/m	0.46	0.52	0.57	0.63	0.71	0.77	0.82	0.9	1.01	1.09	1.23	1.34	1.5	1.72	1.89
8	Sustained current ratings (With both end bonding):-																
8.1	Laid direct, ground temp. = 20 °C & Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	137	164	193	234	278	315	349	391	446	495	551	593	646	693	731
8.2	Drawn into earthenware ducts, ground temp. = 20 °C and Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	131	155	183	223	265	301	334	376	430	478	534	578	632	682	721
8.3	Laid in trefoil formation in air, ambient temp. = 30 °C	A	162	196	234	291	353	406	460	524	611	692	788	873	975	1074	1156
9	Short circuit current rating of conductor for 1 second	kA	3.58	5.01	7.15	10.01	13.59	17.16	21.45	26.46	34.32	42.9	57.2	71.5	90.09	114.4	143
(ii)	Armour																
1	DC resistance at 20 °C (Approximate)	ohm/km	0.389	0.37	0.286	0.263	0.249	0.231	0.221	0.211	0.159	0.148	0.135	0.127	0.115	0.104	0.096
2	AC resistance at 80 °C (Approximate)	ohm/km	0.483	0.459	0.355	0.327	0.309	0.287	0.274	0.262	0.197	0.184	0.168	0.158	0.143	0.129	0.119
3	Short circuit current rating of armour for 1 second (Approximate)	kA	6.66	7	9.07	9.87	10.4	11.2	11.74	12.27	16.25	17.5	19.17	20.42	22.5	25.01	27.09



**Metallic Copper Screen**

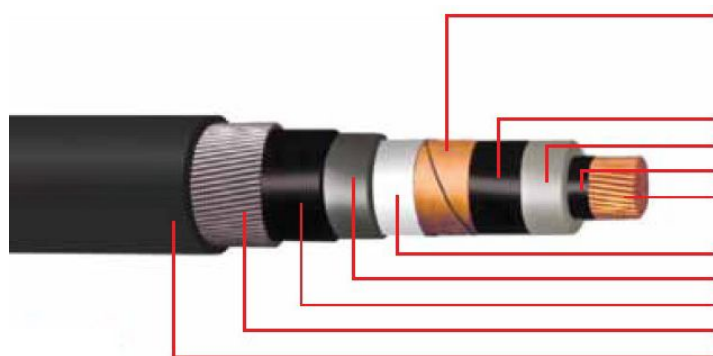
(Copper screen can be of Cu wires + open helix Cu tape or copper tape  
(The details given in below Table are for copper tape screened cables). For  
copper wire screened cables the details can be given on specific request).

- Insulation Screen (Semi-conductive)**
- XLPE Insulation**
- Conductor Screen (Semi-conductive)**
- Copper Conductor**

- Bedding**
- Lead Alloy E Sheath**
- Separation Sheath**
- Aluminium Wire Armour**
- Outer Sheath**

**12/20 (24) kV**  
**Single Core Copper Conductor**  
**XLPE Insulated**  
**Aluminium Wire Armoured**  
**To IEC 60502-2**  
**(Suitable for 12.7/22 kV**  
**Earthed System)**

Copper conductor		SINGLE CORE, CU/XLPE/LC/AWA/PVC ARMoured CABLES, 12/20 kV TO IEC 60502-2														
Sr.No.	Nominal Area of Conductor	mm <sup>2</sup>	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
<b>(A) Manufacturing Dimensions</b>																
1.0	Conductor diameter (Approximate)	mm	6.9	8.1	9.7	11.4	12.9	14.3	16	18.4	20.6	23.3	26.3	30	34.2	38.2
2.0	Insulation thickness (Nominal)	mm	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
3.0	Lead sheath thickness (Nominal)	mm	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.9	2	2.1	2.2	2.3
4.0	Separation sheath thickness (Nominal)	mm	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.6	1.7
5.0	Armour wire diameter (Nominal)	mm	2	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
6.0	Outer sheath thickness (Nominal)	mm	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.6	2.7	2.8	3	3.1	3.2
7.0	Cable overall diameter (Approximate)	mm	35	36	38	40	41.5	43	46	49	51.5	55	58.5	63	68.5	73
8.0	Cable weight (Approximate)	kg/km	2715	3050	3420	3945	4345	4860	5580	6545	7400	8735	10205	12345	14940	17570
9.0	Standard drum length (±5% Tolerance)	m	1000	1000	1000	500	500	500	500	500	500	500	500	500	500	500
<b>(B) Electrical Parameters</b>																
<b>(i) Conductor</b>																
1.0	DC resistance of conductor at 20°C(Maximum)	ohm/km	0.524	0.387	0.268	0.193	0.153	0.124	0.0991	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176
2.0	AC resistance of conductor at 90°C(Approximate)	ohm/km	0.668	0.494	0.342	0.247	0.196	0.159	0.127	0.098	0.078	0.062	0.05	0.04	0.033	0.028
3.0	Reactance at 50Hz(Approximate)	ohm/km	0.166	0.157	0.147	0.14	0.134	0.13	0.127	0.122	0.118	0.114	0.11	0.106	0.103	0.1
4.0	Impedance at 50Hz(Approximate)	ohm/km	0.688	0.518	0.372	0.284	0.237	0.205	0.18	0.156	0.141	0.13	0.121	0.113	0.108	0.104
5.0	Voltage drop (Approximate for 3 phase system)	v/amp/km	1.192	0.897	0.644	0.492	0.41	0.355	0.312	0.27	0.244	0.225	0.21	0.196	0.187	0.18
6.0	Capacitance at 50Hz (Approximate)	µF/km	0.16	0.18	0.2	0.22	0.24	0.26	0.28	0.31	0.34	0.38	0.42	0.46	0.53	0.58
7.0	Approximate charging current per phase at U <sub>0</sub> =12kV and f=50Hz	mA/m	0.6	0.68	0.75	0.83	0.9	0.98	1.06	1.17	1.28	1.43	1.58	1.73	2	2.19
8.0	Sustained current ratings (With both end bonding):-															
8.1	Laid direct, ground temp. = 20 °C & Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	164	193	234	278	315	349	391	446	495	551	593	646	693	731
8.2	Drawn into earthenware ducts, ground temp. = 20 °C and Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	155	183	223	265	301	334	376	430	478	534	578	632	682	721
8.3	Laid in trefoil formation in air, ambient temp. = 30 °C	A	196	234	291	353	406	460	524	611	692	788	873	975	1074	1156
9.0	Short circuit current rating of conductor for 1 second	kA	5.01	7.15	10.01	13.59	17.16	21.45	26.46	34.32	42.9	57.2	71.5	90.09	114.4	143
<b>(ii) Armour</b>																
1.0	DC resistance at 20 °C (Approximate)	ohm/km	0.27	0.256	0.243	0.226	0.216	0.207	0.199	0.148	0.138	0.127	0.12	0.109	0.099	0.091
2.0	AC resistance at 80 °C (Approximate)	ohm/km	0.335	0.318	0.302	0.281	0.268	0.257	0.197	0.184	0.171	0.158	0.149	0.135	0.123	0.113
3.0	Short circuit current rating of armour for 1 second (Approximate)	kA	9.6	10.14	10.67	11.47	12	12.54	16.25	17.5	18.75	20.42	21.67	23.75	26.26	28.34



**Metallic Copper Screen**

(Copper screen can be of Cu wires + open helix Cu tape or copper tape (The details given in below Table are for copper tape screened cables). For copper wire screened cables the details can be on specific request).

**Insulation Screen (Semi-conductive)**

**XLPE Insulation**

**Conductor Screen (Semi-conductive)**

**Copper Conductor**

**Bedding**

**Lead Alloy E Sheath**

**Separation Sheath**

**Aluminium Wire Armour**

**Outer Sheath**

**18/30 (36) kV  
Single Core Copper Conductor  
XLPE Insulated  
Aluminium Wire Armoured  
To IEC 60502-2  
(Suitable for 19/33 kV Earthed  
System)**

COPPER CONDUCTOR			SINGLE CORE, CU/XLPE/LC/AWA/PVC ARMoured CABLES, 18/30 kV TO IEC 60502-2												
Sr. No.	Nominal Area of Conductor	mm <sup>2</sup>	50	70	95	120	150	185	240	300	400	500	630	800	1000
(A)	Manufacturing Dimensions														
1.0	Conductor diameter (Approximate)	mm	8.1	9.7	11.4	12.9	14.3	16	18.4	20.6	23.3	26.3	30	34.2	38.2
2.0	Insulation thickness (Nominal)	mm	8	8	8	8	8	8	8	8	8	8	8	8	8
3.0	Lead sheath thickness (Nominal)	mm	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2	2.1	2.2	2.3	2.4	2.5
4.0	Separation sheath thickness (Nominal)	mm	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.7	1.8
5.0	Armour wire diameter (Nominal)	mm	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.15	3.15
6.0	Outer sheath thickness (Nominal)	mm	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.8	2.9	3	3.2	3.3	3.5
7.0	Cable overall diameter (Approximate)	mm	42	45	47	49	50.5	52.5	55	57.5	61	65	69.5	76	81
8.0	Cable weight (Approximate)	kg/km	3835	4530	5000	5550	5985	6720	7575	8600	10010	11590	13820	16855	19630
9.0	Standard drum length (±5% Tolerance)	m	500	500	500	500	500	500	500	500	500	500	500	250	250
(B)	Electrical Parameters														
(i)	Conductor														
1.0	DC resistance of conductor at 20 °C (Maximum)	ohm/km	0.387	0.268	0.193	0.153	0.124	0.0991	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176
2.0	AC resistance of conductor at 90 °C (Approximate)	ohm/km	0.494	0.342	0.247	0.196	0.159	0.127	0.097	0.078	0.062	0.049	0.04	0.033	0.028
3.0	Reactance at 50 Hz (Approximate)	ohm/km	0.167	0.157	0.15	0.145	0.14	0.135	0.129	0.125	0.12	0.117	0.112	0.11	0.107
4.0	Impedance at 50 Hz (Approximate)	ohm/km	0.521	0.376	0.289	0.244	0.212	0.185	0.161	0.147	0.135	0.127	0.119	0.115	0.111
5.0	Voltage drop (Approximate for 3 phase system)	v/amp/km	0.902	0.651	0.501	0.423	0.367	0.32	0.279	0.255	0.234	0.22	0.206	0.199	0.192
6.0	Capacitance at 50 Hz (Approximate)	µF/km	0.14	0.15	0.17	0.18	0.2	0.21	0.23	0.25	0.28	0.3	0.34	0.38	0.42
7.0	Approximate charging current per phase at U <sub>0</sub> = 18 kV and f = 50 Hz	mA/m	0.79	0.85	0.96	1.02	1.13	1.19	1.3	1.41	1.58	1.7	1.92	2.15	2.38
8.0	Sustained current ratings (With both end bonding):														
8.1	Laid direct, ground temp. = 20 °C & Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	193	234	278	315	349	391	446	495	551	593	646	693	731
8.2	Drawn into earthenware ducts, ground temp. = 20 °C and Thermal resistivity of soil = 1.5 °C m/W, depth of laying = 0.8 m, laid in trefoil formation.	A	183	223	265	301	334	376	430	478	534	578	632	682	721
8.3	Laid in trefoil formation in air, ambient temp. = 30 °C	A	234	291	353	406	460	524	611	692	788	873	975	1074	1156
9.0	Short circuit current rating of conductor for 1 second	kA	7.15	10.01	13.59	17.16	21.45	26.46	34.32	42.9	57.2	71.5	90.09	114.4	143
(ii)	Armour														
1.0	DC resistance at 20 °C (Approximate)	ohm/km	0.216	0.164	0.155	0.148	0.145	0.135	0.13	0.122	0.113	0.105	0.097	0.071	0.066
2.0	AC resistance at 80 °C (Approximate)	ohm/km	0.268	0.204	0.192	0.184	0.18	0.168	0.161	0.151	0.14	0.13	0.12	0.088	0.082
3.0	Short circuit current rating of armour for 1 second (Approximate)	kA	12	15.84	16.67	17.5	17.92	19.17	20	21.25	22.92	24.59	26.67	36.39	39.04



# TECHNICAL DETAILS

## SHORT CIRCUIT RATING

The short circuit ratings (r.m.s. values) of XLPE insulated cables have been calculated on the following assumptions.

1. Conductor temperature prior to short circuit 90 0C
2. Max permissible temperature during short circuit 250 0C

3. Specific gravity

- |              |             |
|--------------|-------------|
| a. Copper    | 8.89 gm/cc  |
| b. Aluminium | 2.703 gm/cc |

4. Resistivity

- |              |                                |
|--------------|--------------------------------|
| a. Copper    | 17.241 X 10 <sup>-6</sup> W mm |
| b. Aluminium | 28.264 X 10 <sup>-6</sup> W mm |

The Maximum short circuit current is calculated with the following formula

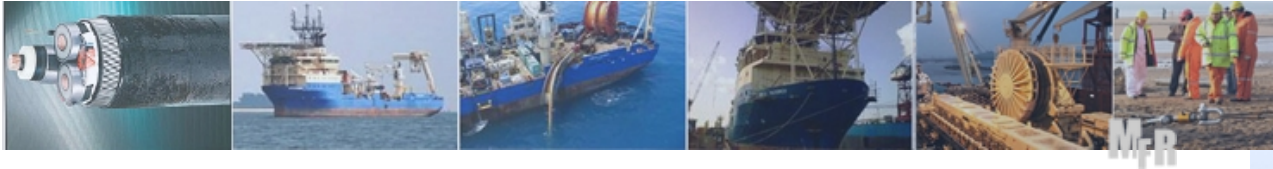
$$I_{sh} = \frac{K \times A}{\sqrt{t}} \text{ (kA)}$$

Where  $I_{sh}$  = r.m.s. value of short circuit current (kA)

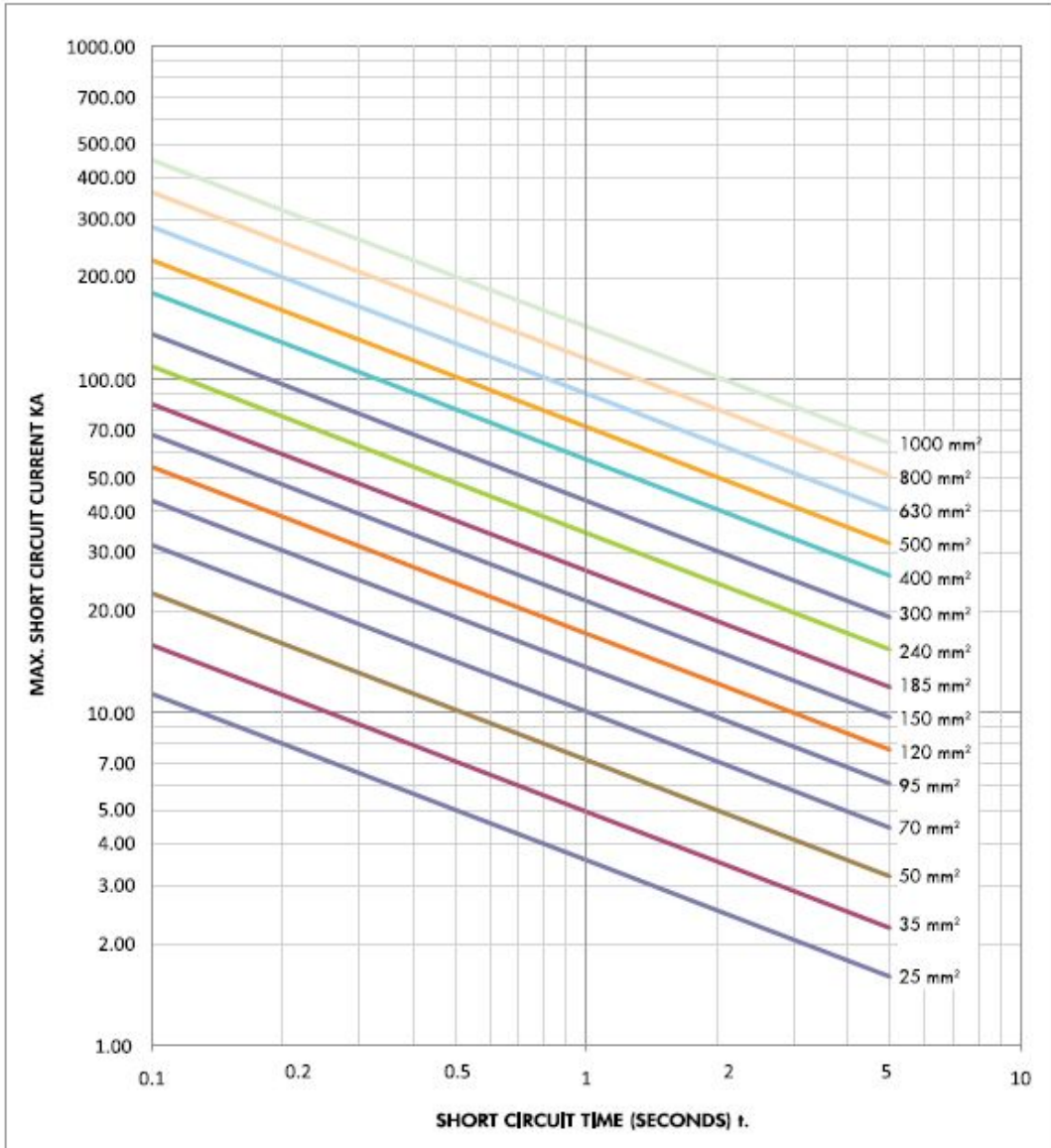
K = a constant (0.143 & 0.094 for copper & aluminum respectively)

A = nominal area of the conductor (mm<sup>2</sup>)

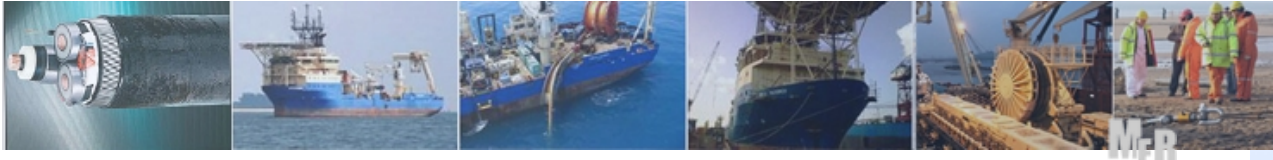
t = duration of the short circuit (sec)



**COPPER CONDUCTOR**  
 SHORT CIRCUIT CURRENT CURVES FOR  
 COPPER CONDUCTOR XLPE INSULATED CABLE

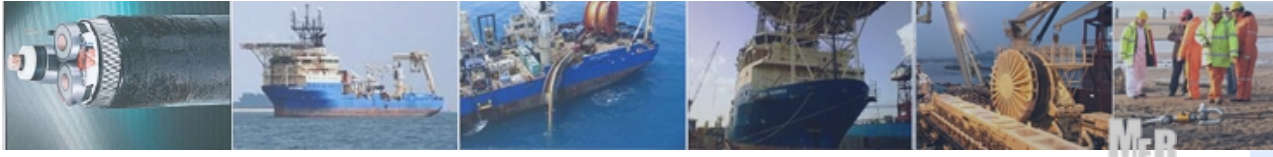


Short Circuit Characteristics



## Laying and installation of cables

- After arrival at the site the cable should be examined visually to check any exterior damage.
- At site the cable drum should be rolled only in the direction shown on the flange otherwise the cable may become loose & hence difficult to handle.
- •The route of the cable should be decided before hand considering the points like transportation of the cable at these points, atmosphere and ground conditions, where joints and terminations will be done, etc.
- While laying up the cable minimum bending radius as required to be strictly maintained.
- If the cable is pulled by pulling eye or winch, utmost care should be taken that tensile stress on the cable is within its limit.
- If the cable is laid in duct or pipe, outer diameter of the duct or pipe should be at least 1.5 times the diameter of the cable.
- Suitable derating factors should be applied as per the environmental & installation conditions while selecting the size of the cable.
- After laying up the cable system must be subject to the DC voltage as mentioned in the table no. 17. The system should be energized after it has withstood this test



## Drum Handling Instructions

