



UNI★STAR[®]

MEDIUM VOLTAGE CABLES



**FOR
SYSTEM
VOLTAGES
UPTO
33 KV**

UNI★STAR[®]

'UNISTAR' XLPE CABLES

Crosslinked Polyethylene Cable abbreviated as XLPE Cable was developed to overcome the susceptibility of PILC Cables to ingress of moisture. Polyethylene which has the best electrical properties, but poor thermal properties on account of its thermoplastic nature in comparison to impregnated paper, is crosslinked by dry Nitrogen curing process to improve its thermomechanical properties without loss of electrical properties. 'Unistar' XLPE Cables are manufactured and tested as per national / international standards and also as per specific requirement of customers. Dimension of cables conforming to IS-7098 Part (II) are given in table - 1 to 12

'Unistar' XLPE Cable has the following advantages :-

- Higher power rating
- Higher emergency overload rating
- Higher short circuit rating
- Higher resistance to moisture
- Higher insulation resistance
- Simpler jointing & termination compared to PILC & PVC Cables.

These cables may also be supplied with improved fire performance characteristics. The sheath of these cables shall be specially formulated to meet the requirement of Flame Retardance (FR) or Flame Retardance with reduced halogen evolution and Low Smoke (FRLS)

'UNISTAR' XLPE Cable finds its applications in power transmission & distribution, railways fertilizer, and petrochemical plants, submarine and under water power transmission, instrumentation and control, etc.

Cross-sectional view of 3 core XPLE cable to IS:7098 part-II

technique in a most sophisticated catenary continuous vulcanizing extrusion line, employing most advanced technology, imported from ABB Cables Sweden with dry curing.

TEST AND QUALITY CONTROL

'UNISTAR' XLPE cables are subjected to all routine and type tests as per relevant manufacturing specifications which include high voltage test, partial discharge test, dielectric power factor test, heating cycles test, impulse withstand test etc. Beside this, 'UNISTAR' XLPE cable are subjected to special long term development test programmes to ensure that cables manufactured are true to design life of 50 years. The Quality Control Department which is independent of production, maintains strict control on raw material, manufacturing process and final testing as per quality assurance scheme recommended by our collaborators ABB Cables, Sweden



INSTALLATION & ACCESSORIES

'UNISTAR' XLPE Cables are smaller and on an average 30% lighter than paper and 10% lighter than PVC insulated cables. Techniques employed in the installation of low voltage XLPE cables are similar to that employed for standard PVC insulated power cables. Some accessories such as compression lugs and ferrules, glands, splicing

MANUFACTURING

Manufacture of XLPE cables requires great skill at all stages of processing. Extrusion should be smooth, homogeneous and free from objectionable voids and contaminations. Material handling system must be designed to ensure minimum contamination. For high voltage cable, conductor and insulation shields should be uniform and smooth and must adhere to insulation without any void, imperfection and contamination. To ensure the above, 'UNISTAR' XLPE Cables are manufactured by triple extrusion

and termination kits as used for PVC cables may be used for XLPE cables. Additional advantage for XLPE cables is that it can withstand higher soldering temperature and hot pouring compound. For high voltage cables, different methods may be employed for splicing and termination, these are as under :-

(a) Taped termination and splicing : This is the most popular method. It does not require and special skill or equipment except crimping tool or welding equipment for conductor jointing.

Taped splice : In the taped splice, insulation is built up by wrapping a special electric grade self bonding EP rubber tape around the jointed conductor. Core screening and conductor screening are performed by using semi-conducting self-bonding tape.

Taped termination : A termination is built up on the site to the dimensions given in the installation instruction. The electric field grading is performed by a semiconductor layer with non-linear resistivity/stress characteristics. This type of field grading is a patented process of ABB Cable and has proved to be highly reliable. Termination takes very little space and is recommended for installations where many parallel cables are to be connected to one joint.



(b) Slip in moulded EP rubber termination and splicing : This type of termination consists of a premoulded stress cone and skirts made of very resilient weather - proof EP Rubber. These are suitable for all application with round conductor cable and also in polluted area. Compared to taped termination this is somewhat quicker and easier to install. On the other hand material cost is higher and a large stock is required, since one set of material covers only a small range of cable sizes.

(c) 'THERMOFIT' termination and splicing : These are made of heat shrinkable radiation vulcanized cross linked polyethylene tubing (semi-conducting and insulation grade) and skirts. These are fitted to the cable end or joints and set in position by shrinkfitting by application of heat. This is a patented process of Ray Chem Corporation, USA and one of the easiest and reliable methods of

termination and splicing. Standard kits are available from the manufacturer.

(d) Epoxy Cast Termination & Splicing : These are available for cables upto and including 11 KV grade from standard manufacturer in our country. Standard kits are marketed under various trade names.

TECHNICAL SERVICES

Our technical service department is specially organised to assist our valued customers in finalising the section, design, installation, jointing and termination of XLPE Cables. This department also organises demonstration of jointing & termination techniques of XLPE Cables.

SUSTAINED CURRENT RATINGS OF HV XLPE CABLES

The current ratings of HV XLPE Cables given in the different tables are based on the following assumptions.

- (i) Maximum conductor temperature for continuous operation : 90°C
- (ii) Ambient air temperature : 40°C
- (iii) Ground temperature : 30°C
- (iv) Thermal resistivity of soil : 1.5 km/w
- (v) Depth of laying (to the highest point of the cables laid direct in the ground)
 - a) 3.3, 6.6 & 11 KV cables : 90 cm
 - b) 22 and 33 KV : 105 cm
- (vi) Max. conductor temperature at the end of a short circuit : 250°C

METHOD OF INSTALLATION

1. Multi core cables installed singly.
2. Single core cables laid in trefoil formation with screen /armour bonded at both ends.



TABLE - 1
SINGLE CORE 3.3 kV (E) & (UE) XLPE INSULATED CABLES

**CONSTRUCTION -
ARMOURED CABLE**

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o XLPE insulation
- o Hard Drawn Aluminium Round Wire Armour
- o Extruded PVC Outer Sheath

UNARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o XLPE insulation
- o Copper tape Screen
- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Aluminium Round wire Armoured cable					Unarmoured cable					Normal Delivery length
		Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al conductor)	Approx. Cable wt. (Cu conductor)	Nominal insulation thickness	Nominal outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	2.5	1.4	1.24	17.0	0.39	0.55	2.2	1.8	15.0	0.27	0.42	500
35	2.5	1.4	1.24	18.0	0.45	0.67	2.2	1.8	16.0	0.31	0.53	500
50	2.5	1.4	1.40	19.5	0.53	0.83	2.2	1.8	17.0	0.36	0.66	500
70	2.5	1.6	1.40	21.5	0.66	1.09	2.2	1.8	18.5	0.45	0.88	500
95	2.5	1.6	1.40	23.5	0.78	1.38	2.2	2.0	21.0	0.58	1.18	500
120	2.5	1.6	1.40	25.0	0.89	1.64	2.2	2.0	22.0	0.67	1.43	500
150	2.5	1.6	1.40	26.5	1.00	1.92	2.2	2.0	23.5	0.77	1.70	500
185	2.5	1.6	1.40	28.0	1.15	2.31	2.2	2.0	25.0	0.91	2.07	500
240	2.5	1.6	1.56	30.5	1.40	2.93	2.2	2.0	27.5	1.11	2.64	500
300	2.5	1.6	1.56	32.5	1.63	3.55	2.2	2.0	29.5	1.32	3.23	500
400	2.6	2.0	1.56	36.5	2.05	4.50	2.2	2.2	33.0	1.64	4.09	500
500	2.8	2.0	1.56	40.0	2.46	5.55	2.4	2.2	36.0	2.00	5.10	500
630	3.0	2.0	1.72	44.0	3.05	7.08	2.6	2.2	40.0	2.51	6.54	500
800	3.3	2.0	1.88	49.5	3.80	8.92	2.8	2.4	45.5	3.17	8.29	500
1000	3.5	2.5	2.04	55.0	4.76	11.20	3.0	2.6	50.0	3.91	10.35	500

TABLE - 2
SINGLE CORE 6.6 kV (E) XLPE INSULATED CABLES

CONSTRUCTION -

ARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o PVC Inner Sheath
- o Hard Drawn Aluminium Round Wire Armour
- o Extruded PVC Outer Sheath

UNARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)

- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Aluminium Round wire Armoured cable					Unarmoured cable					Normal Delivery length
			Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal insulation thickness	Nominal outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	2.8	0.3	1.6	1.40	22.0	0.63	0.79	2.8	1.8	18.0	0.37	0.53	500
35	2.8	0.3	1.6	1.40	23.0	0.69	0.91	2.8	2.0	19.5	0.44	0.66	500
50	2.8	0.3	1.6	1.40	24.0	0.77	1.07	2.8	2.0	20.5	0.50	0.80	500
70	2.8	0.3	1.6	1.40	25.5	0.89	1.32	2.8	2.0	22.0	0.60	1.03	500
95	2.8	0.3	1.6	1.40	27.5	1.03	1.63	2.8	2.0	24.0	0.72	1.32	500
120	2.8	0.3	1.6	1.40	28.5	1.15	1.90	2.8	2.0	25.5	0.82	1.57	500
150	2.8	0.3	1.6	1.56	30.5	1.30	2.23	2.8	2.0	27.0	0.93	1.86	500
185	2.8	0.3	1.6	1.56	32.0	1.46	2.63	2.8	2.0	28.5	1.07	2.24	500
240	2.8	0.4	2.0	1.56	35.5	1.82	3.35	2.8	2.2	31.0	1.32	2.58	500
300	3.0	0.4	2.0	1.56	38.0	2.12	4.04	3.0	2.2	33.5	1.58	3.50	500
400	3.3	0.4	2.0	1.72	42.0	2.57	5.02	3.3	2.2	37.0	1.93	4.39	500
500	3.5	0.5	2.0	1.88	45.5	3.08	6.17	3.5	2.4	41.0	2.37	5.46	500
630	3.5	0.5	2.0	1.88	49.0	3.65	7.67	3.5	2.4	44.5	2.88	6.90	500
800	3.5	0.5	2.5	2.04	55.5	4.64	9.76	3.5	2.6	50.0	3.60	8.72	500
1000	3.6	0.6	2.5	2.20	60.5	5.51	11.95	3.6	2.8	54.5	4.36	10.81	500

TABLE - 3
SINGLE CORE 11 kV (E) XLPE INSULATED CABLES

**CONSTRUCTION -
ARMOURED CABLE**

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o PVC Inner Sheath
- o Hard Drawn Aluminium Round Wire Armour
- o Extruded PVC Outer Sheath

UNARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)

- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Aluminium Round wire Armoured cable					Unarmoured cable					Normal Delivery length
			Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cables diameter	Approx. Cable wt. (Al-conductor)	Approx Cable wt. (Cu-conductor)	Nominal insulation thickness	Nominal outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	3.6	0.3	1.60	1.40	23.5	0.71	0.87	3.6	2.0	20.0	0.45	0.61	500
35	3.6	0.3	1.60	1.40	24.5	0.78	1.00	3.6	2.0	21.0	0.51	0.73	500
50	3.6	0.3	1.60	1.40	25.5	0.86	1.16	3.6	2.0	22.0	0.57	0.87	500
70	3.6	0.3	1.60	1.40	27.0	0.99	1.42	3.6	2.0	23.5	0.67	1.10	500
95	3.6	0.3	1.60	1.40	29.0	1.13	1.73	3.6	2.0	26.0	0.80	1.40	500
120	3.6	0.3	1.60	1.56	30.5	1.27	2.03	3.6	2.0	27.0	0.90	1.65	500
150	3.6	0.3	1.60	1.56	32.0	1.40	2.33	3.6	2.0	28.5	1.01	1.94	500
185	3.6	0.4	2.00	1.56	35.0	1.68	2.84	3.6	2.2	30.5	1.19	2.35	500
240	3.6	0.4	2.00	1.56	37.0	1.94	3.47	3.6	2.2	32.5	1.42	2.95	500
300	3.6	0.4	2.00	1.56	39.0	2.21	4.13	3.6	2.2	34.5	1.65	3.57	500
400	3.6	0.4	2.00	1.72	42.5	2.62	5.07	3.6	2.2	37.5	1.97	4.43	500
500	3.6	0.5	2.00	1.88	46.0	3.10	6.19	3.6	2.4	41.0	2.38	5.48	500
630	3.6	0.5	2.00	1.88	49.5	2.66	7.69	3.6	2.4	44.5	2.89	6.92	500
800	3.6	0.5	2.50	2.04	56.0	4.67	9.79	3.6	2.6	50.0	3.62	8.75	500
1000	3.6	0.6	2.50	2.20	60.5	5.51	11.95	3.6	2.8	54.5	4.36	10.81	500

TABLE - 4
SINGLE CORE 11 kV (UE) XLPE INSULATED CABLES

**CONSTRUCTION -
ARMOURED CABLE**

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o PVC Inner Sheath
- o Hard Drawn Aluminium Round Wire Armour
- o Extruded PVC Outer Sheath

UNARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)

- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Aluminium Round wire Armoured cable					Unarmoured cable					Normal Delivery length
			Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal insulation thickness	Nominal outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	5.5	0.3	1.60	1.40	27.0	0.92	1.08	5.5	2.0	24.0	0.61	0.76	500
35	5.5	0.3	1.60	1.40	28.0	1.00	1.22	5.5	2.0	25.0	0.67	0.89	500
50	5.5	0.3	1.60	1.56	29.5	1.11	1.41	5.5	2.0	26.0	0.74	1.04	500
70	5.5	0.3	1.60	1.56	31.5	1.24	1.67	5.5	2.0	27.5	0.85	1.28	500
95	5.5	0.3	2.00	1.56	34.0	1.48	2.08	5.5	2.0	30.0	0.99	1.59	500
120	5.5	0.4	2.00	1.56	35.5	1.63	2.38	5.5	2.2	31.0	1.13	1.88	500
150	5.5	0.4	2.00	1.56	37.0	1.77	2.70	5.5	2.2	32.5	1.25	2.18	500
185	5.5	0.4	2.00	1.56	38.5	1.96	3.13	5.5	2.2	34.0	1.41	2.57	500
240	5.5	0.4	2.00	1.72	41.0	2.27	3.80	5.5	2.2	36.5	1.65	3.18	500
300	5.5	0.4	2.00	1.72	43.0	2.56	4.48	5.5	2.2	38.5	1.90	3.82	500
400	5.5	0.5	2.00	1.88	46.5	3.02	5.47	5.5	2.4	42.0	2.28	4.74	500
500	5.5	0.5	2.50	2.04	51.0	3.66	6.76	5.5	2.4	45.0	2.67	5.76	500
630	5.5	0.5	2.50	2.04	54.5	4.27	8.29	5.5	2.6	49.0	3.25	7.28	500
800	5.5	0.6	2.50	2.20	60.0	5.17	10.29	5.5	2.8	54.0	4.02	9.14	500
1000	5.5	0.6	2.50	2.36	64.5	6.01	12.45	5.5	2.8	58.0	4.73	11.17	500

TABLE - 5
SINGLE CORE 22 kV (E) XLPE INSULATED CABLES

CONSTRUCTION -

ARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o PVC Inner Sheath
- o Hard Drawn Aluminium Round Wire Armour
- o Extruded PVC Outer Sheath

UNARMOURED CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)

- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Aluminium Round wire Armoured cable					Unarmoured cable					Normal Delivery length
			Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal insulation thickness	Nominal outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
35	6.0	0.3	1.60	1.56	29.5	1.08	1.30	6.0	2.0	26.0	0.71	0.93	500
50	6.0	0.3	1.60	1.56	30.5	1.17	1.47	6.0	2.0	27.0	0.78	1.08	500
70	6.0	0.3	1.60	1.56	32.5	1.30	1.74	6.0	2.0	28.5	0.90	1.33	500
95	6.0	0.4	2.00	1.56	35.5	1.57	2.17	6.0	2.2	31.0	1.07	1.67	500
120	6.0	0.4	2.00	1.56	36.5	1.70	2.46	6.0	2.2	32.0	1.18	1.94	500
150	6.0	0.4	2.00	1.56	38.0	1.85	2.78	6.0	2.2	33.5	1.31	2.23	500
185	6.0	0.4	2.00	1.72	40.0	2.07	3.23	6.0	2.2	35.0	1.47	2.63	500
240	6.0	0.4	2.00	1.72	42.0	2.35	3.88	6.0	2.2	37.5	1.71	3.24	500
300	6.0	0.4	2.00	1.72	44.0	2.64	4.56	6.0	2.2	39.5	1.96	3.88	500
400	6.0	0.5	2.00	1.88	47.5	3.10	5.55	6.0	2.4	43.0	2.35	4.81	500
500	6.0	0.5	2.50	2.04	52.0	3.75	6.85	6.0	2.6	46.5	2.79	5.89	500
630	6.0	0.5	2.50	2.04	55.5	4.38	8.41	6.0	2.6	50.0	3.35	7.38	500
800	6.0	0.6	2.50	2.20	61.0	5.33	10.45	6.0	2.8	55.0	4.16	9.28	500
1000	6.0	0.6	2.50	2.36	65.5	6.19	12.63	6.0	3.0	59.5	4.94	11.38	500

TABLE - 6
SINGLE CORE 33 kV (E) XLPE INSULATED CABLES

CONSTRUCTION -

ARMoured CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o PVC Inner Sheath
- o Hard Drawn Aluminium Round Wire Armour
- o Extruded PVC Outer Sheath

UNARMoured CABLE

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)

- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Aluminium Round wire Armoured cable					Unarmoured cable					Normal Delivery length
			Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal insulation thickness	Nominal outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
50	8.8	0.4	2.00	1.56	37.5	1.63	1.93	8.8	2.2	33.0	1.10	1.40	500
70	8.8	0.4	2.00	1.56	39.0	1.78	2.21	8.8	2.2	34.5	1.23	1.66	500
95	8.8	0.4	2.00	1.72	41.5	2.01	2.61	8.8	2.2	36.5	1.39	1.98	500
120	8.8	0.4	2.00	1.72	42.5	2.15	2.91	8.8	2.2	37.5	1.51	2.26	500
150	8.8	0.4	2.00	1.72	44.0	2.31	3.24	8.8	2.2	39.0	1.64	2.57	500
185	8.8	0.5	2.00	1.88	46.0	2.57	3.73	8.8	2.4	41.0	1.86	3.02	500
240	8.8	0.5	2.00	1.88	48.5	2.88	4.41	8.8	2.4	43.5	2.12	3.65	500
300	8.8	0.5	2.50	2.04	51.5	3.41	5.33	8.8	2.6	46.0	2.45	4.37	500
400	8.8	0.5	2.50	2.04	54.5	3.85	6.31	8.8	2.6	49.0	2.84	5.29	500
500	8.8	0.6	2.50	2.20	58.5	4.42	7.52	8.8	2.8	52.5	3.32	6.41	500
630	8.8	0.6	2.50	2.36	62.0	5.12	9.15	8.8	2.8	56.0	3.89	7.91	500
800	8.8	0.6	2.50	2.36	67.0	6.03	11.15	8.8	3.0	61.0	4.75	9.87	500
1000	8.8	0.7	3.15	2.52	73.0	7.27	13.71	8.8	3.2	65.5	5.57	12.01	500

TABLE - 7

THREE CORE 3.3 kV (E) & (UE) XLPE INSULATED ARMoured CABLES

CONSTRUCTION -

- o Aluminium/Annealed Plain Copper Conductor
Compacted Circular for Sizes ≤35 Sqmm & Stranded Shaped for Sizes >35 Sqmm)
- o XLPE insulation
- o Cores laid up together suitably
- o PVC Inner Sheath
- o Galvanized Flat Steel Strip / Round Wire Armour
- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal Insulation thickness	Min. inner sheath thickness	Galvanized Flat Steel Strip Armoured cable					Galvanized Round Steel Wire Armoured cable					Normal Delivery length
			Nominal dimensions of Flat Strips	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx Cable wt. (Cu-conductor)	Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	2.2	0.3	4 x 0.8	1.40	30.0	1.80	2.29	1.6	1.56	32.0	2.41	2.90	500
35	2.2	0.3	4 x 0.8	1.56	32.5	2.03	2.70	1.6	1.56	33.0	2.73	3.40	500
50	2.2	0.4	4 x 0.8	1.56	31.5	2.35	3.26	2.0	1.56	34.0	3.06	3.98	500
70	2.2	0.4	4 x 0.8	1.56	36.5	2.80	4.12	2.0	1.56	38.5	3.61	4.93	500
95	2.2	0.4	4 x 0.8	1.72	38.5	3.40	5.23	2.0	1.72	40.5	4.74	6.57	500
120	2.2	0.5	4 x 0.8	1.72	41.0	3.87	6.18	2.0	1.88	43.5	5.23	7.54	500
150	2.2	0.5	4 x 0.8	1.88	43.5	4.28	7.12	2.5	2.04	47.0	5.81	8.46	500
185	2.2	0.5	4 x 0.8	2.04	47.0	4.98	8.54	2.5	2.04	50.0	6.58	10.14	500
240	2.2	0.6	4 x 0.8	2.20	51.5	5.90	10.59	2.5	2.20	54.5	7.59	12.27	500
300	2.2	0.6	4 x 0.8	2.20	55.0	7.00	12.88	2.5	2.36	59.0	9.69	15.57	500
400	2.2	0.7	4 x 0.8	2.52	61.5	8.35	15.87	3.15	2.68	66.5	11.33	18.85	500

TABLE - 8
THREE CORE 6.6 kV (E) XLPE INSULATED ARMoured CABLES

CONSTRUCTION -

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o Cores laid up together suitably with fillers
- o PVC Inner Sheath
- o Galvanized Flat Steel Strip / Round Wire Armour
- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Galvanized Flat Steel Strip Armoured cable					Galvanized Round Steel Wire Armoured cable					Normal Delivery length
			Nominal dimensions of Flat Strips	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	2.8	0.4	4 x 0.8	1.56	37.0	2.03	2.51	2.00	1.72	40.0	2.73	3.21	500
35	2.8	0.4	4 x 0.8	1.72	39.5	2.30	2.98	2.00	1.72	42.0	3.02	3.69	500
50	2.8	0.5	4 x 0.8	1.72	42.0	2.62	3.53	2.00	1.88	45.0	3.43	4.34	500
70	2.8	0.5	4 x 0.8	1.88	46.0	3.11	4.43	2.00	1.88	48.5	3.93	5.25	500
95	2.8	0.5	4 x 0.8	1.88	50.5	3.69	5.52	2.50	2.04	54.0	5.10	6.93	500
120	2.8	0.6	4 x 0.8	2.04	53.5	4.12	6.43	2.50	2.20	57.0	5.61	7.92	500
150	2.8	0.6	4 x 0.8	2.20	57.0	4.65	7.49	2.50	2.20	60.5	6.19	9.03	500
185	2.8	0.6	4 x 0.8	2.20	60.5	5.32	8.88	2.50	2.36	64.0	7.03	10.59	500
240	2.8	0.7	4 x 0.8	2.36	65.5	6.29	10.97	3.15	2.52	71.0	8.96	13.64	500
300	3.0	0.7	4 x 0.8	2.52	71.5	7.46	13.34	3.15	2.68	76.5	10.36	16.23	500
400	3.3	0.7	4 x 0.8	2.84	80.0	9.22	16.73	4.00	3.00	86.5	13.73	21.24	250

TABLE - 9

THREE CORE 11 kV (E) XLPE INSULATED ARMoured CABLES**CONSTRUCTION -**

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o Cores laid up together suitably with fillers
- o PVC Inner Sheath
- o Galvanized Flat Steel Strip / Round Wire Armour
- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Galvanized Flat Steel Strip Armoured cable					Galvanized Round Steel Wire Armoured cable					Normal Delivery length
			Nominal dimensions of Flat Strips	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx Cable wt. (Cu-conductor)	Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	3.6	0.4	4 x 0.8	1.72	41.0	2.40	2.89	2.00	1.72	43.5	3.14	3.63	500
35	3.6	0.5	4 x 0.8	1.72	43.0	2.65	3.33	2.00	1.88	46.0	3.49	4.16	500
50	3.6	0.5	4 x 0.8	1.88	46.0	3.01	3.92	2.50	2.04	49.5	4.33	5.24	500
70	3.6	0.5	4 x 0.8	1.88	49.5	3.54	4.95	2.50	2.04	53.0	4.95	6.27	500
95	3.6	0.6	4 x 0.8	2.04	54.5	4.16	5.99	2.50	2.20	58.5	5.70	7.53	500
120	3.6	0.6	4 x 0.8	2.20	57.5	4.63	6.94	2.50	2.20	60.5	6.22	8.53	500
150	3.6	0.6	4 x 0.8	2.20	60.5	5.16	8.00	2.50	2.36	64.0	6.85	9.68	500
185	3.6	0.7	4 x 0.8	2.36	64.5	5.85	9.41	3.15	2.52	69.5	8.48	12.05	500
240	3.6	0.7	4 x 0.8	2.52	69.5	6.93	11.61	3.15	2.68	74.5	9.72	14.04	500
300	3.6	0.7	4 x 0.8	2.68	74.5	7.94	13.82	3.15	2.84	79.5	10.92	16.80	500
400	3.6	0.7	4 x 0.8	2.84	81.0	9.38	16.89	4.00	3.00	88.00	13.97	21.48	250

TABLE - 10
THREE CORE 11 KV (UE) XLPE INSULATED ARMoured CABLES

CONSTRUCTION -

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o Cores laid up together suitably with fillers
- o PVC Inner Sheath
- o Galvanized Flat Steel Strip / Round Wire Armour
- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Galvanized Flat Steel Strip Armoured cable					Galvanized Round Steel Wire Armoured cable					Normal Delivery length
			Nominal dimensions of Flat Strips	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
25	5.5	0.5	4 x 0.8	1.88	49.5	3.34	3.82	2.50	2.04	53.50	4.75	5.23	500
35	5.5	0.5	4 x 0.8	2.04	52.0	3.63	4.31	2.50	2.20	56.00	5.12	5.79	500
50	5.5	0.6	4 x 0.8	2.20	55.0	4.03	4.95	2.50	2.20	58.50	5.56	6.48	500
70	5.5	0.6	4 x 0.8	2.20	58.5	4.54	5.96	2.50	2.36	62.50	6.32	7.64	500
95	5.5	0.6	4 x 0.8	2.36	63.5	5.30	7.13	3.15	2.52	68.50	7.87	9.70	500
120	5.5	0.7	4 x 0.8	2.36	66.0	5.82	8.13	3.15	2.52	71.00	8.53	10.84	500
150	5.5	0.7	4 x 0.8	2.52	69.5	6.42	9.26	3.15	2.68	74.50	9.22	12.06	500
185	5.5	0.7	4 x 0.8	2.68	73.5	7.16	10.72	3.15	2.84	78.50	10.10	13.66	500
240	5.5	0.7	4 x 0.8	2.84	78.5	8.32	13.00	3.15	3.00	83.50	11.49	16.17	250
300	5.5	0.7	4 x 0.8	3.00	83.0	9.43	15.30	4.00	3.00	89.50	14.09	19.96	250
400	5.5	0.7	4 x 0.8	3.00	89.5	10.87	18.38	4.00	3.00	96.00	15.84	23.35	250

TABLE - 11
THREE CORE 22 kV (E) XLPE INSULATED ARMoured CABLES

CONSTRUCTION -

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o Cores laid up together suitably with fillers
- o PVC Inner Sheath
- o Galvanized Flat Steel Strip / Round Wire Armour
- o Extruded PVC Outer Sheath

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Galvanized Flat Steel Strip Armoured cable					Galvanized Round Steel Wire Armoured cable					Normal Delivery length
			Nominal dimensions of Flat Strips	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx Cable wt. (Cu-conductor)	Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
35	6.0	0.6	4 x 0.8	2.04	54.50	3.90	4.57	2.50	2.20	58.5	5.48	6.16	500
50	6.0	0.6	4 x 0.8	2.20	57.50	4.32	5.23	2.50	2.36	61.0	5.94	6.85	500
70	6.0	0.6	4 x 0.8	2.36	61.00	4.88	6.20	2.50	2.36	64.5	6.55	7.87	500
95	6.0	0.7	4 x 0.8	2.36	66.00	5.64	7.47	3.15	2.52	71.0	8.29	10.12	500
120	6.0	0.7	4 x 0.8	2.52	68.50	6.18	8.49	3.15	2.68	73.5	9.00	11.31	500
150	6.0	0.7	4 x 0.8	2.68	72.00	6.73	9.56	3.15	2.68	77.0	9.53	12.37	500
185	6.0	0.7	4 x 0.8	2.68	75.50	7.51	11.07	3.15	2.84	80.5	10.52	14.09	500
240	6.0	0.7	4 x 0.8	2.84	80.50	8.57	13.26	4.00	3.00	87.5	13.16	17.84	250
300	6.0	0.7	4 x 0.8	3.00	85.50	9.79	15.66	4.00	3.00	92.0	14.52	20.40	250
400	6.0	0.7	4 x 0.8	3.00	92.00	11.28	18.79	4.00	3.00	98.5	16.40	23.91	250

TABLE - 12

THREE CORE 33 kV (E) XLPE INSULATED ARMoured CABLES

CONSTRUCTION -

- o Compacted Circular, Aluminium/Annealed Plain Copper Conductor
- o Conductor Screen (Extruded Semi Conducting layer)
- o XLPE insulation
- o Insulation Screen (Extruded Semi Conducting layer followed by Copper tape)
- o Cores laid up together suitably with fillers
- o PVC Inner Sheath
- o Galvanized Flat Steel Strip / Round Wire Armour
- o Extruded PVC Outer Sheath

DIMENSIONS -

Nominal Area of Conductor	Nominal insulation thickness	Min. inner sheath thickness	Galvanized Flat Steel Strip Armoured cable					Galvanized Round Steel Wire Armoured cable					Normal Delivery length
			Nominal dimensions of Flat Strips	Minimum outer sheath thickness	Approx. overall Cables diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu-conductor)	Nominal diameter of armour wire	Minimum outer sheath thickness	Approx. overall cable diameter	Approx. Cable wt. (Al-conductor)	Approx. Cable wt. (Cu conductor)	
(Sqmm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(mm)	(mm)	(mm)	(kg/m)	(kg/m)	(m)
50	8.8	0.7	4x0.8	2.52	70.5	5.99	6.90	3.15	2.68	75.50	8.83	9.73	500
70	8.8	0.7	4x0.8	2.68	74.0	6.64	7.96	3.15	2.84	79.00	9.62	10.94	500
95	8.8	0.7	4x0.8	2.84	79.0	7.51	9.34	3.15	3.00	84.00	10.68	12.51	250
120	8.8	0.7	4x0.8	2.84	81.5	7.95	10.27	4.00	3.00	88.00	12.54	14.85	250
150	8.8	0.7	4x0.8	3.00	85.0	8.64	11.48	4.00	3.00	91.50	13.30	16.14	250
185	8.8	0.7	4x0.8	3.00	88.5	9.53	13.10	4.00	3.00	95.00	14.43	17.49	250
240	8.8	0.7	4x0.8	3.00	93.0	10.59	15.27	4.00	3.00	99.50	15.71	20.39	250
300	8.8	0.7	4x0.8	3.00	97.5	11.84	17.71	4.00	3.00	104.00	17.27	23.15	250
400	8.8	0.7	4x0.8	3.00	104.0	13.51	21.02	4.00	3.00	110.50	19.33	26.84	250

Note : Normal delivery length specified in the various tables are for general guidance only. Cables can be however supplied in longer lengths as per specific requirement of the customer.

TABLE - 13
CURRENT RATING

Single core XLPE Insulated Unarmoured cables laid in trefoil formation (Solid Bonded)

Cable Size mm ²	Aluminium (Amp)									Copper (Amp)								
	3.3kV (E) & (UE)			6.6kV (E), 11kV (E) & 11kV (UE)			22kV (E) & 33 kV (E)			3.3kV			6.6kV (E), 11kV (E) & 11kV (UE)			22kV (E) & 33 kV (E)		
	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air
25	96	86	105	97	86	110	-	-	-	125	110	130	125	110	140	-	-	-
35	115	100	125	115	100	135	115	100	140	150	130	160	150	130	175	150	130	180
50	135	120	150	135	120	160	135	120	170	175	155	195	175	155	205	175	150	215
70	165	145	190	165	145	200	165	145	210	215	190	245	215	190	260	210	185	270
95	195	175	235	200	175	245	195	170	255	255	225	300	255	225	315	255	220	330
120	225	200	275	225	195	285	225	195	295	290	255	350	290	255	365	290	250	380
150	250	220	310	250	220	320	250	215	330	320	285	400	325	285	415	320	280	430
185	285	250	360	285	250	370	280	245	380	365	320	460	365	320	480	360	315	490
240	330	285	425	330	285	455	325	280	450	420	370	550	420	370	560	420	365	580
300	370	325	495	370	325	510	370	320	520	470	410	630	475	415	650	470	410	660
400	420	370	580	425	375	600	420	360	610	530	465	740	540	465	760	530	460	770
500	480	420	690	485	420	700	480	410	710	600	520	860	610	520	880	600	520	890
630	540	470	800	550	475	810	550	470	820	670	580	980	680	590	1010	680	580	1020
800	610	530	930	620	530	940	610	520	950	740	640	1120	750	640	1140	750	640	1160
1000	680	580	1060	690	590	1070	680	580	1080	800	690	1250	820	700	1270	820	700	1290

TABLE - 14
CURRENT RATING

Single core XLPE Insulated Armoured cables laid in trefoil formation (Solid Bonded)																		
Cable Size mm ²	Aluminium (Amp)									Copper (Amp)								
	3.3kV (E) & (UE)			6.6kV (E), 11kV (E) & 11kV (UE)			22kV (E) & 33 kV (E)			3.3kV			6.6kV (E), 11kV (E) & 11kV (UE)			22kV (E) & 33 kV (E)		
	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air
25	98	87	110	99	87	115	-	-	-	125	115	140	125	110	150	-	-	-
35	115	105	135	115	105	140	115	100	145	150	135	170	150	135	180	150	130	185
50	140	120	160	140	120	165	135	120	170	175	155	205	175	155	215	175	150	220
70	170	150	200	170	145	210	165	145	215	215	190	260	215	190	270	215	185	275
95	200	175	245	200	175	255	195	170	260	255	225	315	255	225	325	250	220	335
120	225	200	285	225	195	295	225	195	300	290	255	365	290	250	375	285	245	385
150	250	220	325	250	220	330	250	215	340	325	285	415	320	280	425	315	275	430
185	285	250	375	285	245	380	280	240	385	360	315	475	360	315	485	355	305	490
240	325	285	440	325	280	450	320	275	450	415	360	560	410	355	570	400	350	570
300	365	320	500	365	315	510	355	305	510	460	400	640	455	395	640	445	380	650
400	410	360	590	410	355	590	400	345	600	510	445	730	510	435	730	495	425	740
500	465	400	680	455	395	680	445	380	680	560	485	840	550	475	830	540	460	830
630	520	445	780	510	435	780	495	420	770	610	530	940	600	520	930	580	500	920
800	560	485	880	550	470	870	540	460	870	660	570	1040	640	540	1010	630	530	1020
1000	600	510	970	590	500	960	570	490	950	680	580	1100	670	570	1090	650	550	1080

TABLE - 15
CURRENT RATING

Three core XLPE Insulated Armoured cables																			
Cable Size mm²	Aluminium (Amp)									Copper (Amp)									
	3.3kV (E) & (UE)			6.6kV (E), 11kV (E) & 11kV (UE)			22kV (E) & 33 kV (E)			3.3kV (E) & (UE)			6.6kV (E), 11kV (E) & 11kV (UE)			22kV (E) & 33 kV (E)			
	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	Ground	Duct	Air	
25	94	80	99	95	82	105	-	-	-	120	100	125	120	105	135	-	-	-	
35	115	94	120	115	97	125	110	98	130	145	120	155	145	125	165	145	125	165	
50	135	110	145	130	115	150	130	115	155	170	145	190	170	150	195	170	150	200	
70	165	140	185	160	140	190	160	140	190	210	175	235	210	180	240	205	180	245	
95	195	165	225	190	165	230	190	170	230	250	210	290	250	215	295	245	215	300	
120	220	185	255	220	190	260	215	190	265	285	240	330	280	240	335	275	245	340	
150	245	210	295	245	210	295	240	215	300	315	270	375	310	270	380	305	275	385	
185	280	235	340	275	240	335	270	240	340	355	300	435	350	305	430	345	305	435	
240	320	270	400	315	275	395	310	275	400	410	350	510	400	350	500	395	350	510	
300	360	305	460	355	310	450	350	310	455	460	390	590	445	390	570	440	390	580	
400	410	350	535	400	350	520	395	355	530	520	440	670	500	440	650	495	440	660	

TABLE - 16

Nominal Area of Conductor	Recommended Short Circuit Rating of conductor for a duration of one Second	
	Aluminium Conductor	Copper Conductor
(Sqmm)	(kA)	(kA)
25	2.4	3.6
35	3.3	5.0
50	4.7	7.1
70	6.6	10.0
95	9.0	13.6
120	11.3	17.1
150	14.2	21.4
185	17.5	26.4
240	22.6	34.3
300	28.3	42.9
400	37.7	57.1
500	47.2	71.4
630	59.4	90
800	75.5	114
1000	94.3	143

TABLE - 17

Single Core Unarmoured XLPE insulated cables												
Area (Sqmm)	Approx. Reactance (Ohm/ Km)						Approx. Capacitance (µF/km)					
	3.3kV(E) & (UE)	6.6kV(E)	11kV(E)	11kV(UE)	22kV(E)	33kV(E)	3.3kV(E) & (UE)	6.6kV(E)	11kV(E)	11kV(UE)	22kV(E)	33kV(E)
25	0.116	0.129	0.135	0.146	-	-	0.24	0.22	0.18	0.14	-	-
35	0.110	0.123	0.129	0.139	0.142	-	0.27	0.24	0.20	0.15	0.14	-
50	0.106	0.118	0.123	0.133	0.136	0.148	0.30	0.27	0.22	0.16	0.15	0.12
70	0.098	0.109	0.114	0.123	0.125	0.137	0.35	0.31	0.25	0.18	0.17	0.13
95	0.095	0.104	0.108	0.116	0.119	0.130	0.41	0.35	0.29	0.21	0.19	0.15
120	0.091	0.100	0.104	0.113	0.115	0.125	0.44	0.38	0.31	0.22	0.21	0.16
150	0.089	0.097	0.101	0.109	0.111	0.121	0.48	0.41	0.33	0.24	0.22	0.17
185	0.086	0.094	0.098	0.106	0.108	0.118	0.53	0.45	0.36	0.26	0.24	0.18
240	0.084	0.091	0.095	0.102	0.103	0.113	0.60	0.50	0.40	0.28	0.26	0.20
300	0.082	0.090	0.092	0.098	0.100	0.110	0.66	0.51	0.44	0.31	0.29	0.21
400	0.080	0.088	0.089	0.095	0.097	0.105	0.75	0.53	0.49	0.34	0.32	0.23
500	0.079	0.086	0.087	0.092	0.094	0.102	0.77	0.56	0.54	0.38	0.35	0.26
630	0.077	0.084	0.084	0.090	0.091	0.098	0.80	0.62	0.61	0.42	0.39	0.28
800	0.076	0.082	0.082	0.087	0.088	0.095	0.86	0.71	0.70	0.48	0.44	0.32
1000	0.076	0.081	0.081	0.085	0.087	0.093	0.88	0.77	0.77	0.52	0.48	0.35

TABLE - 18

Single Core Round Wire Armoured XLPE insulated cables

Area (Sqmm)	Approx. Reactance (Ohm/ Km)						Approx. Capacitance (µF/km)					
	3.3kV(E) & (UE)	6.6kV(E)	11kV(E)	11kV(UE)	22kV(E)	33kV(E)	3.3kV	6.6kV(E)	11kV(E)	11kV(UE)	22kV(E)	33kV(E)
25	0.125	0.139	0.144	0.154	-	-	0.21	0.22	0.18	0.14	-	-
35	0.119	0.133	0.137	0.147	0.15	-	0.24	0.24	0.20	0.15	0.14	-
50	0.115	0.127	0.131	0.141	0.143	0.156	0.27	0.27	0.22	0.16	0.15	0.12
70	0.107	0.117	0.121	0.131	0.133	0.145	0.31	0.31	0.25	0.18	0.17	0.13
95	0.102	0.110	0.114	0.124	0.127	0.137	0.36	0.35	0.29	0.21	0.19	0.15
120	0.098	0.107	0.112	0.121	0.123	0.133	0.39	0.38	0.31	0.22	0.21	0.16
150	0.095	0.104	0.107	0.116	0.118	0.127	0.43	0.41	0.33	0.24	0.22	0.17
185	0.093	0.101	0.106	0.112	0.115	0.124	0.47	0.45	0.36	0.26	0.24	0.18
240	0.09	0.099	0.101	0.108	0.110	0.119	0.53	0.50	0.40	0.28	0.26	0.2
300	0.087	0.096	0.098	0.105	0.106	0.117	0.58	0.51	0.44	0.31	0.29	0.21
400	0.086	0.094	0.095	0.101	0.103	0.112	0.63	0.53	0.49	0.34	0.32	0.23
500	0.084	0.092	0.093	0.100	0.101	0.108	0.66	0.56	0.54	0.38	0.35	0.26
630	0.083	0.089	0.090	0.096	0.097	0.104	0.70	0.62	0.61	0.42	0.39	0.28
800	0.081	0.088	0.089	0.093	0.094	0.100	0.72	0.71	0.70	0.48	0.44	0.32
1000	0.082	0.087	0.087	0.091	0.092	0.099	0.76	0.77	0.77	0.52	0.48	0.35

TABLE - 19

Three core XLPE insulated Armoured cables												
Area (Sqmm)	Approx. Reactance (Ohm/ Km)						Approx. Capacitance (µF/km)					
	3.3kV(E) & (UE)	6.6kV(E)	11kV(E)	11kV(UE)	22kV(E)	33kV(E)	3.3kV(E) & (UE)	6.6kV(E)	11kV(E)	11kV(UE)	22kV(E)	33kV(E)
25	0.098	0.117	0.124	0.138	-	-	0.21	0.22	0.19	0.14	-	-
35	0.094	0.112	0.118	0.132	0.135	-	0.24	0.25	0.20	0.	0.14	-
50	0.088	0.107	0.113	0.126	0.129	0.143	0.27	0.27	0.23	0.17	0.16	0.12
70	0.084	0.099	0.105	0.116	0.119	0.133	0.31	0.31	0.25	0.19	0.17	0.13
95	0.081	0.094	0.099	0.110	0.112	0.125	0.35	0.36	0.29	0.21	0.20	0.15
120	0.079	0.092	0.097	0.107	0.109	0.121	0.39	0.39	0.31	0.22	0.21	0.16
150	0.077	0.088	0.093	0.102	0.105	0.116	0.42	0.42	0.34	0.24	0.23	0.17
185	0.076	0.086	0.090	0.099	0.101	0.112	0.46	0.46	0.37	0.26	0.24	0.18
240	0.074	0.084	0.087	0.096	0.098	0.108	0.51	0.51	0.41	0.29	0.27	0.20
300	0.073	0.083	0.085	0.093	0.095	0.104	0.57	0.52	0.45	0.31	0.29	0.22
400	0.071	0.081	0.083	0.090	0.091	0.100	0.63	0.54	0.50	0.35	0.32	0.24

Table - 20**Rating factors for variation in ambient air temperature**

Air temperature, °C	25	30	35	40	45	50	55	60
Rating factor (maximum conductor temperature 90°C)	1.16	1.11	1.06	1.00	0.94	0.88	0.81	0.74

Table - 21**Rating factors for variation in ground temperature for
cables laid direct in the ground**

Ground temperature, °C	15	20	25	30	35	40	45	50
Rating factor (maximum conductor temperature 90°C)	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82

Table - 22**Rating factors for variation in ground temperature for
cables in ducts**

Ground temperature, °C	15	20	25	30	35	40	45	50
Rating factor (maximum conductor temperature 90°C)	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82

**Rating factors for depth of laying
Single or Three Core Cables laid direct in the ground**

Depth of Laying mm	3.3, 6.6 and 11 kV Cables	22 and 33 kV Cables
900	1.00	-
1050	0.99	1.00
1200	0.97	0.99
1500	0.95	0.97
1800	0.94	0.95
2000	0.93	0.94
2500	0.91	0.92
3000 or more	0.90	0.91

Table - 24

**Rating factors for depth of laying
Single or Three Core Cables in single-way ducts**

Depth of Laying mm	3.3, 6.6 and 11 kV Cables	22 and 33 kV Cables
900	1.00	-
1050	0.99	1.00
1200	0.98	0.99
1500	0.96	0.98
1800	0.95	0.96
2000	0.94	0.95
2500	0.93	0.94
3000 or more	0.92	0.93

**Rating factors for variation in thermal resistivity of soil
Three-core cables laid direct in the ground**

Nominal area of conductor mm ²	Value of Thermal Resistivity of Soil K.m./W					
	1.0	1.2	1.5	2.0	2.5	3.0
25	1.16	1.08	1.00	0.90	0.82	0.75
35	1.16	1.08	1.00	0.90	0.81	0.75
50	1.16	1.08	1.00	0.89	0.81	0.75
70	1.16	1.09	1.00	0.89	0.81	0.75
95	1.16	1.09	1.00	0.89	0.81	0.75
120	1.16	1.09	1.00	0.89	0.81	0.75
150	1.16	1.09	1.00	0.89	0.81	0.75
185	1.16	1.09	1.00	0.89	0.81	0.75
240	1.17	1.09	1.00	0.89	0.81	0.75
300	1.17	1.09	1.00	0.89	0.81	0.75
400	1.17	1.09	1.00	0.89	0.81	0.75
500	1.17	1.09	1.00	0.89	0.81	0.74

Table - 26**Rating factors for variation in thermal resistivity of soil
Three-core cables in single-way ducts**

Nominal area of conductor mm ²	Value of Thermal Resistivity of Soil K.m./W					
	1.0	1.2	1.5	2.0	2.5	3.0
25	1.07	1.04	1.00	0.93	0.89	0.84
35	1.07	1.04	1.00	0.93	0.88	0.83
50	1.07	1.04	1.00	0.93	0.88	0.83
70	1.08	1.04	1.00	0.93	0.88	0.83
95	1.08	1.05	1.00	0.93	0.87	0.83
120	1.09	1.05	1.00	0.93	0.87	0.83
150	1.09	1.05	1.00	0.93	0.87	0.83
185	1.09	1.05	1.00	0.93	0.87	0.82
240	1.09	1.05	1.00	0.93	0.87	0.82
300	1.09	1.05	1.00	0.92	0.87	0.82
400	1.10	1.06	1.00	0.92	0.87	0.82
500	1.10	1.06	1.00	0.92	0.86	0.81

Table - 27**Rating factors for variation in thermal resistivity of soil for
Three single-core cables laid direct in the ground**

Nominal area of conductor mm ²	Value of Thermal Resistivity of Soil K.m./W					
	1.0	1.2	1.5	2.0	2.5	3.0
25	1.17	1.09	1.00	0.88	0.80	0.74
35	1.18	1.10	1.00	0.88	0.80	0.74
50	1.19	1.10	1.00	0.88	0.80	0.73
70	1.19	1.10	1.00	0.88	0.80	0.73
95	1.19	1.10	1.00	0.88	0.79	0.73
120	1.19	1.10	1.00	0.88	0.79	0.73
150	1.19	1.10	1.00	0.88	0.79	0.73
185	1.19	1.10	1.00	0.88	0.79	0.72
240	1.20	1.11	1.00	0.88	0.79	0.72
300	1.20	1.11	1.00	0.87	0.79	0.72
400	1.20	1.11	1.00	0.87	0.79	0.72
500	1.20	1.11	1.00	0.87	0.79	0.72
630	1.21	1.11	1.00	0.87	0.78	0.72
800	1.21	1.11	1.00	0.87	0.78	0.72
1000	1.21	1.11	1.00	0.87	0.78	0.72

Table - 28

**Rating factors for variation in thermal resistivity of soil for
Three single-core cables in ducts**

Nominal area of conductor mm ²	Value of Thermal Resistivity of Soil K.m./W					
	1.0	1.2	1.5	2.0	2.5	3.0
25	1.11	1.05	1.00	0.92	0.85	0.80
35	1.11	1.06	1.00	0.92	0.85	0.80
50	1.12	1.06	1.00	0.92	0.85	0.79
70	1.12	1.06	1.00	0.92	0.85	0.79
95	1.12	1.07	1.00	0.91	0.84	0.79
120	1.12	1.07	1.00	0.91	0.84	0.79
150	1.12	1.07	1.00	0.91	0.84	0.78
185	1.13	1.07	1.00	0.91	0.84	0.78
240	1.13	1.07	1.00	0.90	0.83	0.78
300	1.13	1.07	1.00	0.90	0.83	0.77
400	1.14	1.08	1.00	0.90	0.83	0.77
500	1.14	1.08	1.00	0.90	0.83	0.77
630	1.14	1.08	1.00	0.90	0.82	0.76
800	1.15	1.08	1.00	0.90	0.82	0.76
1000	1.15	1.08	1.00	0.90	0.82	0.76

Table - 29

Group rating factors for three-core cables in horizontal formation laid direct in the ground

Nominal cables in group	Spacing between cables, centres, mm				
	Touching	200	400	600	800
2	0.79	0.86	0.90	0.92	0.94
3	0.67	0.77	0.82	0.86	0.89
4	0.61	0.72	0.79	0.83	0.87
5	0.56	0.68	0.76	0.81	0.85
6	0.53	0.65	0.74	0.80	0.84
7	0.50	0.63	0.72	0.78	0.83
8	0.48	0.61	0.71	0.78	-
9	0.46	0.60	0.70	0.77	-
10	0.44	0.59	0.69	-	-
11	0.43	0.58	0.69	-	-
12	0.42	0.57	0.68	-	-

Table - 30

Group rating factors for three-core cables in single-way ducts in horizontal formation

Nominal cables in group	Spacing between ducts centres, mm				
	Touching	200	400	600	800
2	0.85	0.89	0.92	0.94	0.95
3	0.75	0.81	0.86	0.89	0.71
4	0.70	0.76	0.83	0.87	0.89
5	0.65	0.73	0.80	0.85	0.88
6	0.62	0.70	0.78	0.84	0.87
7	0.59	0.68	0.77	0.82	0.86
8	0.57	0.67	0.76	0.82	-
9	0.55	0.65	0.75	0.81	-
10	0.54	0.64	0.74	-	-
11	0.52	0.63	0.74	-	-
12	0.51	0.62	0.73	-	-

Table - 31

**Group rating factors for circuits of three single-core cables,
in trefoil laid direct in the ground**

Number of trefoil in group	Spacing between trefoil group centres, mm				
	Touching	200	400	600	800
2	0.76	0.83	0.87	0.90	0.92
3	0.64	0.72	0.79	0.83	0.86
4	0.58	0.67	0.75	0.80	0.84
5	0.53	0.63	0.71	0.77	0.81
6	0.50	0.60	0.69	0.76	0.80
7	0.47	0.58	0.67	0.74	0.79
8	0.45	0.56	0.66	0.73	-
9	0.43	0.55	0.65	0.73	-
10	0.42	0.54	0.64	-	-
11	0.41	0.53	0.64	-	-
12	0.40	0.52	0.63	-	-

Table - 32

**Group rating factors for circuits of single-core cables
in single-way ducts in trefoil**

Number of cables in group	Spacing between duct group centres, mm				
	Touching	200	400	600	800
2	0.81	0.85	0.89	0.91	0.93
3	0.69	0.75	0.81	0.84	0.87
4	0.64	0.69	0.77	0.82	0.85
5	0.59	0.65	0.74	0.79	0.83
6	0.56	0.63	0.72	0.78	0.82
7	0.53	0.60	0.70	0.77	0.81
8	0.51	0.59	0.69	0.76	-
9	0.49	0.57	0.68	0.75	-
10	0.48	0.56	0.67	-	-
11	0.47	0.55	0.66	-	-
12	0.46	0.52	0.66	-	-

Table - 33

A - Group rating factors for three core Cables laid inside concrete trench with removable covers, on cable trays where air circulation is restricted. The cables spaced by one cable diameter and trays in tiers by 300 mm. The clearance of the cable from the wall is 25 mm.

No. of cables trays in tier	No. of cables				
	1	2	3	6	9
1	0.95	0.90	0.88	0.85	0.84
2	0.90	0.85	0.83	0.81	0.80
3	0.88	0.83	0.81	0.79	0.78
6	0.86	0.81	0.79	0.77	0.76

B - Group rating factors for three core Cables laid on cable trays exposed to air, the cables spaced by one cable diameter and trays in tiers by 300 mm. The clearance between the wall and the cable is 25 mm.

No. of cables trays in tier	No. of cables				
	1	2	3	6	9
1	1	0.98	0.96	0.93	0.92
2	1	0.95	0.93	0.90	0.89
3	1	0.94	0.92	0.89	0.88
6	1	0.93	0.90	0.87	0.86

C - Group rating factors for three core Cables laid on cable trays exposed to air, the cables touching and trays in tiers by 300 mm. The clearance between the wall and the cable 25 mm.

No. of trays	No. of cables per tray				
	1	2	3	6	9
1	1.0	0.84	0.80	0.75	0.73
2	1.0	0.80	0.76	0.71	0.69
3	1.0	0.78	0.74	0.70	0.68
6	1.0	0.76	0.72	0.68	0.66

Table - 34

A - Group rating factors for single core Cables laid on Racks/Trays in covered trench with removable covers where air circulation is restricted, Trefoils are separated by two cable dia horizontally and the trays are in tiers with 30 cm. gap between them.

No. of racks/ trays in tiers	No. of trefoils in Horizontal formation		
	1	2	3
1	0.95	0.90	0.88
2	0.90	0.85	0.83
3	0.88	0.83	0.81
6	0.86	0.81	0.79

B- Group rating factors for single core Cables laid as in A but in open air.

1	1.0	0.98	0.96
2	1.0	0.95	0.93
3	1.0	0.94	0.92
6	1.0	0.93	0.90

Note : All figures given in various tables are non-binding and indicative only.