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LT XLPE Cables

As per IS 7098 : Part 1 : 1988

FGI

Since 1958

POWERING INNOVATION

Fort Gloster Industries Limited

From the house of Bangurs

THINK OF CABLES - THINK OF US

For decades our products have made a mark both in the national & global markets by "powering miles and illuminating dreams". Together we with our partners & with our people coupled with emboldened processes we help our customers build a better, more sustainable world.

For more than six decades we have been your "trusted powering partner" and our products has ensured to offer improved lives of people & our customers in building the basic infrastructure irradiating miles through enabling safe & secured cabling. Our strategy reflects our legacy & our continuing commitment to meet the needs of our customers & the communities in which we live & work.

We aspire to be India's leading power cable manufacturing company with an outstanding portfolio of premium products. We are a high performing business that is sensitive to consumer & community needs. We are proud of being a responsible producer and marketeer of power cables championing a safe, trusted & responsible product which will reach millions illuminating lives.

Fort Gloster Industries had a phenomenal growth & became the first inmany developments in our country in cable trade. Incorporated in 1890 the cable division was established in 1958 to undertake production of electric wires & cables under technical collaboration with British Insulated Callendar's Company Ltd., London, UK. (BICC)

FROM CHAIRMAN'S DESK

Fort Gloster Cables have been the pioneer in cables which had commenced its commercial journey in 1958. Our aspiration remains to be a world-class organization, driven by innovation through a competitive talent pool to motivate all of us to build a sustainable business.

Our constant endeavor will remain to offer an enhanced experience in every action that will deepen our engagement at every level helping us to remain the preferred destination. Portraying our value of our people, our products and our processes.

Our people are our key differentiators. As we embark on this journey, we aim to attract & develop a talent mix of multi-level, cross-functional, subject matter specialists and domain experts who will be dedicated to give their best to every deliverable.

I strongly believe that as we build a capable & committed organization through an engaged people force, we will be well positioned to face any challenges and leverage the opportunities to reach milestones.

Our practices are all around building capabilities & we believe investing in the development of our people through tailored talent developmental programs supporting an aspirational career journey towards building a future ready organization is of paramount importance to us. Our robust rewards & recognition framework stands on the pillars of performance acknowledging accomplishments both in intrinsic & extrinsic ways.

I am convinced through innovative approaches coupled with our collective determination Fort Gloster will re-establish market authority to become the leader and the most trusted brand in the cable industry.

1873

Fort Gloster Jute Manufacturing Company Limited acquired land of the erstwhile garrison of Fort Gloster on a strategic and picturesque location along the Ganges to set up its Jute factory.

1958

The old mill was demolished and the cable division was formed to manufacture electric wires and cables in technical collaboration with the world's pioneer cable group M/S British Insulated Callenders Co. Ltd., U.K.(BICC). Company's name was changed to Fort Gloster Industries Limited, to denote its new activities.

1979

First Radial Curing Process for manufacture of High Voltage, XLPE Cables were manufactured with Sumitomo Electric, Japan for which a state of the art CCV Line was imported from Japan.

2020

The Fort Gloster Industries limited was reacquired by Gloster Limited under the leadership of Shri Hemant Bangur, son of Late Gopal Das Bangur through Corporate Insolvency Resolution Process (CIRP).

2021-22

The entire Manufacturing facility was revamped, expanding the factory premises and discarding old obsolete machineries by replacing latest machines.

2023

Fort Gloster Industries has setup state of the art manufacturing and testing facilities. It has a well- integrated quality assurance division to ensure perfection in every product. Acquired ISO 9001 certification & in process of getting our Test Equipments & Laboratory accredited by NABL.

Our strength lies in our state-of-the-art manufacturing facility supported by a well knitted geographical diversity with an ambition to continuously improve our product performance & reach to all. Our state-of-the-art quality & testing centre coupled with a dedicated team of talented people are passionate about providing the best possible experience to all from every single one of our products in every category ensuring perfection in every product.

Our ambition is to be the best performing, most trusted & respected power cable company in India.

Through our excellence & the power of quality- we set & achieve ambitious goals & the quality of our products & services reflects the power & heritage of Fort Gloster.

We are proud to produce and market the finest, safest brand with an objective to serve with utmost safety with responsibility.

BIS LICENCE (7098/PART1)

BIS LICENCE (1554/PART1)

ISO CERTIFICATE

CPRI (Bangalore) Test Report

INTRODUCTION

XLPE Insulated LT Power & Control Cables suitable for 1100 volt grade are manufactured as per IS:7098/Part 1.
Various stages of cable constructions are mentioned below.

CABLE CONSTRUCTION

Conductor

The Conductors are made from H2/H4 grade aluminium or with high conductivity copper as per IS:8130-2013.
The construction of the conductors are as under :-

Nominal cross-sectional area		Construction
Copper sq. mm.	Aluminium sq. mm	
--	1.5	Solid
1.5 to 6	2.5 to 10	Solid/Stranded
10 and above	16 and above	Stranded

In twin and multicore cables, the conductors of nominal area less than 16 sq.mm. are circular only. Conductors of nominal area 16 sq. mm. and above may be circular or shaped. In Single Core Cables, the conductor is circular only.

Insulation

Conductors are insulated with XLPE compound suitable for maximum conductor temperature of 90°C as per IS:7098 (Part1)-1988

Core Identification

Cores are identified by the following colour scheme of XLPE insulation:

No of Cores		Colour of Core
1	:	Red, Black, Yellow, Blue or Natural
2	:	Red and Black
3	:	Red, Yellow & Blue
3.5 or 4	:	Red, Yellow, Blue & Black
5	:	Red, Yellow, Blue, Black and Grey
6 & above	:	Two Adjacent cores (counting & direction core) in each layer are coloured Blue and Yellow respectively and the remaining cores are Grey or by numerals as per IS:7098 (Part1)

Laying up of Cores

In twin & Multicore cables, the required cores are laid up with suitable lay. The outermost layer is having right hand lay and the successive layers are laid with opposite lay. Whenever necessary, PVC fillers may be provided in the interstices and a suitable plastic or proofed cotton tape may be applied over the laid up cores as a binder.

Inner Sheath

The laid up cores shall be provided with an inner sheath applied either by extrusion or by wrapping. It shall be ensured that it is as circular as possible.

Armouring

Armour provides mechanical protection to the cable & it is applied over the inner sheath for multicore cables & over the insulation for single core cables. It consists of either Galvanised steel Round wire or Formed wire / flat strip. Single core armoured cables intended to be used on a.c. system are armoured with any non-magnetic materials such as hard drawn aluminium or aluminium alloy wires or strips.

Outer Sheath

Outer Sheath of extruded PVC ST2 is provided over the Armour for armoured cables, over the inner sheath for multicore unarmoured cable & over the insulation for single core unarmoured cable.

Cable Identification

The name of the manufacturer **"Fort Gloster Industries Ltd"** or Trade -mark, along with 'Electric' , Reference to this Indian Standard for example Ref IS:7098 (Part1), Type of Cable and Voltage Grade, Number of cores, Nominal Cross-Section area of conductor, Cable code, Year of Manufacture and Sequential Length Marking are printed/embossed on the outer sheath of the cables.

Cable Code

Constituent	Code Letter
Aluminium Conductor	A
XLPE Insulation	2X
Steel round wire armour	W
Non-magnetic round wire armour	Wa
Steel Strip armour	F
Non-magnetic strip armour	Fa
Double steel strip armour	FF
Double steel round wire armour	WW
PVC outer sheath	Y

*NOTE – No code letter for conductor is required when the conductor material is copper

Advantage of XLPE cables over PVC cables

XLPE Insulated Power Cables have become well-established as a suitable alternative over PVC insulated cables because of the following reasons:

- Higher continuous current carrying capacity
- Higher operating temperature of 90°C and short circuit temperature 250°C
- Emergency Overload capacity is more (upto130°C)
- Higher short circuit rating
- Lower Di-electric loss
- Higher Insulation resistance.
- Lower Overall diameter, lower weight, lower minimum bending radius – easier for handling & installation.
- Does not produce toxic fumes while burning
- Longer Service Life.

Table X1

Single Core XLPE Insulated Armoured & Unarmoured Cable with Aluminium Conductor Conforming to IS : 7098 Part 1 : 1988

Physical Parameters:

Nominal Cross-Sectional Area	Thickness of Insulation (Nominal)		Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
	Arm	Un-Arm	Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
											kg/km	kg/km	kg/km
mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	A1	A1	A1
4	1.0	0.7	1.40	---	1.24	---	1.80	10.0	---	8.0	120	---	75
6	1.0	0.7	1.40	---	1.24	---	1.80	11.0	---	8.5	140	---	90
10	1.0	0.7	1.40	---	1.24	---	1.80	11.5	---	9.5	160	---	110
16	1.0	0.7	1.40	---	1.24	---	1.80	12.5	---	10.5	190	---	135
25	1.2	0.9	1.40	---	1.24	---	1.80	14.0	---	12.0	250	---	180
35	1.2	0.9	1.40	---	1.24	---	1.80	15.0	---	13.0	290	---	215
50	1.3	1.0	1.40	---	1.24	---	1.80	16.5	---	14.5	350	---	270
70	1.4	1.1	1.40	---	1.24	---	1.80	18.5	---	16.5	445	---	355
95	1.4	1.1	1.60	4.0 x 0.8	1.40	1.40	1.80	21.0	19.0	18.0	585	520	440
120	1.5	1.2	1.60	4.0 x 0.8	1.40	1.40	1.80	22.5	21.0	19.5	680	620	530
150	1.7	1.4	1.60	4.0 x 0.8	1.40	1.40	2.00	24.0	22.5	21.5	795	725	650
185	1.9	1.6	1.60	4.0 x 0.8	1.40	1.40	2.00	26.5	25.0	24.0	950	865	785
240	2.0	1.7	1.60	4.0 x 0.8	1.40	1.40	2.00	29.0	27.5	26.5	1160	1070	975
300	2.1	1.8	1.60	4.0 x 0.8	1.56	1.56	2.00	31.0	29.5	28.5	1390	1285	1165
400	2.4	2.0	2.00	4.0 x 0.8	1.56	1.56	2.20	36.0	33.5	32.5	1795	1610	1485
500	2.6	2.2	2.00	4.0 x 0.8	1.56	1.56	2.20	39.0	36.5	35.5	2180	1980	1845
630	2.8	2.4	2.00	4.0 x 0.8	1.72	1.72	2.20	43.5	41.0	40.0	2700	2480	2295
800	3.1	2.6	2.00	4.0 x 0.8	1.88	1.72	2.40	48.5	46.0	44.5	3360	3070	2890
1000	3.3	2.8	2.50	4.0 x 0.8	2.04	1.88	2.60	54.5	50.5	49.5	4225	3750	3570

Electrical Parameters:

Nominal Cross-Sectional Area	Max DC Resistance of Conductor at 20°C	Approximate AC Resistance at Max Operating Temperature 90°C	Approximate Reactamce at 50Hz		Current Rating			Short Circuit Rating for 1 Sec	Voltage Drop for Round Wire
			Round Wire Armoured	Un-Arm	Direct in Ground at 30°C	In Duct at 30°C	In Air at 40°C		
mm²	Ω/km	Ω/km	Ω/km	Ω/km	Amps	Amps	Amps	kA(rms)	V/A/km
	A1	A1	A1	A1	A1	A1	A1	A1	A1
4	7.41	9.50	0.150	0.136	37	34	33	0.38	19.01
6	4.61	5.91	0.142	0.126	47	43	43	0.56	11.83
10	3.08	3.95	0.129	0.117	59	54	55	0.94	7.90
16	1.91	2.45	0.124	0.113	76	69	72	1.50	4.90
25	1.20	1.54	0.117	0.107	98	89	98	2.35	3.09
35	0.868	1.113	0.112	0.103	116	106	119	3.29	2.24
50	0.641	0.822	0.108	0.100	137	124	145	4.70	1.66
70	0.443	0.568	0.100	0.092	168	151	185	6.58	1.15
95	0.32	0.410	0.099	0.089	202	181	235	8.93	0.84
120	0.253	0.324	0.095	0.086	230	206	276	11.28	0.68
150	0.206	0.264	0.094	0.086	256	229	314	14.10	0.56
185	0.164	0.210	0.091	0.085	290	258	366	17.39	0.46
240	0.125	0.160	0.089	0.083	335	298	434	22.56	0.37
300	0.100	0.128	0.087	0.082	376	333	500	28.20	0.31
400	0.0778	0.0998	0.087	0.080	429	378	589	37.60	0.26
500	0.0605	0.0776	0.085	0.079	485	426	685	47.00	0.23
630	0.0469	0.0601	0.083	0.078	546	477	793	59.22	0.21
800	0.0367	0.0471	0.082	0.076	608	528	907	75.20	0.19
1000	0.0291	0.0373	0.082	0.076	665	575	1022	94.00	0.18

Table X2

Two Core XLPE Insulated Armoured & Unarmoured Cable with Aluminium Conductor Conforming to IS : 7098 Part 1 : 1988

Physical Parameters:

Nominal Cross-Sectional Area	Thickness of Insulation (Nominal)	Thickness of Inner Sheath (Minimum)	Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
			Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
											kg/km	kg/km	kg/km
mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	A1	A1	A1
4	0.7	0.3	1.40	---	1.24	---	1.80	14.5	---	13.0	405	---	200
6	0.7	0.3	1.40	---	1.24	---	1.80	16.0	---	14.5	470	---	245
10	0.7	0.3	1.40	---	1.24	---	1.80	17.5	---	16.0	565	---	310
16	0.7	0.3	1.40	---	1.40	---	1.80	18.0	---	16.5	485	---	255
25	0.9	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	19.0	17.5	17.0	670	510	365
35	0.9	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	20.5	18.5	18.5	790	605	440
50	1.0	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	22.5	20.5	20.5	935	750	545
70	1.1	0.3	1.60	4.0 x 0.8	1.56	1.56	2.00	25.5	24.0	23.0	1180	950	715
95	1.1	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	28.5	26.0	26.0	1585	1185	930
120	1.2	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	31.0	28.5	28.0	1835	1380	1115
150	1.4	0.4	2.00	4.0 x 0.8	1.72	1.72	2.20	34.0	31.5	31.0	2170	1660	1330
185	1.6	0.5	2.00	4.0 x 0.8	1.88	1.72	2.40	37.5	35.0	34.5	2580	1985	1655
240	1.7	0.5	2.50	4.0 x 0.8	2.04	1.88	2.60	42.0	38.5	38.0	3410	2445	2080
300	1.8	0.6	2.50	4.0 x 0.8	2.20	2.04	2.80	46.0	42.5	42.0	3985	2960	2550
400	2.0	0.6	2.50	4.0 x 0.8	2.36	2.36	3.00	51.5	48.0	47.5	4855	3695	3200
500	2.2	0.7	3.15	4.0 x 0.8	2.68	2.52	3.40	59.0	54.0	54.0	6455	4600	4095
630	2.4	0.7	3.15	4.0 x 0.8	2.84	2.68	3.60	64.5	59.5	60.0	7740	5625	5085

Electrical Parameters:

Nominal Cross-Sectional Area	Max DC Resistance of Conductor at 20°C	Approximate AC Resistance at Max Operating Temperature 90°C	Approximate Reactance at 50Hz	Current Rating			Short Circuit Rating for 1 Sec	Voltage Drop
				Direct in Ground at 30°C	In Duct at 30°C	In Air at 40°C		
mm²	Ω/km	Ω/km	Ω/km	Amps	Amps	Amps	kA(rms)	V/A/km
	A1	A1	A1	A1	A1	A1	A1	A1
4	7.41	9.50	0.093	42	36	38	0.38	16.46
6	4.61	5.91	0.089	55	46	50	0.56	10.24
10	3.08	3.95	0.084	68	57	64	0.94	6.84
16	1.91	2.45	0.081	89	74	83	1.50	4.24
25	1.20	1.54	0.081	114	95	109	2.35	2.67
35	0.868	1.113	0.079	136	113	133	3.29	1.93
50	0.641	0.822	0.078	161	134	162	4.70	1.43
70	0.443	0.568	0.074	197	164	204	6.58	0.99
95	0.32	0.410	0.072	235	196	251	8.93	0.72
120	0.253	0.324	0.072	266	222	287	11.28	0.58
150	0.206	0.264	0.072	296	248	328	14.10	0.47
185	0.164	0.210	0.072	335	281	379	17.39	0.39
240	0.125	0.160	0.071	385	324	448	22.56	0.30
300	0.100	0.128	0.071	432	364	513	28.20	0.25
400	0.0778	0.0998	0.070	487	412	593	37.60	0.21
500	0.0605	0.0776	0.070	548	463	683	47.00	0.18
630	0.0469	0.0601	0.070	612	518	784	59.22	0.16

Table X3

Three Core XLPE Insulated Armoured & Unarmoured Cable with Aluminium Conductor Conforming to IS : 7098 Part 1 : 1988

Physical Parameters:

Nominal Cross-Sectional Area	Thickness of Insulation (Nominal)	Thickness of Inner Sheath (Minimum)	Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
			Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
											kg/km	kg/km	kg/km
mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	A1	A1	A1
4	0.7	0.3	1.40	---	1.24	---	1.80	15.5	---	14.0	400	---	190
6	0.7	0.3	1.40	---	1.24	---	1.80	16.5	---	15.0	460	---	225
10	0.7	0.3	1.40	---	1.24	---	1.80	18.5	---	17.0	560	---	280
16	0.7	0.3	1.60	4.0 x 0.8	1.40	1.24	1.80	18.5	16.5	16.0	655	480	325
25	0.9	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	21.5	20.0	20.0	865	670	475
35	0.9	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	23.0	21.5	21.0	990	790	575
50	1.0	0.3	1.60	4.0 x 0.8	1.56	1.40	2.00	27.0	25.0	24.5	1265	990	740
70	1.1	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	30.5	28.0	28.0	1750	1300	1010
95	1.1	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	34.0	31.5	31.0	2115	1605	1280
120	1.2	0.4	2.00	4.0 x 0.8	1.72	1.56	2.20	36.5	34.0	33.5	2470	1905	1540
150	1.4	0.5	2.00	4.0 x 0.8	1.88	1.72	2.40	41.0	38.0	38.0	2960	2325	1905
185	1.6	0.5	2.50	4.0 x 0.8	2.04	1.88	2.60	46.0	42.5	42.0	3855	2800	2345
240	1.7	0.6	2.50	4.0 x 0.8	2.20	2.04	2.80	50.5	46.5	46.5	4640	3480	2975
300	1.8	0.6	2.50	4.0 x 0.8	2.36	2.20	3.00	56.5	53.0	52.5	5545	4230	3650
400	2.0	0.7	3.15	4.0 x 0.8	2.68	2.52	3.20	63.5	58.5	58.0	7305	5260	4585
500	2.2	0.7	3.15	4.0 x 0.8	2.84	2.68	3.60	68.0	63.0	63.0	8680	6440	5775
630	2.4	0.7	4.00	4.0 x 0.8	3.00	2.84	3.80	79.5	72.5	72.5	11590	8025	7260

Table X4

3½ Core XLPE Insulated Armoured & Unarmoured Cable with Aluminium Conductor Conforming to IS : 7098 Part 1 : 1988

Physical Parameters:

Nominal Cross-Sectional Area		Thickness of Insulation (Nominal)		Thickness of Inner Sheath (Minimum)	Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
		Phase	Neutral		Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
													kg/km	kg/km	kg/km
mm²	mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	A1	A1	A1
25	16	0.9	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	23.0	21.5	21.0	960	760	545
35	16	0.9	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	24.5	23.0	23.0	1115	885	650
50	25	1.0	0.9	0.3	1.60	4.0 x 0.8	1.56	1.40	2.00	28.0	26.0	26.0	1395	1110	840
70	35	1.1	0.9	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	32.5	30.0	30.0	1960	1480	1150
95	50	1.1	1.0	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	36.5	34.0	33.5	2375	1835	1470
120	70	1.2	1.1	0.4	2.00	4.0 x 0.8	1.72	1.72	2.20	39.5	37.0	36.5	2830	2235	1795
150	70	1.4	1.1	0.5	2.00	4.0 x 0.8	1.88	1.72	2.40	44.0	41.0	41.0	3315	2625	2165
185	95	1.6	1.1	0.5	2.50	4.0 x 0.8	2.04	1.88	2.60	50.0	46.0	46.0	4365	3210	2700
240	120	1.7	1.2	0.6	2.50	4.0 x 0.8	2.20	2.04	2.80	55.5	52.0	52.0	5295	4000	3440
300	150	1.8	1.4	0.6	2.50	4.0 x 0.8	2.36	2.20	3.00	60.0	56.5	56.5	6220	4785	4175
400	185	2.0	1.6	0.7	3.15	4.0 x 0.8	2.68	2.52	3.40	68.0	63.0	63.0	8215	5975	5305
500	240	2.2	1.7	0.7	3.15	4.0 x 0.8	2.84	2.68	3.60	75.0	70.0	70.0	9870	7400	6665
630	300	2.4	1.8	0.7	4.00	4.0 x 0.8	3.00	3.00	4.00	86.0	79.5	79.5	13050	9225	8400

Table X5

Four Core XLPE Insulated Armoured & Unarmoured Cable with Aluminium Conductor Conforming to IS: 7098 Part 1 : 1988

Physical Parameters:

Nominal Cross-Sectional Area	Thickness of Insulation (Nominal)	Thickness of Inner Sheath (Minimum)	Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
			Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
											kg/km	kg/km	kg/km
mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	A1	A1	A1
4	0.7	0.3	1.40	---	1.24	---	1.80	16.5	---	15.0	455	---	220
6	0.7	0.3	1.40	---	1.24	---	1.80	18.0	---	16.5	535	---	265
10	0.7	0.3	1.40	---	1.40	---	1.80	20.5	---	18.5	665	---	335
16	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	1.80	20.5	18.5	18.0	775	590	400
25	0.9	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	24.0	22.5	22.0	1040	825	590
35	0.9	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	26.0	24.0	24.0	1215	980	725
50	1.0	0.3	1.60	4.0 x 0.8	1.56	1.56	2.00	30.0	28.5	27.5	1535	1240	925
70	1.1	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	34.5	32.0	31.5	2140	1630	1280
95	1.1	0.4	2.00	4.0 x 0.8	1.72	1.56	2.20	39.0	36.0	36.0	2650	2050	1640
120	1.2	0.5	2.00	4.0 x 0.8	1.88	1.72	2.40	42.5	40.0	39.5	3135	2475	2035
150	1.4	0.5	2.50	4.0 x 0.8	2.04	1.88	2.60	47.5	43.5	43.5	4025	2950	2475
185	1.6	0.5	2.50	4.0 x 0.8	2.20	2.04	2.80	53.0	49.0	49.0	4845	3585	3065
240	1.7	0.6	2.50	4.0 x 0.8	2.36	2.20	3.00	59.0	55.0	55.0	5880	4505	3915
300	1.8	0.7	3.15	4.0 x 0.8	2.52	2.36	3.20	66.5	61.5	61.5	7650	5465	4800
400	2.0	0.7	3.15	4.0 x 0.8	2.84	2.68	3.60	75.0	70.0	70.0	9310	6840	6100
500	2.2	0.7	4.00	4.0 x 0.8	3.00	2.84	3.80	84.5	77.5	78.0	12280	8470	7650
630	2.4	0.7	4.00	4.0 x 0.8	3.00	3.00	4.00	93.0	86.5	87.0	14705	10475	9560

Electrical Parameters of XLPE Insulated 3 Core, 3½ Core & 4 Core Armoured & Unarmoured cable with Aluminium Conductor Conforming to IS:7098 Part 1 : 1988

Nominal Cross-Sectional Area	Max DC Resistance of Conductor at 20°C	Approximate AC Resistance at Max Operating Temperature 90°C	Approximate Reactance at 50Hz	Current Rating			Short Circuit Rating for 1 Sec	Voltage Drop
				Direct in Ground at 30°C	In Duct at 30°C	In Air at 40°C		
mm²	Ω/km	Ω/km	Ω/km	Amps	Amps	Amps	kA(rms)	V/A/km
	A1	A1	A1	A1	A1	A1	A1	A1
4	7.41	9.50	0.093	35	30	32	0.38	16.46
6	4.61	5.91	0.089	46	38	42	0.56	10.24
10	3.08	3.95	0.084	57	48	54	0.94	6.84
16	1.91	2.45	0.081	74	61	69	1.50	4.24
25	1.20	1.54	0.081	95	79	93	2.35	2.67
35	0.868	1.113	0.079	114	94	114	3.29	1.93
50	0.641	0.822	0.078	134	112	138	4.70	1.43
70	0.443	0.568	0.074	164	137	175	6.58	0.99
95	0.32	0.410	0.072	197	164	216	8.93	0.72
120	0.253	0.324	0.072	223	187	249	11.28	0.58
150	0.206	0.264	0.072	249	209	284	14.10	0.47
185	0.164	0.210	0.072	282	238	329	17.39	0.39
240	0.125	0.160	0.071	327	276	392	22.56	0.30
300	0.100	0.128	0.071	369	312	452	28.20	0.25
400	0.0778	0.0998	0.070	420	356	526	37.60	0.21
500	0.0605	0.0776	0.070	478	412	612	47.00	0.18
630	0.0469	0.0601	0.070	542	468	712	59.22	0.16

Table X6

XLPE Insulated Armoured & Unarmoured Control Cable with Copper Conductor of 1.5 mm²

Conforming to IS : 7098 Part 1 : 1988

Physical Parameters:

No. of Cores X Nominal Cross-Sectional Area	Thickness of Insulation (Nominal)	Thickness of Inner Sheath (Minimum)	Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
			Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
No x mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg/km	kg/km	kg/km
2 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	12.5	---	11.0	320	---	160
3 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	13.0	---	11.5	335	---	165
4 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	14.0	---	12.5	385	---	190
5 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	15.0	---	13.5	420	---	220
6 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	16.0	---	14.5	475	---	250
7 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	16.0	---	14.5	490	---	265
10 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	19.0	---	17.5	650	---	355
12 x 1.5	0.7	0.3	1.40	---	1.24	---	1.80	19.5	---	18.0	700	---	400
14 x 1.5	0.7	0.3	1.40	---	1.40	---	1.80	20.5	---	18.5	775	---	445
19 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	1.80	22.5	21.0	20.5	990	790	555
24 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	26.0	24.0	24.0	1195	955	700
27 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	26.5	24.5	24.5	1255	1015	760
30 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	27.0	25.5	25.0	1345	1100	825
37 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	29.0	27.5	27.0	1540	1265	970
44 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.56	1.40	2.00	32.5	30.5	30.0	1800	1465	1135
52 x 1.5	0.7	0.3	1.60	4.0 x 0.8	1.56	1.56	2.00	33.5	32.0	31.5	1995	1675	1295
61 x 1.5	0.7	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	36.5	34.0	34.0	2430	1890	1525

Electrical Parameters:

No. of Cores X Nominal Cross-Sectional Area	Max DC Resistance of Conductor at 20°C	Approximate AC Resistance at Max Operating Temperature 90°C	Approximate Reactance at 50Hz	Current Rating			Short Circuit Rating for 1 Sec	Voltage Drop for Round Wire
				Direct in Ground at 30°C	In Duct at 30°C	In Air at 40°C		
No x mm²	Ω/km	Ω/km	Ω/km	Amps	Amps	Amps	kA(rms)	V/A/km
2 x 1.5	12.1	15.43	0.105	31	27	27	0.21	26.72
3 x 1.5	12.1	15.43	0.105	26	22	23	0.21	26.72
4 x 1.5	12.1	15.43	0.105	26	22	23	0.21	26.72
5 x 1.5	12.1	15.43	0.105	26	22	23	0.21	26.72
6 x 1.5	12.1	15.43	0.105	21	18	18	0.21	26.72
7 x 1.5	12.1	15.43	0.105	20	17	17	0.21	26.72
10 x 1.5	12.1	15.43	0.105	17	15	15	0.21	26.72
12 x 1.5	12.1	15.43	0.105	16	14	14	0.21	26.72
14 x 1.5	12.1	15.43	0.105	16	14	14	0.21	26.72
19 x 1.5	12.1	15.43	0.105	14	12	12	0.21	26.72
24 x 1.5	12.1	15.43	0.105	13	11	11	0.21	26.72
27 x 1.5	12.1	15.43	0.105	12	11	11	0.21	26.72
30 x 1.5	12.1	15.43	0.105	12	11	11	0.21	26.72
37 x 1.5	12.1	15.43	0.105	11	10	10	0.21	26.72
44 x 1.5	12.1	15.43	0.105	11	9	9	0.21	26.72
52 x 1.5	12.1	15.43	0.105	10	9	9	0.21	26.72
61 x 1.5	12.1	15.43	0.105	9	8	8	0.21	26.72

Table X7

XLPE Insulated Armoured & Unarmoured Control Cable with Copper Conductor of 2.5 mm²

Conforming to IS : 7098 Part 1 : 1988

Physical Parameters:

No. of Cores X Nominal Cross-Sectional Area	Thickness of Insulation (Nominal)	Thickness of Inner Sheath (Minimum)	Dimension of Armour (Nominal)		Thickness of Outer Sheath			Approximate Overall Diameter			Approximate Net Weight of Cable		
			Round Wire	Flat Strip	Round Wire (Min)	Flat Strip (Min)	Un-arm (Nom)	Round Wire	Flat Strip	Un-arm	Round Wire Arm-oured	Flat Strip Arm-oured	Unarm-oured
No x mm²	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg/km	kg/km	kg/km
2 x 2.5	0.7	0.3	1.40	---	1.24	---	1.80	13.5	---	12.0	380	---	200
3 x 2.5	0.7	0.3	1.40	---	1.24	---	1.80	14.0	---	12.5	395	---	205
4 x 2.5	0.7	0.3	1.40	---	1.24	---	1.80	15.0	---	13.5	455	---	240
5 x 2.5	0.7	0.3	1.40	---	1.24	---	1.80	16.0	---	14.5	505	---	280
6 x 2.5	0.7	0.3	1.40	---	1.24	---	1.80	17.0	---	15.5	565	---	320
7 x 2.5	0.7	0.3	1.40	---	1.24	---	1.80	17.0	---	15.5	590	---	345
10 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.24	1.80	21.5	19.5	19.0	860	665	470
12 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	1.80	22.0	20.5	19.5	935	745	530
14 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	1.80	23.0	21.0	20.5	1030	830	595
19 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	25.0	23.0	23.0	1240	1010	775
24 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	28.5	26.5	26.5	1510	1250	955
27 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	29.0	27.5	27.0	1610	1335	1045
30 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.40	1.40	2.00	30.0	28.0	28.0	1715	1425	1135
37 x 2.5	0.7	0.3	1.60	4.0 x 0.8	1.56	1.40	2.00	32.0	30.5	30.0	2005	1685	1350
44 x 2.5	0.7	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	36.5	34.5	34.0	2565	2000	1635
52 x 2.5	0.7	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	38.0	36.0	35.5	2845	2255	1870
61 x 2.5	0.7	0.4	2.00	4.0 x 0.8	1.56	1.56	2.20	40.0	38.0	37.5	3165	2570	2140

Electrical Parameters:

No. of Cores X Nominal Cross-Sectional Area	Max DC Resistance of Conductor at 20°C	Approximate AC Resistance at Max Operating Temperature 90°C	Approximate Reactamce at 50Hz	Current Rating			Short Circuit Rating for 1 Sec	Voltage Drop
				Direct in Ground at 30°C	In Duct at 30°C	In Air at 40°C		
No x mm²	Ω/km	Ω/km	Ω/km	Amps	Amps	Amps	kA(rms)	V/A/km
2 x 2.5	7.41	9.45	0.099	41	35	36	0.36	16.37
3 x 2.5	7.41	9.45	0.099	34	29	30	0.36	16.37
4 x 2.5	7.41	9.45	0.099	34	29	30	0.36	16.37
5 x 2.5	7.41	9.45	0.099	34	29	30	0.36	16.37
6 x 2.5	7.41	9.45	0.099	27	23	24	0.36	16.37
7 x 2.5	7.41	9.45	0.099	26	22	23	0.36	16.37
10 x 2.5	7.41	9.45	0.099	23	20	20	0.36	16.37
12 x 2.5	7.41	9.45	0.099	22	19	19	0.36	16.37
14 x 2.5	7.41	9.45	0.099	21	18	18	0.36	16.37
19 x 2.5	7.41	9.45	0.099	18	16	16	0.36	16.37
24 x 2.5	7.41	9.45	0.099	17	15	15	0.36	16.37
27 x 2.5	7.41	9.45	0.099	16	14	14	0.36	16.37
30 x 2.5	7.41	9.45	0.099	16	14	14	0.36	16.37
37 x 2.5	7.41	9.45	0.099	15	13	13	0.36	16.37
44 x 2.5	7.41	9.45	0.099	14	12	12	0.36	16.37
52 x 2.5	7.41	9.45	0.099	14	12	12	0.36	16.37
61 x 2.5	7.41	9.45	0.099	12	11	11	0.36	16.37

- The above data is indicative & subject to manufacturing tolerance
- Conductors up-to & including 10mm² will be Non-compacted & Circular Shaped
- Conductors Sizes 16mm² & above will be Compacted Circular for Single core Cable and Compacted Shaped for Multicore 2Core, 3Core, 3.5Core & 4Core Cable.
- Operating Conditions: | Thermal Resistivity of Soil : 1.5 K.m/W | Depth of Laying : 750 mm

  (i) Maximum Conductor Temperature: 90°C (ii) Ambient air temperature : 40°C (iii) Ground temperature : 30°C (iv) Depth of laying : 750 mm.

RATING FACTOR

For variation in Ambient Air temperature for Cables in Free Air.

Maximum Conductor temperature (°C)	25	30	35	40	45	50	55	60
Rating factors	1.14	1.10	1.05	1.00	0.95	0.89	0.84	0.77

For variation in Ground temperature for Direct Buried Cable

Maximum Conductor temperature (°C)	15	20	25	30	35	40	45	50
Rating factors	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82

Rating factors for variation in depth of laying

RATING FACTORS

For depth of laying (Cables laid in ground)

Depth of laying	Size		
cm	up to 25 mm^2	Above 25 mm^2 up to 300 mm^2	Above 300 mm^2
75	1.00	1.00	1.00
90	0.99	0.98	0.97
105	0.98	0.97	0.96
120	0.97	0.96	0.95
150	0.96	0.94	0.92
180 or more	0.95	0.93	0.91

Rating factors for variation in thermal resistivity of soil

RATING FACTORS

For variation in thermal resistivity of soil
(Twin and multi-core cables laid direct in the ground)

Normal area of conductor mm^2	For values for Thermal Resistivity of Soil in °C cm/W					
	100	120	150	200	250	300
1.5	1.10	1.05	1.0	0.92	0.86	0.81
2.5	1.10	1.05	1.0	0.92	0.86	0.81
4	1.10	1.05	1.0	0.92	0.86	0.81
6	1.10	1.05	1.0	0.92	0.86	0.81
10	1.10	1.06	1.0	0.92	0.85	0.80
16	1.12	1.06	1.0	0.91	0.84	0.79
25	1.14	1.08	1.0	0.91	0.84	0.78
35	1.15	1.08	1.0	0.91	0.84	0.77
50	1.15	1.08	1.0	0.91	0.84	0.77
70	1.15	1.08	1.0	0.90	0.83	0.76
95	1.15	1.08	1.0	0.90	0.83	0.76
120	1.17	1.09	1.0	0.90	0.82	0.76
150	1.17	1.09	1.0	0.90	0.82	0.76
185	1.18	1.09	1.0	0.89	0.81	0.75
240	1.18	1.09	1.0	0.89	0.81	0.75
300	1.18	1.09	1.0	0.89	0.81	0.75
400	1.19	1.10	1.0	0.89	0.81	0.75

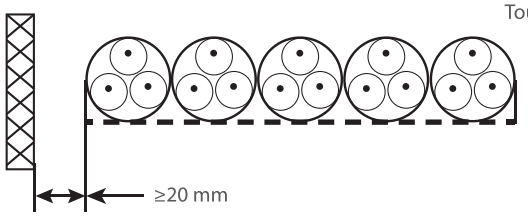
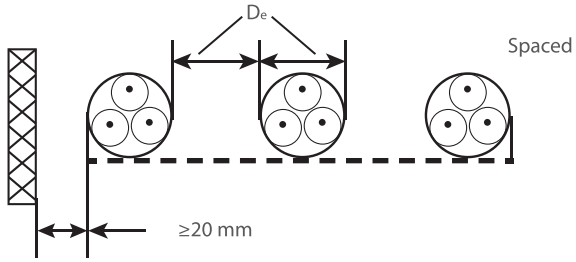
RATING FACTORS

For variation in thermal resistivity of soil
(two and three single-core cables laid direct in the ground)

Normal area of conductor mm²	Two cables touching, for values for Thermal Resistivity of Soil in °C cm/W					
	100	120	150	200	250	300
1.5	1.15	1.08	1.0	0.91	0.84	0.78
2.5	1.15	1.08	1.0	0.91	0.84	0.78
4	1.15	1.08	1.0	0.91	0.84	0.78
6	1.15	1.08	1.0	0.91	0.84	0.78
10	1.15	1.08	1.0	0.90	0.83	0.77
16	1.17	1.09	1.0	0.90	0.83	0.77
25	1.18	1.09	1.0	0.90	0.82	0.76
35	1.18	1.09	1.0	0.90	0.82	0.75
50	1.18	1.09	1.0	0.90	0.82	0.75
70	1.19	1.09	1.0	0.89	0.81	0.74
95	1.19	1.09	1.0	0.89	0.81	0.74
120	1.21	1.10	1.0	0.89	0.80	0.74
150	1.21	1.10	1.0	0.89	0.80	0.74
185	1.21	1.10	1.0	0.89	0.80	0.74
240	1.21	1.10	1.0	0.89	0.80	0.74
300	1.21	1.10	1.0	0.89	0.80	0.74
400	1.21	1.10	1.0	0.88	0.80	0.74
500	1.21	1.10	1.0	0.88	0.80	0.74
630	1.22	1.10	1.0	0.88	0.80	0.74

Normal area of conductor mm²	Three cables in Trefoil touching, for values for Thermal Resistivity of Soil in °C cm/W					
	100	120	150	200	250	300
1.5	1.18	1.09	1.0	0.90	0.82	0.76
2.5	1.18	1.09	1.0	0.90	0.82	0.76
4	1.18	1.09	1.0	0.90	0.82	0.76
6	1.18	1.09	1.0	0.90	0.82	0.76
10	1.18	1.09	1.0	0.90	0.82	0.76
16	1.19	1.09	1.0	0.89	0.81	0.74
25	1.19	1.09	1.0	0.89	0.81	0.74
35	1.20	1.09	1.0	0.88	0.80	0.74
50	1.20	1.09	1.0	0.88	0.80	0.74
70	1.21	1.10	1.0	0.88	0.80	0.74
95	1.22	1.10	1.0	0.88	0.80	0.74
120	1.22	1.10	1.0	0.88	0.79	0.74
150	1.22	1.10	1.0	0.88	0.79	0.73
185	1.22	1.10	1.0	0.88	0.79	0.73
240	1.22	1.10	1.0	0.88	0.79	0.73
300	1.22	1.10	1.0	0.88	0.79	0.72
400	1.24	1.11	1.0	0.88	0.79	0.72
500	1.22	1.10	1.0	0.88	0.79	0.72
630	1.22	1.10	1.0	0.88	0.79	0.72

Table 5 Group Rating Factors for Multi-Core Cables in Air on Perforated Trays

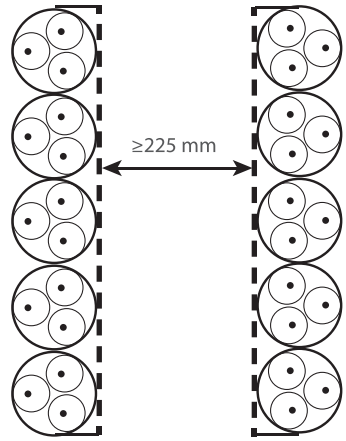
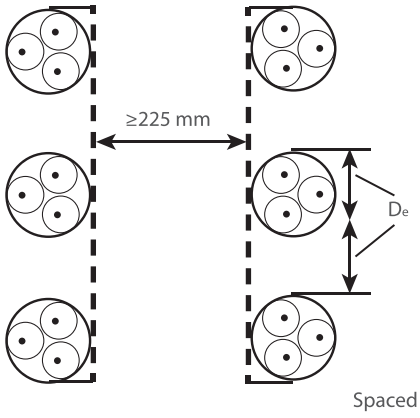
	Number of Trays	Number of Cables					
		1	2	3	4	6	9
Touching 	1	1.00	0.88	0.82	0.79	0.76	0.73
	2	1.00	0.87	0.80	0.77	0.73	0.68
	3	1.00	0.86	0.79	0.76	0.71	0.66
Spaced 	1	1.00	1.00	0.98	0.95	0.91	-
	2	1.00	0.99	0.96	0.92	0.87	-
	3	1.00	0.98	0.95	0.91	0.85	-

NOTES

Factors apply to single layer groups of cables as shown above. Factors for cables installed in more than one layer touching each other will be significantly lower and must be determined by an appropriate method.

Factors are given for vertical spacing between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing , the factors should be reduced.

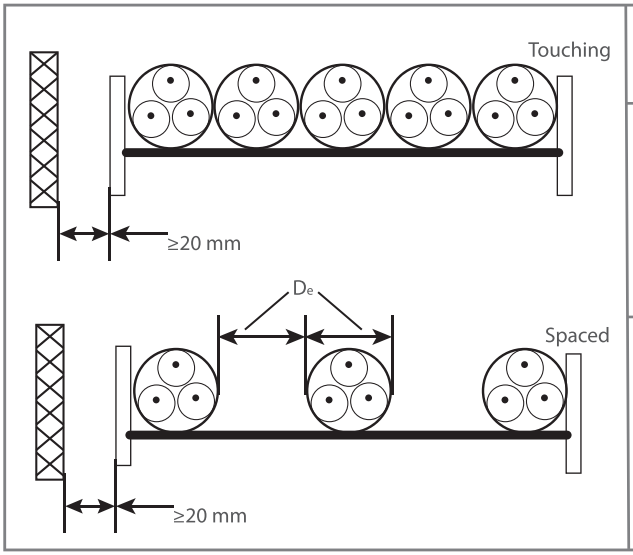
Table 6 Group Rating Factors for Multi-Core Cables in Air on Vertical Perforated Trays

	Number of Trays	Number of Cables					
		1	2	3	4	6	9
 Touching	1	1.00	0.88	0.82	0.78	0.73	0.72
	2	1.00	0.88	0.81	0.76	0.71	0.70
 Spaced	1	1.00	0.91	0.89	0.88	0.87	-
	2	1.00	0.91	0.88	0.87	0.85	-

NOTES

Factors are given for horizontal spacing between trays of 225 mm with trays mounted back-to-back. For closer spacing the factors should be reduced.

Table 7 Group Rating Factors for Multi-Core Cables in Air on Ladder Supports, Cleats, etc.



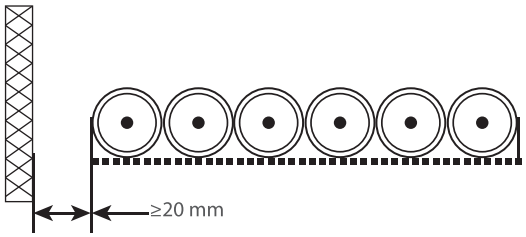
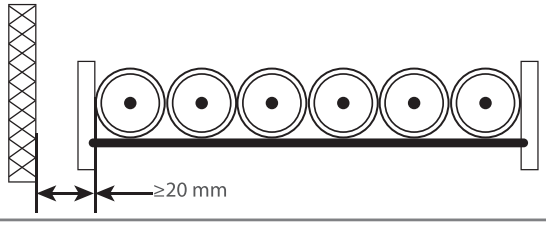
Number of Trays	Number of Cables					
	1	2	3	4	6	9
1	1.00	0.87	0.82	0.80	0.79	0.78
2	1.00	0.86	0.80	0.78	0.76	0.73
3	1.00	0.85	0.79	0.76	0.73	0.70
1	1.00	1.00	1.00	1.00	1.00	-
2	1.00	0.99	0.98	0.97	0.96	-
3	1.00	0.98	0.97	0.96	0.93	-

NOTES

Factors apply to single layer groups of cables as shown above. Factors for cables installed in more than one layer touching each other will be significantly lower and must be determined by an appropriate method.

Factors are given for vertical spacing between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing, the factors should be reduced.

Table 8 Group Rating Factors to be Applied for Circuits of Three Single-core Cables in Air Flat Touching

	Number of Trays	Number of Three-Phase Circuits		
		1	2	3
Cables on perforated trays 	1	0.98	0.91	0.87
	2	0.96	0.87	0.81
	3	0.95	0.85	0.78
Cables on ladder supports, cleats, ctc 	1	1.00	0.97	0.96
	2	0.98	0.93	0.89
	3	0.97	0.90	0.86

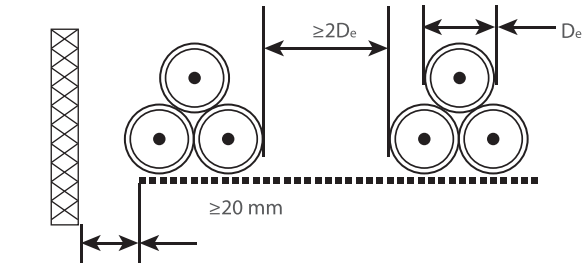
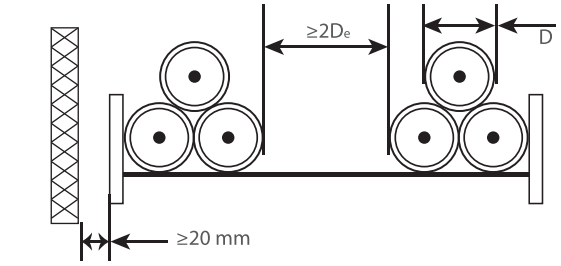
NOTES

Factors are given for single layers of cables as shown above. Factors for cables installed in more than one layer touching each other will be significantly lower and must be determined by an appropriate method.

Factors are given for vertical spacing between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing, the factors should be reduced.

For circuits having more than one cable in parallel per phase, each three phase set of conductors should be considered as a circuit for the purpose of this table.

Table 9 Group Rating Factors to be Applied for Circuits of Three Single Core Cables in Air on Perforated Trays and Ladder Supports in Trefoil Formation

	Number of Trays	Number of Three-Phase Circuits		
		1	2	3
Cables on perforated trays 	1	1.00	0.98	0.96
	2	0.97	0.93	0.89
	3	0.96	0.92	0.86
Cables on ladder supports, cleats, etc 	1	1.00	1.00	1.00
	2	0.97	0.95	0.93
	3	0.96	0.94	0.90

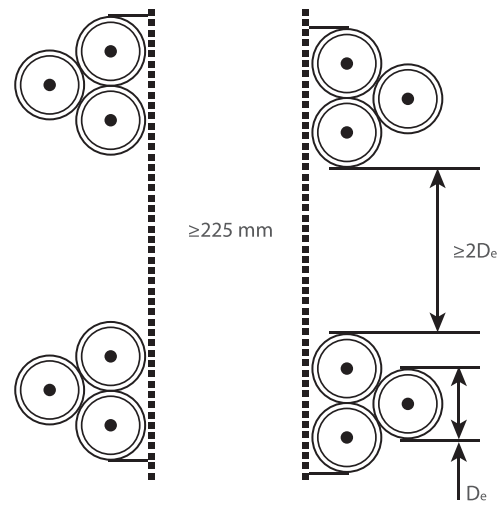
NOTES

Factors are given for single layers of trefoil groups as shown above. Factors for trefoil groups installed in more than one layer touching each other will be significantly lower and must be determined by an appropriate method.

Factors are given for vertical spacing between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing, the factors should be reduced.

For circuits having more than one cable in parallel per phase, each three phase set of conductors should be considered as a circuit for the purpose of this table.

Table 10 Group Rating Factors to be Applied for Circuits of Three Single Core Cables in Air on Vertical Perforated Trays in Trefoil Formation

	Number of Trays	Number of Three-Phase Circuits		
		1	2	3
	1	1.00	0.91	0.89
	2	1.00	0.90	0.86

NOTES

Factors are given for single layers of trefoil groups as shown above. Factors for trefoil groups installed in more than one layer touching each other will be significantly lower and must be determined by an appropriate method.

Factors are given for horizontal spacing between vertical trays of 225 mm with trays mounted back to back. For closer spacing the factors should be reduced.

For circuits having more than one cable in parallel per phase, each three phase set of conductors should be considered as a circuit for the purpose of this table.

CABLE LAYING GUIDELINES

1) After removing the drum lagging's/cover, the cable should be checked for exterior damages. To avoid damage to the protective covering and the insulation, the cable must not be pulled across hard and sharp objects and must not be bent in an inadmissible way.
2) The cable should always be pulled off from the top of the drum. In doing so, the drum should be placed in such a way that the painted arrow points to the opposite direction of pulling.
3) Suitable provisions should be made to brake the drum, so that during a sudden stop further rolling and consequent buckling of the cable is avoided. A suitable plank can serve as drum brake.
4) The cable pulling rope shall be checked and secured firmly on the pulling eye or steel/nylon stock fitted to the leading end of the cable.

   Maximum safe puling force with pulling eye will be as mentioned below:

   For Aluminium Conductor : 30 N/mm^2

   For Copper Conductor : 50 N/mm^2
5) Minimum Bending radius:
   For 1100 Voltage grade cables : 15 x O/Dia for Single core cables and 12 x O/Dia for multicore cables.

DRUM HANDLING GUIDELINES

1) When the cable drum is rolled from one point to another, it should be rotated in the direction of the arrow marked on the cable drum. The cable will unwind and become loose if the drum is rolled in the opposite direction.
2) Cable drums should not be dropped from trucks or railway wagons during unloading operations. A ramp or crane may be used for unloading cable drums. If an inclined ramp is used for unloading (Temporary ramp with inclination of 1:3 to 1:4 approx shall be constructed), the same shall be wide enough for the complete contact of both the flanges. The cable drums should then be rolled over the ramps by means of ropes and winches. Additionally, a sand bed at the foot of the ramp may be made to brake the rolling of cable drum.
3) On receipt of the cable drums, protective covering, lagging should be checked for evidence of any mechanical damage. Tightness of all nuts and bolts on the cable flanges to be checked beforehand.
4) The jacks are to be placed on the two sides of the cable drum and a suitable strong spindle should be selected to carry the weight without bending and it's lying horizontally in the bearings so as to prevent the drum creeping to one side or the other while it is rotating. Before attempting to pull off the cable, remove the end protection and cut the securing ropes so as to leave the cable end free to move.

While paying out the drum, it has to be rotated in the opposite direction of the arrow painted on the drum. Suitable breaking arrangements are to be made to prevent unnecessary rolling of the drum.

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