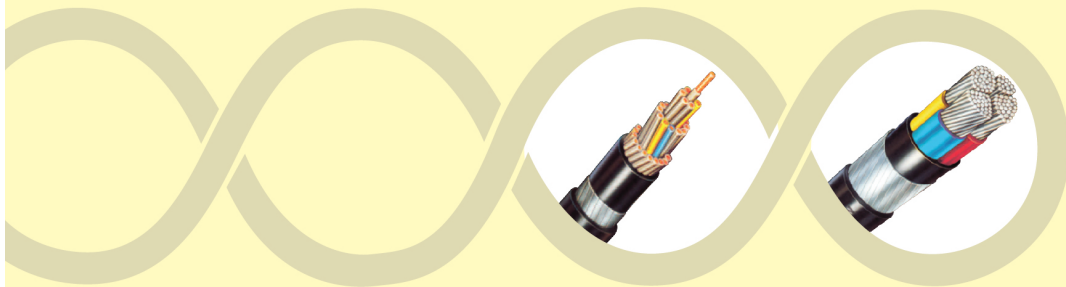


LOW VOLTAGE

cables

IEC Standard



RPG CABLES
(A Division of KEC International Limited)



MYSORE PLANT



SILVASSA PLANT

RPG CABLES MANUFACTURES A RANGE OF COMPONENTS OF LV CABLES AT ITS FACILITIES AT SILVASSA AND MYSORE

The Silvassa unit manufactures Components of LV Cables since the year 2000. XLPE/ PVC insulated cables are manufactured upto 1000sqmm(Single Core) and 630sqmm(Multi Core) conforming to IS, IEC & BS standards. Special cables, as per user requirement, such as screened drive cables, XLPE insulated Fire Survival Cables etc are also manufactured.

The Mysore unit of RPG Cables manufactures LV cables upto 1000 sqmm(Single Core) and 630 sqmm(Multi Core) conforming to IS, IEC & BS standards. Special cables, as per user requirement, such as screened drive cables, XLPE insulated Fire Survival Cables etc are also manufactured. Over the years , the cables manufactured at Mysore have been exported to several countries.

The units are accredited to ISO 9001/ISO 14001/ISO 18001 standards and have won several quality and other awards since inception.

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SPECIFICATION & CONSTRUCTION

1KV cables are designed and manufactured based on the national (IS) & international (IEC, BS) standards and project based customer specifications. Following are the standard stages of cable design & manufacturing.

ELEMENT	XLPE	PVC/HR PVC
CONDUCTOR	THE CURRENT CARRYING COMPONENT : KEC offer cables with Electrolytic Copper (Plain or Tinned) & Aluminium conductor in form of Solid, Stranded Circular, Compacted Circular and Shaped as per IS 8130, IEC 60228 & BS EN 60228. The sector shaped conductor are manufactured with pre-spiral lay which gives compact shape to the cable with reduced dia at laid up stage.	
INSULATION	XLPE, the 90 deg.C thermoset dielectric, is applied as insulation over the conductor by extrusion process. Cross Linked Polyethyelene (XLPE) as per IS 7098-1, IEC 60502-1, BS 7655.	Thermoplastic dielectric, is applied as insulation over the conductor by extrusion process. We offer both general purpose PVC of 70 deg.C (Type A) and Heat Resistant PVC of 85 deg.C (Type C) Poly-Vinyl Chloride (PVC) as per IS 5831, IEC 60502-1, BS 7655. Low Smoke Zero Halogen (LSZH) as per IEC 60502-1.
LAYING UP OF CORES	The multi-cores are Laid-up with appropriate tooling to form a compact circular shape, PVC fillers can be applied (wherever necessary) to provide circular shape.	
INNERSHEATH	THE BEDDING FOR ARMOUR : PVC / LSZH innersheath is applied as a protection over the laid up cores, Innersheath can be offered in 2 forms Extruded or Taped. Extruded PVC bedding of ST2/LSZH PVC as per IS 5831, IEC 60502-1, BS 7655. Taped Bedding of Thermoplastic tape to be compatible with temperature rating of the cable as per IS 7098-1, IEC 60502-1.	PVC / LSZH innersheath is applied as a protection over the laid up cores, Innersheath can be offered in 2 forms Extruded or Taped. Extruded PVC bedding of ST2/LSZH PVC as per IS 5831, IEC 60502-1, BS 7655. Taped Bedding of Thermoplastic tape to be compatible with temperature rating of the cable as per IS 7098-1, IEC 60502-1.
ARMOUR	Galavnised Steel Round Wire as per IS 3975, IEC 60502-1, BS 10257. Galavnised Steel Flat Strip as per IS 3975, IEC 60502-1. For Single Core cables to be used in AC circuits Aluminium Round Wire or Flat Strip armour is provided to avoid magnetic hysteresis losses. For cables to be used in mines, required armour conductance (may be 75% to 40%) can be achieved by Double wire armour or by incorporating Tinned Copper Wires with Galvanised Steel Wires.	
OUTERSHEATH	PVC / LSZH outersheath is applied by extrusion process generally Black in colour with sequential length marking and required details Printed with non-contact ink jet printer. Poly-Vinyl Chloride (PVC) as per IS 5831, IEC 60502-1, BS 7655. Low Smoke Zero Halogen (LSZH) as per IEC 60502-1.	

SPECIAL REQUIREMENTS -

KEC Cables can be custom designed & manufactured for special requirements as follows :

FR innersheath & outersheath material can be offered to meet the requirement of reduced Flame propagation characteristics as per ASTM-2863, IEC 60332 Part 3.

FRLS innersheath & outersheath material can be offered to meet the requirement of reduced Flame propagation characteristics and Low Smoke & Low acid gas emission as per ASTM 2843, ASTM-2863, IEC 60332 Part 3, IEC 60754-1, SS 424-14-75.

LSZH innersheath & outersheath material can be offered to meet the requirement of reduced Flame propagation characteristics and Low Smoke & Zero Halogen gas emission as per ASTM 2843, ASTM-2863, IEC 60332 Part 3, IEC 60754-1, SS 424-14-75.

Copper tape, Copper wires or Aluminium tape can be provided as shielding / screening over laid up cores or innersheath.

Fire Survival cables :

Heat barrier Glass backed mica tape can be applied over the conductor for Fire Survival cables to meet the test requirements of 750 deg.c for 3 hours as per IEC 60331 & 950 deg.c for 3hours category CWZ as per BS 6387. Cables are used where the applications require circuit integrity during a fire mainly in Fire Alarm systems, sprinkler systems in schools, hospitals, shopping malls, cinemas etc.

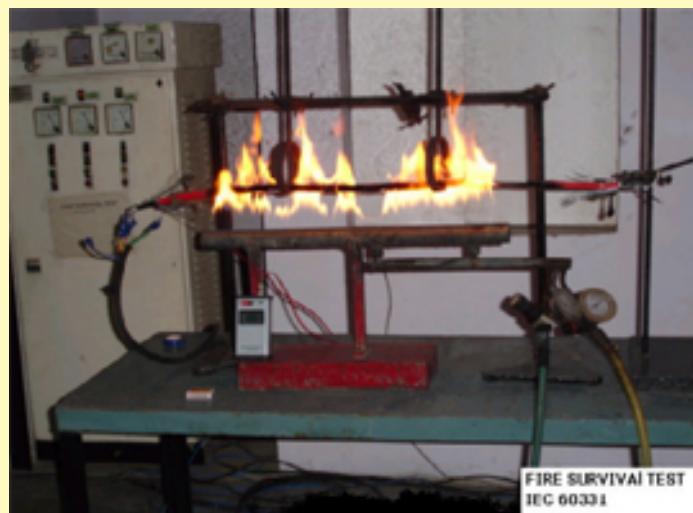


TABLE 1A: TECHNICAL DATA FOR CLASS-2 CONDUCTOR AS PER IEC: 60228 - 2004

Conductor cross sectional Area (Note 1)	Minimum No of wires				Maximum D.C. Resistance			Maximum A.C. Resistance			Maximum A.C. Resistance		
	Non Compacted		Compacted		@ 20 deg. C			@ 90 deg. C			@ 70 deg. C (PVC)		
	Circular		(Circular / Shaped)		Plain Copper	Tinned Copper	Aluminium	Plain Copper	Tinned Copper	Aluminium	Plain Copper	Tinned Copper	Aluminium
	sq.mm	CU	AL	CU	AL	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km
1.50	7	-	-	-	12.10	12.20	-	15.50	15.63	-	14.50	14.62	21.70
2.50	7	-	-	-	7.41	7.56	-	9.48	9.67	-	8.90	9.08	14.50
4	7	-	-	-	4.61	4.70	-	5.90	6.01	-	5.52	5.63	8.90
6	7	-	-	-	3.08	3.11	-	3.94	3.98	-	3.69	3.73	5.54
10	7	7	-	-	1.83	1.84	3.08	2.34	2.35	3.94	2.19	2.20	3.70
16	7	7	6	6	1.15	1.16	1.91	1.47	1.48	2.44	1.38	1.39	2.30
25	7	7	6	6	0.727	0.734	1.20	0.93	0.94	1.54	0.87	0.88	1.44
35	7	7	6	6	0.524	0.529	0.868	0.671	0.68	1.11	0.63	0.64	1.04
50	19	19	6	6	0.387	0.391	0.641	0.495	0.500	0.820	0.464	0.469	0.770
70	19	19	12	12	0.268	0.270	0.443	0.319	0.323	0.567	0.321	0.323	0.533
95	19	19	15	15	0.193	0.195	0.320	0.247	0.250	0.410	0.232	0.234	0.385
120	37	37	18	15	0.153	0.154	0.253	0.196	0.197	0.324	0.184	0.185	0.305
150	37	37	18	15	0.124	0.126	0.206	0.159	0.162	0.264	0.150	0.152	0.249
185	37	37	30	30	0.0991	0.100	0.164	0.127	0.128	0.210	0.121	0.122	0.198
240	37	37	34	30	0.0754	0.0762	0.1250	0.0965	0.0975	0.1600	0.0930	0.0940	0.1520
300	61	61	34	30	0.0601	0.0607	0.1000	0.0769	0.0777	0.1280	0.0750	0.0757	0.1220
400	61	61	53	53	0.0470	0.0475	0.0778	0.0602	0.0608	0.1000	0.0604	0.0610	0.0961
500	61	61	53	53	0.0366	0.0369	0.0605	0.0468	0.0472	0.0774	0.0490	0.0494	0.0761
630	91	91	53	53	0.0283	0.0286	0.0469	0.0362	0.0366	0.0600	0.0401	0.0405	0.0606
800	91	91	53	53	0.0221	0.0224	0.0367	0.0283	0.0287	0.0470	0.0339	0.0343	0.0495
1000	91	91	53	53	0.0176	0.0177	0.0291	0.0225	0.0226	0.0372	0.0297	0.0298	0.0416

Note 1 : Conductors of 1.5sq.mm to 10sq.mm can be manufactured as per class-1 solid conductor as per IEC 60228.

TABLE 1B: TECHNICAL DATA FOR CLASS-5 FLEXIBLE COPPER CONDUCTOR AS PER IEC: 60228 - 2004

Conductor cross sectional Area	Maximum dia of individual strand in conductor	Maximum D.C. Resistance		Maximum A.C. Resistance		Maximum A.C. Resistance	
		@ 20 deg. C		@ 90 deg. C		@ 70 deg. C (PVC)	
		Plain Copper	Tinned Copper	Plain Copper	Tinned Copper	Plain Copper	Tinned Copper
sq.mm	mm	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km
0.50	0.21	39.00	40.10	49.76	51.16	46.69	48.01
0.75	0.21	26.00	26.70	33.18	34.07	31.14	31.98
1.00	0.21	19.50	20.00	24.89	25.53	23.36	23.96
1.50	0.26	13.30	13.70	17.03	17.54	15.94	16.41
2.50	0.26	7.98	8.21	10.21	10.50	9.58	9.86
4	0.31	4.95	5.09	6.33	6.51	5.93	6.09
6	0.31	3.30	3.39	4.22	4.34	3.95	4.06
10	0.41	1.91	1.95	2.44	2.49	2.29	2.33
16	0.41	1.21	1.24	1.55	1.58	1.45	1.49
25	0.41	0.780	0.795	0.9976	1.0167	0.933	0.951
35	0.41	0.554	0.565	0.7093	0.7233	0.666	0.679
50	0.41	0.386	0.393	0.4937	0.5027	0.463	0.471
70	0.51	0.272	0.277	0.3252	0.3315	0.304	0.310
95	0.51	0.206	0.210	0.2636	0.2687	0.248	0.252
120	0.51	0.161	0.164	0.2062	0.2100	0.194	0.197
150	0.51	0.129	0.132	0.1654	0.1692	0.156	0.160
185	0.51	0.106	0.108	0.1358	0.1383	0.129	0.132
240	0.51	0.0801	0.0817	0.1025	0.1045	0.0986	0.1005
300	0.51	0.0641	0.0654	0.0820	0.0837	0.0798	0.0813
400	0.51	0.0486	0.0495	0.0622	0.0634	0.0623	0.0634
500	0.61	0.0384	0.0391	0.0491	0.0500	0.0512	0.0520
630	0.61	0.0287	0.0292	0.0367	0.0373	0.0406	0.0412

TABLE: 2 - CAPACITANCE

1KV XLPE INSULATED CABLES - APPROXIMATE CAPACITANCE (microfarads/km)

Nominal Conductor cross sectional Area sq.mm	XLPE				PVC/HR PVC			
	Single Core		Two Core	Multicore (More than Two Cores)	Single Core		Two Core	Multicore (More than Two Cores)
	Unarmoured	Armoured			Unarmoured	Armoured		
1.50	0.189	-	0.064	0.161	0.433	-	0.153	0.369
2.50	0.229	-	0.071	0.191	0.481	-	0.166	0.408
4	0.300	-	0.081	0.244	0.576	-	0.186	0.482
6	0.354	-	0.087	0.283	0.673	-	0.201	0.554
10	0.441	-	0.096	0.347	0.831	-	0.221	0.671
16	0.515	0.371	0.100	0.401	0.965	0.776	0.236	0.770
25	0.512	0.391	0.105	0.406	1.005	0.833	0.245	0.809
35	0.592	0.450	0.111	0.464	1.156	0.955	0.259	0.922
50	0.598	0.483	0.115	0.479	1.160	0.982	0.268	0.933
70	0.624	0.512	0.117	0.490	1.306	1.102	0.275	1.024
95	0.723	0.592	0.122	0.564	1.341	1.153	0.282	1.060
120	0.774	0.641	0.127	0.605	1.539	1.320	0.297	1.207
150	0.734	0.607	0.126	0.569	1.494	1.302	0.296	1.165
185	0.712	0.617	0.127	0.563	1.515	1.338	0.300	1.189
240	0.763	0.665	0.130	0.594	1.564	1.395	0.304	1.218
300	0.790	0.693	0.130	0.616	1.570	1.412	0.306	1.229
400	0.839	0.705	0.132	0.649	1.693	1.488	0.308	1.314
500	0.857	0.707	0.133	0.666	1.646	1.471	0.310	1.292
630	0.917	0.766	0.137	0.714	1.690	1.493	0.316	1.334
800	0.946	0.778	-	-	1.867	1.647	-	-
1000	0.965	0.803	-	-	2.031	1.791	-	-

TABLE 3 - REACTANCE

1KV XLPE INSULATED CABLES - APPROXIMATE REACTANCE (ohms/km)

Conductor cross sectional Area sqmm	XLPE			PVC/HR PVC		
	Single Core		Multicore	Single Core		Multicore
	Unarmoured	Armoured		Unarmoured	Armoured	
1.50	0.120	-	0.108	0.1239	-	0.1116
2.50	0.113	-	0.1007	0.1201	-	0.1077
4	0.107	-	0.0947	0.1160	-	0.1035
6	0.103	-	0.0902	0.1106	-	0.0980
10	0.098	-	0.0852	0.1045	-	0.0918
16	0.094	0.101	0.0815	0.0999	0.1058	0.0871
25	0.095	0.100	0.0816	0.0989	0.1037	0.0861
35	0.092	0.097	0.0794	0.0962	0.1004	0.0833
50	0.092	0.096	0.0792	0.0966	0.0997	0.0837
70	0.088	0.091	0.0752	0.0910	0.0937	0.0780
95	0.086	0.089	0.0734	0.0905	0.0928	0.0775
120	0.0857	0.0879	0.0726	0.0886	0.0906	0.0755
150	0.0863	0.0886	0.0732	0.0889	0.0911	0.0758
185	0.0858	0.0875	0.0727	0.0881	0.0898	0.0750
240	0.0851	0.0866	0.0719	0.0876	0.0891	0.0745
300	0.0843	0.0857	0.0711	0.0870	0.0884	0.0740
400	0.0837	0.0855	0.0705	0.0865	0.0880	0.0730
500	0.0835	0.0851	0.0703	0.0863	0.0879	0.0732
630	0.0829	0.0843	0.0697	0.0859	0.0876	0.0728
800	0.0826	0.0841	-	0.0848	0.0863	-
1000	0.0823	0.0836	-	0.0838	0.0851	-

TABLE 4A- IMPEDANCE (Plain Copper Conductor) @ 90 deg. C)
 1KV XLPE INSULATED CABLES - APPROXIMATE IMPEDANCE (ohms/km)

Conductor cross sectional Area	XLPE			PVC		
	Single Core @ 90 deg. C		Multicore @ 90 deg. C	Single Core @ 70 deg. C		Multicore @ 70 deg. C
	Unarmoured	Armoured		Unarmoured	Armoured	
1.50	15.5005	-	15.5004	14.5005	-	14.5004
2.50	9.4807	-	9.4805	8.9008	-	8.9007
4	5.9010	-	5.9008	5.5212	-	5.5210
6	3.9413	-	3.9410	3.6917	-	3.6913
10	2.3421	-	2.3416	2.1925	-	2.1919
16	1.4730	1.4735	1.4723	1.3836	1.3840	1.3827
25	0.9348	0.9353	0.9336	0.8756	0.8762	0.8743
35	0.6773	0.6780	0.6757	0.6373	0.6379	0.6355
50	0.5035	0.5041	0.5013	0.4739	0.4746	0.4715
70	0.3542	0.3549	0.3511	0.3336	0.3344	0.3303
95	0.2617	0.2625	0.2577	0.2490	0.2499	0.2446
120	0.2139	0.2148	0.2090	0.2042	0.2051	0.1989
150	0.1809	0.1820	0.1750	0.1744	0.1755	0.1681
185	0.1533	0.1542	0.1463	0.1497	0.1507	0.1424
240	0.1286	0.1297	0.1204	0.1278	0.1288	0.1192
300	0.1141	0.1151	0.1048	0.1149	0.1159	0.1054
400	0.1031	0.1045	0.0927	0.1055	0.1067	0.0947
500	0.0957	0.0971	0.0845	0.0992	0.1006	0.0881
630	0.0904	0.0917	0.0785	0.0948	0.0963	0.0831
800	0.0873	0.0888	-	0.0913	0.0927	-
1000	0.0853	0.0866	-	0.0889	0.0901	-

TABLE 4B- IMPEDANCE (Aluminium Conductor) @ 90 deg. C)
 1KV XLPE INSULATED CABLES - APPROXIMATE IMPEDANCE (ohms/km)

Conductor cross sectional Area	XLPE			PVC		
	Single Core @ 90 deg. C		Multicore @ 90 deg. C	Single Core @ 70 deg. C		Multicore @ 70 deg. C
	Unarmoured	Armoured		Unarmoured	Armoured	
1.50	23.1703	-	23.1702	21.7004	-	21.7003
2.50	15.5004	-	15.5003	14.5005	-	14.5004
4	9.4806	-	9.4805	8.9008	-	8.9006
6	5.9009	-	5.9007	5.5411	-	5.5409
10	3.9412	-	3.9409	3.7015	-	3.7011
16	2.4418	2.4421	2.4414	2.3022	2.3024	2.3016
25	1.5429	1.5432	1.5422	1.4434	1.4437	1.4426
35	1.1138	1.1142	1.1128	1.0444	1.0448	1.0433
50	0.8252	0.8255	0.8238	0.7760	0.7764	0.7745
70	0.5738	0.5743	0.5720	0.5407	0.5412	0.5387
95	0.4190	0.4195	0.4165	0.3955	0.3960	0.3927
120	0.3351	0.3357	0.3320	0.3176	0.3182	0.3142
150	0.2777	0.2785	0.2740	0.2644	0.2651	0.2603
185	0.2269	0.2275	0.2222	0.2167	0.2174	0.2117
240	0.1812	0.1819	0.1754	0.1754	0.1762	0.1693
300	0.1532	0.1540	0.1464	0.1498	0.1507	0.1427
400	0.1304	0.1315	0.1224	0.1293	0.1303	0.1207
500	0.1138	0.1150	0.1046	0.1151	0.1163	0.1056
630	0.1023	0.1034	0.0920	0.1051	0.1065	0.0947
800	0.0950	0.0964	-	0.0982	0.0995	-
1000	0.0903	0.0915	-	0.0936	0.0947	-

TABLE 5A- VOLTAGE DROP (Plain Copper Conductor) @ 90 deg. C)
 1KV XLPE INSULATED CABLES - APPROXIMATE VOLTAGE DROP (mV/A/m)

Conductor cross sectional Area	XLPE			PVC		
	Single Phase @ 90 deg. C		3 Phase @ 90 deg. C	Single Phase @ 70 deg. C		3 Phase @ 70 deg. C
	Unarmoured	Armoured		Unarmoured	Armoured	
1.50	31.0009	-	26.8156	29.0011	-	25.0857
2.50	18.9614	-	16.4013	17.8016	-	15.3981
4	11.8020	-	10.2083	11.0424	-	9.5513
6	7.8827	-	6.8180	7.3833	-	6.3860
10	4.6841	-	4.0509	4.3850	-	3.7920
16	2.9461	2.9469	2.5470	2.7672	2.7681	2.3922
25	1.8696	1.8706	1.6151	1.7512	1.7523	1.5125
35	1.3546	1.3559	1.1689	1.2746	1.2759	1.0994
50	1.0070	1.0083	0.8673	0.9479	0.9492	0.8157
70	0.7083	0.7097	0.6075	0.6673	0.6688	0.5715
95	0.5234	0.5250	0.4458	0.4981	0.4997	0.4232
120	0.4279	0.4296	0.3616	0.4084	0.4102	0.3441
150	0.3618	0.3640	0.3028	0.3487	0.3510	0.2908
185	0.3065	0.3085	0.2532	0.2994	0.3014	0.2463
240	0.2573	0.2593	0.2082	0.2555	0.2576	0.2061
300	0.2282	0.2302	0.1812	0.2297	0.2319	0.1823
400	0.2061	0.2091	0.1604	0.2110	0.2135	0.1639
500	0.1914	0.1942	0.1461	0.1985	0.2013	0.1524
630	0.1808	0.1834	0.1359	0.1896	0.1927	0.1438
800	0.1746	0.1775	-	0.1826	0.1854	-
1000	0.1706	0.1732	-	0.1778	0.1803	-

TABLE 5B- VOLTAGE DROP (Aluminium Conductor) @ 90 deg. C)
 1KV XLPE INSULATED CABLES - APPROXIMATE VOLTAGE DROP (mV/A/m)

Conductor cross sectional Area	XLPE			PVC		
	Single Phase @ 90 deg. C		3 Phase @ 90 deg. C	Single Phase @ 70 deg. C		3 Phase @ 70 deg. C
	Unarmoured	Armoured		Unarmoured	Armoured	
1.50	46.3406	-	40.0845	43.4007	-	37.5415
2.50	31.0008	-	26.8156	29.0010	-	25.0857
4	18.9612	-	16.4012	17.8015	-	15.3980
6	11.8018	-	10.2082	11.0822	-	9.5857
10	7.8824	-	6.8178	7.4030	-	6.4030
16	4.8837	4.8842	4.2236	4.6043	4.6049	3.9819
25	3.0858	3.0864	2.6679	2.8868	2.8875	2.4956
35	2.2277	2.2284	1.9252	2.0889	2.0897	1.8050
50	1.6503	1.6511	1.4252	1.5521	1.5529	1.3399
70	1.1476	1.1485	0.9895	1.0814	1.0823	0.9319
95	0.8380	0.8391	0.7206	0.7910	0.7921	0.6794
120	0.6703	0.6714	0.5744	0.6352	0.6363	0.5436
150	0.5555	0.5569	0.4740	0.5288	0.5303	0.4503
185	0.4537	0.4550	0.3845	0.4334	0.4348	0.3663
240	0.3624	0.3639	0.3035	0.3509	0.3524	0.2928
300	0.3065	0.3080	0.2533	0.2997	0.3013	0.2469
400	0.2608	0.2631	0.2117	0.2586	0.2606	0.2088
500	0.2277	0.2300	0.1809	0.2301	0.2325	0.1827
630	0.2046	0.2069	0.1591	0.2102	0.2130	0.1639
800	0.1901	0.1928	-	0.1964	0.1990	-
1000	0.1805	0.1831	-	0.1871	0.1894	-

TABLE 6 - SHORT CIRCUIT CURRENT RATINGS

1KV XLPE INSULATED CABLES - Short Circuit Ratings for 1 second

Conductor cross sectional Area	XLPE Insulated (for 90 deg. C)		Type "A" PVC Insulated (for 70 deg. C)	
	Copper	Aluminium	Copper	Aluminium
1.50	0.21	0.14	0.173	0.114
2.50	0.36	0.24	0.283	0.190
4	0.57	0.38	0.46	0.303
6	0.86	0.57	0.69	0.455
10	1.43	0.94	1.15	0.758
16	2.29	1.51	1.84	1.21
25	3.58	2.36	2.88	1.90
35	5.01	3.31	4.03	2.65
50	7.15	4.72	5.75	3.79
70	10.02	6.61	8.05	5.31
95	13.59	8.98	10.90	7.20
120	17.17	11.34	13.80	9.10
150	21.46	14.17	17.30	11.40
185	26.47	17.48	21.30	14.02
240	34.34	22.68	27.60	18.20
300	42.92	28.34	34.50	22.80
400	57.23	37.79	46.00	30.40
500	71.54	47.24	57.50	38.00
630	90.14	59.52	72.50	47.25
800	114.46	75.58	92.00	60.00
1000	143.08	94.48	115.00	75.00

1) Maximum Initial Conductor temperature before short circuit :
for cross linked Polyethelene (XLPE) - 90 deg.c
for general purpose PVC (Type A) - 70 deg.c
for Heat Resistant PVC (Type C) - 85 deg.c

2) Maximum final Conductor temperature during short circuit (XLPE) : 250 deg.c

Maximum final Conductor temperature during short circuit (PVC): 160 deg.c

Short Circuit Rating for other duration can be calculated from :

$$I_{scT} = \frac{I_{sc1}}{\sqrt{T}}$$

I_{scT} = Short Circuit rating for "T" seconds

I_{sc1} = Short Circuit rating for one second

T = Duration in seconds

BASIC ASSUMPTION FOR CURRENT RATINGS & RATING FACTORS

SCOPE

The current ratings of cables as indicated in various tables have been calculated on certain assumed conditions. In actual practice these conditions may be different. Therefore to determine the actual current ratings as per installation conditions, the tabulated ratings shall be multiplied with appropriate factors

BASIC ASSUMPTION FOR CURRENT RATINGS

	XLPE	PVC/HR PVC
Maximum permissible temperature	90 deg. C for Cross linked polyethylene	70 deg. C for general purpose PVC,
Ground/Duct temperature	30 deg. C	30 deg. C
Ambient temperature	40 deg. C	40 deg. C
Thermal resistivity of soil	150 deg. C cm/W	150 deg. C cm/W
Depth of laying - for 1.1kV cables	for 1.1kV cables - 750mm	for 1.1kV cables - 750mm

Single Core cables installed in one circuit in following arrangement

Multi Core cables installed in single circuit

TABLE 7A- CURRENT RATINGS
CURRENT RATINGS FOR 2 SINGLE CORE UNARMoured / ARMoured
CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		Direct in Duct (30 deg. C) Amp.		Direct in Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
	XLPE	XLPE	XLPE	XLPE	XLPE	XLPE
1.50	31	24	29	22	25	20
2.50	41	32	36	29	33	27
4	54	42	49	39	44	35
6	68	52	64	50	55	44
10	89	69	85	65	80	61
16	116	90	114	85	104	82
25	148	115	142	110	139	109
35	181	139	169	127	172	136
50	213	162	195	145	213	164
70	259	199	235	181	271	208
95	310	241	269	212	335	258
120	352	272	299	237	389	303
150	393	305	324	253	447	348
185	444	347	356	278	524	407
240	518	406	419	327	623	487
300	583	461	464	368	722	567
400	657	527	532	431	850	668
500	731	600	582	490	976	786
630	823	666	649	542	1130	922
800	907	750	740	619	1279	1065
1000	981	833	800	687	1430	1220

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 7B- CURRENT RATINGS
CURRENT RATINGS FOR 2 SINGLE CORE UNARMoured / ARMoured CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		In Duct (30 deg. C) Amp.		In Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC
1.50	25	21	23	19	24	18
2.50	35	28	31	25	32	25
4	46	36	42	33	43	32
6	57	44	54	42	54	41
10	75	59	72	56	72	56
16	94	75	92	71	92	72
25	125	97	120	93	125	99
35	150	120	140	110	155	120
50	180	145	165	130	190	150
70	220	170	200	155	235	185
95	265	205	230	180	275	215
120	300	230	255	200	310	240
150	340	265	280	220	345	270
185	380	300	305	240	390	305
240	420	335	340	270	445	350
300	465	370	370	295	500	395
400	500	410	405	335	570	455
500	540	435	430	355	610	490
630	590	485	465	395	680	560
800						
1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 8A- CURRENT RATINGS
CURRENT RATINGS FOR 3 SINGLE CORE UNARMoured / ARMoured
CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		Direct in Duct (30 deg. C) Amp.		Direct in Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
	XLPE	XLPE	XLPE	XLPE	XLPE	XLPE
1.50	27	20	26	20	22	17
2.50	36	28	35	28	29	23
4	46	36	45	35	41	31
6	58	44	57	42	52	39
10	77	59	76	59	71	53
16	99	76	97	75	96	73
25	127	97	127	95	126	99
35	155	116	149	116	157	122
50	183	139	177	133	196	149
70	221	168	204	162	248	190
95	264	204	240	181	299	235
120	298	231	262	201	357	275
150	334	259	292	224	411	320
185	370	290	315	254	479	370
240	424	340	350	283	569	445
300	470	382	389	317	659	514
400	556	437	466	370	769	605
500	620	500	518	428	877	704
630	695	565	555	464	1013	822
800	758	629	637	542	1148	940
1000	834	704	702	606	1275	1070

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 8B- CURRENT RATINGS
CURRENT RATINGS FOR 3 SINGLE CORE UNARMoured /
ARMoured CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		In Duct (30 deg. C) Amp.		In Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC
1.50	22	17	21	17	20	15
2.50	30	24	29	24	27	21
4	39	31	38	30	35	27
6	49	39	48	37	44	35
10	65	51	64	51	60	47
16	85	66	83	65	82	64
25	110	86	110	84	110	84
35	130	100	125	100	130	105
50	155	120	150	115	165	130
70	190	140	175	135	205	155
95	220	175	200	155	245	190
120	250	195	220	170	280	220
150	280	220	245	190	320	250
185	305	240	260	210	370	290
240	345	270	285	225	425	335
300	375	295	310	245	475	380
400	400	325	335	275	550	435
500	425	345	355	295	590	480
630	470	390	375	320	660	550
800						
1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 9A- CURRENT RATINGS -

CURRENT RATINGS FOR TWO CORES UNARMoured / ARMoured CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		Direct in Duct (30 deg. C) Amp.		Direct in Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
sqmm	XLPE	XLPE	XLPE	XLPE	XLPE	XLPE
1.50	33	25	29	22	29	23
2.50	43	34	37	29	39	31
4	54	42	46	35	48	36
6	66	54	58	46	59	47
10	90	70	75	57	82	62
16	114	90	95	75	113	79
25	147	117	124	99	148	108
35	177	140	152	117	186	143
50	210	168	185	143	221	173
70	260	202	228	177	278	212
95	309	243	277	217	338	257
120	351	273	300	247	402	295
150	392	310	341	271	461	342
185	448	350	384	305	527	395
240	509	401	434	345	607	465
300	579	458	495	393	688	532
400	638	505	553	453	818	622
500						
630						
800						
1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 9B- CURRENT RATINGS

CURRENT RATINGS FOR TWO CORES UNARMoured / ARMoured CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		In Duct (30 deg. C) Amp.		In Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
sqmm	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC
1.50	23	18	20	16	20	16
2.50	32	25	27	21	27	21
4	41	32	35	27	35	27
6	50	40	44	34	45	35
10	70	55	58	45	60	47
16	90	70	75	58	78	59
25	115	90	97	76	105	78
35	140	110	120	92	125	99
50	165	135	145	115	155	125
70	205	160	180	140	195	150
95	240	190	215	170	230	185
120	275	210	235	190	265	210
150	310	240	270	210	305	240
185	350	275	300	240	350	275
240	405	320	345	275	410	325
300	450	355	385	305	465	365
400	490	385	425	345	530	420
500						
630						
800						
1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 10A- CURRENT RATINGS
CURRENT RATINGS FOR THREE, THREE & HALF, FOUR, FIVE CORES UNARMoured /
ARMoured CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		Direct in Duct (30 deg. C) Amp.		Direct in Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
	XLPE	XLPE	XLPE	XLPE	XLPE	XLPE
1.50	25	20	22	18	22	18
2.50	34	27	28	23	28	23
4	44	34	37	28	38	31
6	55	43	46	37	51	45
10	72	57	60	48	66	60
16	95	73	79	61	85	70
25	122	96	100	80	122	95
35	146	115	120	96	148	117
50	175	134	151	116	181	141
70	212	165	182	141	230	177
95	253	198	211	168	284	221
120	290	225	236	189	330	257
150	325	252	271	210	375	293
185	362	285	308	243	431	338
240	418	330	357	282	512	401
300	467	371	406	316	582	459
400	518	423	439	366	661	536
500	583	474	512	412	765	620
630	645	532	570	463	860	715
800						
1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

Note : For 3.5Core cables consider cable size above 16sqmm conductor area.

TABLE 10B- CURRENT RATINGS - PVC/HR PVC CABLES
CURRENT RATINGS FOR THREE, THREE & HALF, FOUR, FIVE CORES UNARMoured /
ARMoured CABLES ACCORDING TO IEC 60502-I

Conductor cross sectional Area	Direct in Ground (30 deg. C) Amp.		In Duct (30 deg. C) Amp.		In Air (40 deg. C) Amp.	
	Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC	"A" PVC
1.50	21	16	17	14	17	13
2.50	27	21	24	18	24	18
4	36	28	30	23	30	23
6	45	35	38	30	39	30
10	60	46	50	39	52	40
16	77	60	64	50	66	51
25	99	76	81	63	90	70
35	120	92	99	77	110	86
50	145	110	125	95	135	105
70	175	135	150	115	165	130
95	210	165	175	140	200	155
120	240	185	195	155	230	180
150	270	210	225	175	265	205
185	300	235	255	200	305	240
240	345	275	295	235	355	280
300	385	305	335	260	400	315
400	425	335	360	290	455	375
500						
630						
800						
1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 11A THICKNESSES
INSULATION, INNERSHEATH, OUTERSHEATH THICKNESSES OF XLPE INSULATED CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Nominal Insulation Thickness	Minimum Innersheath Thickness				Minimum Outsheath Thickness (Flat strip armoured cable)				Minimum Outsheath Thickness (Round wire armoured cable)				Nominal Outsheath Thickness (Unarmoured cable)			
		1 Core	2 Core	3 Core	4 Core	1 Core	2 Core	3 Core	4 Core	1 Core	2 Core	3 Core	4 Core	1 Core	2 Core	3 Core	4 Core
sqmm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.50	0.70	0.40	0.40	0.40	-	-	-	-	-	1.24	1.24	-	1.24	1.09	1.43	1.43	1.43
2.50	0.70	0.40	0.40	0.40	-	-	-	-	-	1.24	1.24	-	1.24	1.09	1.43	1.43	1.43
4	0.70	0.40	0.40	0.40	-	-	-	-	-	1.24	1.24	-	1.24	1.09	1.43	1.43	1.43
6	0.70	0.40	0.40	0.40	-	-	-	-	-	1.24	1.24	-	1.24	1.09	1.43	1.43	1.43
10	0.70	0.40	0.40	0.40	-	-	-	-	-	1.24	1.24	-	1.24	1.09	1.43	1.43	1.43
16	0.70	0.40	0.40	0.40	-	-	-	-	1.24	1.24	1.24	-	1.24	1.09	1.43	1.43	1.43
25	0.90	0.40	0.40	0.40	0.40	0.40	0.40	-	1.24	1.24	1.24	1.24	1.24	1.09	1.43	1.43	1.43
35	0.90	0.40	0.40	0.40	0.40	0.40	0.40	-	1.24	1.24	1.24	1.24	1.24	1.09	1.43	1.43	1.43
50	1.00	0.40	0.40	0.40	0.40	0.40	0.40	-	1.24	1.24	1.32	1.32	1.32	1.09	1.43	1.43	1.43
70	1.10	0.40	0.40	0.40	0.40	0.40	0.40	-	1.32	1.40	1.40	1.48	1.40	1.09	1.43	1.52	1.52
95	1.10	0.40	0.40	0.40	0.40	0.40	0.40	-	1.40	1.48	1.48	1.56	1.48	1.18	1.60	1.60	1.69
120	1.20	0.40	0.40	0.40	0.40	0.40	0.40	1.24	1.48	1.56	1.64	1.64	1.56	1.18	1.69	1.69	1.77
150	1.40	0.40	0.40	0.40	0.40	0.40	0.60	1.24	1.56	1.64	1.72	1.80	1.64	1.26	1.77	1.86	1.86
185	1.60	0.40	0.40	0.40	0.60	0.60	0.60	1.24	1.72	1.80	1.88	1.96	1.88	1.26	1.86	1.94	2.03
240	1.70	0.40	0.60	0.60	0.60	0.60	0.60	1.24	1.88	1.96	1.96	2.12	1.96	1.35	2.03	2.11	2.20
300	1.80	0.40	0.60	0.60	0.60	0.60	0.60	1.32	1.96	2.04	2.12	2.28	1.96	1.43	2.20	2.28	2.37
400	2.00	0.40	0.60	0.60	0.60	0.60	0.60	1.40	2.20	2.28	2.36	2.52	2.28	1.52	2.37	2.54	2.71
500	2.20	0.40	0.60	0.60	0.60	0.60	0.60	1.48	2.36	2.44	2.52	2.68	2.44	1.60	2.54	2.71	2.88
630	2.40	0.40	0.60	0.60	0.60	0.60	0.60	1.56	2.52	2.68	2.76	2.92	2.68	1.77	2.79	2.88	2.96
800	2.60	0.40	-	-	-	-	-	1.72	-	-	-	-	-	1.86	-	-	-
1000	2.80	0.60	-	-	-	-	-	1.80	-	-	-	-	-	1.94	-	-	-

TABLE 11B THICKNESSES
INSULATION, INNERSHEATH, OUTERSHEATH THICKNESSES OF PVC INSULATED CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Nominal Insulation Thickness	Minimum Innersheath Thickness					Minimum Outsheath Thickness (Flat strip armoured cable)					Minimum Outsheath Thickness (Round wire armoured cable)					Nominal Outsheath Thickness (Unarmoured cable)					
		1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	
sqmm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
150	0.80	-	0.40	0.40	-	0.40	-	-	-	-	1.24	1.24	-	1.24	1.24	1.09	1.43	1.43	-	1.43		
250	0.80	-	0.40	0.40	-	0.40	-	-	-	-	1.24	1.24	-	1.24	1.24	1.09	1.43	1.43	-	1.43		
4	1.00	-	0.40	0.40	-	0.40	-	-	-	-	1.24	1.24	-	1.24	1.24	1.09	1.43	1.43	-	1.43		
6	1.00	-	0.40	0.40	-	0.40	-	-	-	-	1.24	1.24	-	1.24	1.24	1.09	1.43	1.43	-	1.43		
10	1.00	-	0.40	0.40	-	0.40	-	-	-	-	1.24	1.24	-	1.24	1.24	1.09	1.43	1.43	-	1.43		
16	1.00	0.40	0.40	0.40	-	0.40	-	-	-	1.24	1.24	1.24	-	1.24	1.24	1.09	1.43	1.43	-	1.43		
25	1.20	0.40	0.40	0.40	0.40	0.40	-	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.09	1.43	1.43	1.43	1.43		
35	1.20	0.40	0.40	0.40	0.40	0.40	-	1.24	1.24	1.24	1.32	1.24	1.24	1.32	1.32	1.09	1.43	1.43	1.43	1.43		
50	1.40	0.40	0.40	0.40	0.40	0.40	-	1.24	1.32	1.32	1.40	1.24	1.32	1.40	1.48	1.09	1.43	1.43	1.52	1.52		
70	1.40	0.40	0.40	0.40	0.40	0.40	-	1.32	1.40	1.48	1.48	1.24	1.40	1.48	1.56	1.09	1.52	1.60	1.60	1.69		
95	1.60	0.40	0.40	0.40	0.40	0.40	-	1.48	1.56	1.56	1.64	1.24	1.56	1.56	1.64	1.18	1.60	1.69	1.77	1.77		
120	1.60	0.40	0.40	0.40	0.40	0.40	0.40	1.24	1.56	1.64	1.64	1.24	1.64	1.64	1.80	1.18	1.69	1.77	1.86	1.94		
150	1.80	0.40	0.40	0.40	0.40	0.60	0.60	1.24	1.64	1.72	1.72	1.24	1.72	1.80	1.88	1.26	1.77	1.86	1.94	2.03		
185	2.00	0.40	0.40	0.60	0.60	0.60	0.60	1.24	1.72	1.88	1.88	1.24	1.88	1.96	1.96	1.35	1.94	2.03	2.11	2.20		
240	2.20	0.40	0.60	0.60	0.60	0.60	0.60	1.32	1.88	2.04	2.04	1.32	2.04	2.12	2.12	1.43	2.11	2.20	2.28	2.37		
300	2.40	0.40	0.60	0.60	0.60	0.60	0.60	1.32	2.04	2.12	2.20	1.40	2.12	2.28	2.28	1.52	2.20	2.37	2.45	2.54		
400	2.60	0.40	0.60	0.60	0.60	0.60	0.60	1.48	2.20	2.36	2.44	1.48	2.36	2.52	2.52	1.60	2.45	2.54	2.62	2.79		
500	2.80	0.40	0.60	0.60	0.60	0.60	0.60	1.56	2.44	2.60	2.60	1.56	2.52	2.68	2.76	1.69	2.62	2.79	2.88	3.05		
630	2.80	0.40	0.60	0.60	0.60	0.60	0.60	1.64	2.68	2.84	2.84	1.64	2.76	2.92	3.00	1.77	2.88	3.05	3.13	3.30		
800	2.80	0.40	-	-	-	-	-	1.72	-	-	-	1.80	-	-	-	1.94	-	-	-	-		
1000	3.00	0.60	-	-	-	-	-	1.88	-	-	-	1.96	-	-	-	2.03	-	-	-	-		

TABLE 12A - OVERALL DIAMETER (OD)
OVERALL DIAMETER OF XLPE INSULATED CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area sqmm	Approximate O.D. (+/-2 mm) - Unarmoured				Approximate O.D. (+/-2 mm) - Flat strip armoured				Approximate O.D. (+/-2 mm) - Round wire armoured				Nominal Diameter of Round wire armour				
	1Core	2Core	3Core	4Core	1Core	2Core	3Core	4Core	1Core	2Core	3Core	4Core	1Core	2Core	3Core	4Core	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
1.50	6.5	10	10	11	-	-	-	-	-	12	13	13	-	0.80	0.80	-	0.80
2.50	7.0	11	11	12	-	-	-	-	-	13	14	14	-	0.80	0.80	-	1.40
4	7.5	12	12	13	-	-	-	-	-	14	15	15	-	0.80	0.80	-	1.40
6	8.0	13	14	15	-	-	-	-	-	15	16	16	-	0.80	0.80	-	1.25
10	9	15	16	17	-	-	-	-	-	17	19	19	-	1.25	1.25	-	1.25
16	10	17	18	19	-	-	-	-	20	18	19	19	-	1.25	1.25	-	1.60
25	11	17	19	21	21	20	21	23	24	21	23	24	25	0.80	1.60	1.60	1.60
35	12	19	20	23	23	21	23	26	26	23	24	27	27	0.80	1.60	1.60	1.60
50	13	21	23	26	26	24	26	29	29	25	27	30	30	1.25	1.60	1.60	1.60
70	15	24	27	30	30	27	30	33	33	28	32	35	36	1.25	1.60	2.00	2.00
95	17	27	30	34	34	30	33	37	37	32	35	39	39	1.25	2.00	2.00	2.00
120	19	29	32	36	37	32	35	39	40	34	37	41	43	1.60	2.00	2.00	2.50
150	20	33	36	40	41	35	39	43	45	37	42	46	48	1.60	2.00	2.50	2.50
185	23	36	40	45	46	39	43	49	50	42	46	52	53	1.60	2.50	2.50	2.50
240	25	41	45	50	52	44	48	54	55	47	52	57	58	1.60	2.50	2.50	2.50
300	28	45	50	56	57	51	53	59	61	51	56	62	64	1.60	2.50	2.50	2.50
400	31	50	56	62	64	54	59	66	68	57	62	70	72	2.00	2.50	3.15	3.15
500	35	56	62	69	71	58	65	73	75	64	70	77	79	2.00	3.15	3.15	3.15
630	39	62	69	78	80	62	73	81	83	71	77	86	89	2.00	3.15	3.15	3.15
800	44	-	-	-	-	46	-	-	-	50	-	-	-	2.50	-	-	-
1000	48	-	-	-	-	52	-	-	-	55	-	-	-	2.50	-	-	-

TABLE 12B - OVERALL DIAMETER (OD)
OVERALL DIAMETER OF PVC INSULATED CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Approximate O.D. (+/-2 mm) - Unarmoured					Approximate O.D. (+/-2 mm) - Flat strip armoured					Approximate O.D. (+/-2 mm) - Round wire armoured					Nominal Diameter of Round wire armour					
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.50	6.0	10	11	-	12	-	-	-	-	-	-	13	13	-	14	-	0.80	0.80	-	-	0.80
2.50	6.5	11	12	-	13	-	-	-	-	-	-	13	14	-	15	-	0.80	0.80	-	-	0.80
4	7.0	13	14	-	15	-	-	-	-	-	-	15	17	-	18	-	0.80	1.25	-	-	1.25
6	8.0	14	15	-	16	-	-	-	-	-	-	17	18	-	20	-	1.25	1.25	-	-	1.25
10	9	16	17	-	19	-	-	-	-	-	-	19	20	-	22	-	1.25	1.25	-	-	1.25
16	10	16	17	-	19	-	-	-	-	22	13	19	20	-	23	-	1.25	1.25	-	-	1.60
25	11	18	20	22	22	-	21	23	25	25	14	22	24	26	26	0.80	1.60	1.60	-	-	1.60
35	12	20	22	24	25	-	23	25	27	28	16	24	26	28	29	0.80	1.60	1.60	-	-	1.60
50	14	23	25	28	29	-	26	28	31	32	18	27	29	33	34	1.25	1.60	1.60	-	-	2.00
70	16	26	28	32	32	-	28	31	35	35	20	31	33	37	37	1.25	2.00	2.00	-	-	2.00
95	18	30	33	37	37	-	32	35	40	40	22	35	37	42	43	1.25	2.00	2.00	-	-	2.50
120	19	31	34	38	40	23	34	37	41	42	24	36	39	44	45	1.60	2.00	2.00	-	-	2.50
150	21	34	38	42	44	24	37	41	45	47	26	40	44	48	50	1.60	2.50	2.50	-	-	2.50
185	24	38	42	47	48	26	41	46	51	52	28	44	49	54	55	1.60	2.50	2.50	-	-	2.50
240	26	43	47	53	54	29	46	51	56	58	31	50	54	60	61	1.60	2.50	2.50	-	-	2.50
300	29	47	52	59	60	32	51	56	62	64	34	54	59	65	67	2.00	2.50	2.50	-	-	2.50
400	33	53	58	66	68	36	56	62	69	71	38	60	67	74	76	2.00	2.50	2.50	-	-	3.15
500	37	59	66	74	76	39	63	69	77	79	41	67	74	82	84	2.00	3.15	3.15	-	-	3.15
630	41	67	74	84	86	43	71	78	87	90	45	75	82	92	95	2.00	3.15	3.15	-	-	3.15
800	45	-	-	-	-	47	-	-	-	-	50	-	-	-	-	2.50	-	-	-	-	-
1000	50	-	-	-	-	53	-	-	-	-	56	-	-	-	-	2.50	-	-	-	-	-

TABLE 13A - WEIGHTS

APPROXIMATE NETT WEIGHT OF COPPER CONDUCTOR , XLPE INSULATED CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	51	121	139	-	166	-	-	-	-	-	-	260	288	-	329
2.5	63	153	180	-	217	-	-	-	-	-	-	307	343	-	395
4	81	199	239	-	293	-	-	-	-	-	-	372	422	-	495
6	104	258	316	-	392	-	-	-	-	-	-	450	522	-	730
10	150	374	468	-	587	-	-	-	-	-	-	711	828	-	982
16	201	411	590	-	775	-	-	-	-	966	308	715	894	-	1207
25	279	579	821	986	1070	-	843	1112	1331	1414	380	1082	1362	1600	1700
35	372	769	1102	1270	1442	-	1061	1421	1642	1815	483	1328	1715	1956	2156
50	499	1028	1483	1735	1957	-	1373	1856	2175	2386	666	1660	2197	2542	2766
70	690	1415	2065	2412	2730	-	1826	2532	2935	3253	880	2162	3076	3578	3898
95	950	1953	2843	3329	3759	-	2407	3365	3895	4365	1154	2991	4009	4626	5074
120	1179	2419	3531	4202	4692	1344	2902	4083	4836	5310	1447	3517	4759	5601	6440
150	1435	2953	4331	4994	5730	1606	3490	4923	5685	6527	1719	4192	6035	6917	7821
185	1779	3672	5390	6327	7156	1964	4305	6081	7211	8069	2093	5377	7275	8602	9483
240	2322	4797	7049	8220	9360	2519	5590	7934	9175	10368	2669	6843	9328	10774	11962
300	2890	5969	8781	10208	11654	3100	6831	9734	11281	12780	3260	8185	11249	12971	14531
400	3690	7611	11230	12987	14904	3934	8590	12278	14207	16176	4213	10124	13994	16883	18874
500	4709	9699	14326	16653	19009	4977	10772	15488	17989	20404	5290	13168	18154	20981	23445
630	6061	12479	18403	21302	24462	6345	13669	19742	22820	26031	6685	16314	22698	26169	29597
800	7730	-	-	-	-	8067	-	-	-	-	8603	-	-	-	-
1000	9567	-	-	-	-	10030	-	-	-	-	10660	-	-	-	-

TABLE 13B - WEIGHTS

APPROXIMATE NETT WEIGHT OF PVC INSULATED COPPER CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	50	139	162	-	195	-	-	-	-	-	-	284	316	-	363
2.5	67	174	206	-	250	-	-	-	-	-	-	332	378	-	437
4	89	247	296	-	364	-	-	-	-	-	-	438	601	-	702
6	113	312	381	-	472	-	-	-	-	-	-	627	718	-	843
10	161	437	545	-	683	-	-	-	-	-	-	798	940	-	1112
16	222	440	607	-	786	-	-	-	-	1079	320	796	993	-	1346
25	309	640	908	1094	1183	-	931	1226	1466	1555	416	1181	1503	1763	1852
35	406	838	1199	1389	1569	-	1157	1546	1788	1982	523	1433	1850	2141	2323
50	545	1131	1630	1921	2151	-	1504	2067	2402	2646	723	1830	2414	2991	3262
70	736	1533	2234	2612	2949	-	1961	2715	3163	3487	932	2515	3304	3824	4189
95	1019	2113	3086	3624	4080	-	2610	3640	4242	4716	1233	3253	4328	5035	5872
120	1248	2581	3782	4506	5021	1418	3107	4362	5150	5693	1531	3781	5081	6343	6885
150	1518	3138	4601	5331	6108	1692	3718	5262	6056	6962	1815	4755	6395	7349	8296
185	1894	3908	5732	6742	7606	2074	4553	6555	7637	8529	2205	5706	7830	9092	10030
240	2466	5100	7488	8738	9937	2682	5908	8408	9752	11006	2827	7248	9865	11406	12681
300	3073	6326	9324	10846	12371	3283	7245	10312	11976	13559	3549	8702	11975	13789	15394
400	3908	8075	11872	13765	15784	4165	9087	13004	15045	17119	4442	10728	15521	17879	19976
500	4995	10316	15214	17688	20219	5244	11474	16493	19108	21668	5554	14004	19267	22303	24913
630	6414	13309	18999	22741	25257	6608	14615	21088	24335	27886	6961	17704	24410	28065	31497
800	8111	-	-	-	-	8306	-	-	-	-	8847	-	-	-	-
1000	9954	-	-	-	-	10338	-	-	-	-	10943	-	-	-	-

TABLE 14A - WEIGHTS

APPROXIMATE NETT WEIGHT OF ALUMINIUM CONDUCTOR , XLPE INSULATED CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	62	166	184	-	217	-	-	-	-	-	-	349	380	-	432
6	74	207	231	-	275	-	-	-	-	-	-	414	451	-	635
10	88	249	281	-	337	-	-	-	-	-	-	587	641	-	733
16	103	275	340	-	420	-	-	-	-	600	193	532	619	-	840
25	134	287	383	457	485	-	551	674	801	830	236	790	924	1070	1116
35	167	354	479	555	611	-	646	799	928	985	277	912	1092	1242	1326
50	213	450	616	722	801	-	795	989	1161	1230	380	1081	1330	1529	1610
70	286	599	841	981	1098	-	1010	1308	1503	1621	476	1346	1852	2147	2267
95	377	794	1105	1303	1442	-	1249	1627	1868	2048	580	1833	2271	2599	2757
120	461	969	1356	1619	1792	626	1452	1908	2253	2410	729	2067	2584	3018	3540
150	564	1193	1692	1947	2211	735	1731	2284	2637	3008	848	2433	3395	3870	4302
185	692	1476	2096	2455	2764	877	2109	2787	3338	3678	1006	3181	3981	4729	5091
240	876	1875	2667	3112	3516	1072	2668	3551	4067	4525	1222	3921	4945	5666	6118
300	1081	2314	3298	3846	4343	1291	3176	4251	4919	5469	1451	4530	5766	6609	7220
400	1372	2929	4207	4866	5540	1616	3908	5254	6086	6811	1895	5442	6970	8762	9510
500	1735	3692	5314	6181	6994	2003	4764	6477	7517	8389	2316	7160	9142	10509	11430
630	2212	4705	6743	7814	8915	2497	5895	8082	9332	10484	2837	8541	11038	12682	14050
800	2791					3128					3664				
1000	3468					3931					4561				

TABLE 14B - WEIGHTS

APPROXIMATE NETT WEIGHT OF PVC INSULATED ALUMINIUM CABLES ACCORDING TO IEC 60502-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	70	158	198	-	247	-	-	-	-	-	-	421	574	-	656
6	85	189	241	-	304	-	-	-	-	-	-	606	665	-	771
10	99	220	284	-	360	-	-	-	-	-	-	675	753	-	863
16	123	250	332	-	419	-	-	-	-	712	222	613	718	-	979
25	164	348	469	565	599	-	639	788	936	971	271	889	1065	1233	1268
35	200	423	577	674	739	-	741	923	1074	1151	318	1018	1227	1427	1493
50	259	553	763	908	995	-	926	1200	1389	1490	437	1252	1547	1977	2106
70	332	717	1010	1181	1317	-	1145	1491	1732	1855	528	1699	2080	2393	2558
95	445	954	1348	1597	1763	-	1451	1902	2215	2399	659	2094	2590	3009	3555
120	531	1131	1607	1923	2121	700	1657	2188	2567	2793	813	2331	2906	3760	3986
150	647	1378	1962	2284	2589	821	1959	2622	3009	3443	944	2996	3756	4302	4777
185	807	1713	2438	2869	3215	987	2357	3261	3764	4138	1118	3510	4537	5219	5639
240	1020	2178	3105	3630	4093	1235	2986	4025	4644	5162	1380	4326	5482	6298	6837
300	1263	2671	3841	4483	5060	1474	3590	4829	5613	6248	1740	5047	6492	7426	8083
400	1590	3393	4849	5644	6420	1847	4405	5981	6924	7754	2124	6046	8497	9758	10612
500	2021	4308	6203	7216	8204	2270	5466	7482	8635	9653	2580	7996	10256	11830	12898
630	2566	5535	7974	9254	10562	2760	6842	9428	10847	12382	3113	9723	12595	14577	16041
800	3172					3367					3908				
1000	3855					4239					4844				

TABLE 15A - CONTROL CABLES
1.5S0MM MULTICORE CONTROL XLPE INSULATED CABLES ACCORDING TO IEC 60502-1

Number of Cores	Minimum Inner sheath Thickness		Minimum Outersheath Thickness		Nominal Outersheath Thickness		Round wire Diameter	Approximate Overall Diameter			Net Weight of Cable			Current Ratings			Standard Drum Length
	Round wire armoured		Flat strip armoured		Unarmoured			Round wire armoured	Flat strip armoured	Unarmoured	Round wire armoured	Flat strip armoured	Unarmoured	In Ground (30 deg.C)	In Duct (30 deg.C)	In Air (40 deg.C)	
	mm	mm	mm	mm	mm	mm											
2	0.30	1.24	-	1.80	1.80	12	357	-	163	33	29	29	29	29	29	1000	
3	0.30	1.24	-	1.80	1.80	14	389	-	183	25	20	20	20	20	22	1000	
4	0.30	1.24	-	1.80	1.80	15	431	-	213	25	20	20	20	20	22	1000	
5	0.30	1.24	-	1.80	1.80	16	499	-	230	25	20	20	20	20	22	1000	
6	0.30	1.24	-	1.80	1.80	16	564	-	266	22	19	19	19	19	19	1000	
7	0.30	1.24	-	1.80	1.80	16	577	-	274	21	20	20	20	18	18	1000	
8	0.30	1.24	-	1.80	1.80	17	636	-	309	20	17	17	17	18	18	1000	
9	0.30	1.24	-	1.80	1.80	18	702	-	345	19	16	16	16	17	17	1000	
10	0.30	1.24	-	1.80	1.80	20	759	-	368	18	15	15	15	16	16	1000	
12	0.30	1.24	-	1.80	1.80	20	826	-	412	17	14	14	14	15	15	1000	
14	0.30	1.40	-	1.80	1.80	21	931	-	462	16	13	13	13	14	14	1000	
16	0.30	1.40	1.40	1.80	1.80	23	1083	833	515	16	13	13	13	14	14	1000	
19	0.30	1.40	1.40	1.80	1.80	23	1179	911	577	15	12	12	12	13	13	1000	
24	0.30	1.40	1.40	2.00	2.00	27	1436	1139	733	13	11	11	11	12	12	1000	
27	0.30	1.40	1.40	2.00	2.00	27	1532	1218	797	13	11	11	11	11	11	1000	
30	0.30	1.40	1.40	2.00	2.00	28	1634	1327	867	12	10	10	10	11	11	1000	
33	0.30	1.40	1.40	2.00	2.00	29	1755	1413	940	12	9	9	9	10	10	1000	
37	0.30	1.40	1.40	2.00	2.00	30	1891	1540	1023	11	9	9	9	10	10	1000	
44	0.30	1.56	1.40	2.00	2.00	33	2209	1794	1197	11	8	8	8	9	9	1000	
48	0.30	1.56	1.40	2.00	2.00	34	2330	1897	1280	11	8	8	8	9	9	1000	
52	0.30	1.56	1.56	2.00	2.00	34	2457	2058	1367	10	8	8	8	9	9	1000	
56	0.30	1.56	1.56	2.00	2.00	35	2603	2170	1461	10	8	8	8	9	9	1000	
61	0.40	1.56	1.56	2.20	2.20	37	2983	2322	1596	9	8	8	8	8	8	1000	

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 15B - CONTROL CABLES
1.5SQMM MULTICORE CONTROL PVC INSULATED CABLES ACCORDING TO IEC 60502-1

Number of Cores	Minimum Inner sheath Thickness		Minimum Outer sheath Thickness		Nominal Outer sheath Thickness		Round wire Diameter		Approximate Overall Diameter			Net Weight of Cable			Current Ratings (TYPE "A" 70 deg. C PVC)			Standard Drum Length
	Round wire armoured		Flat strip armoured		Unarmoured		Round wire		Round wire armoured	Flat strip armoured	Unarmoured	Round wire armoured	Flat strip armoured	Unarmoured	In Ground (30 deg. C)	In Duct (30 deg. C)	In Air (40 deg. C)	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg/km	kg/km	kg/km	Amps	Amps	Amps	mtrs	
2	0.40	1.24	-	1.43	0.80	13	-	10	284	-	139	23	20	20	20	1000		
3	0.40	1.24	-	1.43	0.80	13	-	11	316	-	162	21	17	17	17	1000		
4	0.40	1.24	-	1.43	0.80	14	-	12	363	-	195	21	17	17	17	1000		
5	0.40	1.24	-	1.43	0.80	15	-	13	398	-	210	21	17	17	17	1000		
6	0.40	1.24	-	1.43	0.80	16	-	14	451	-	249	15	13	13	13	1000		
7	0.40	1.24	-	1.43	0.80	16	-	14	462	-	260	14	13	13	13	1000		
8	0.40	1.24	-	1.43	1.25	18	-	15	629	-	300	14	12	12	12	1000		
9	0.40	1.24	-	1.43	1.25	19	-	16	705	-	344	13	12	12	12	1000		
10	0.40	1.24	-	1.43	1.25	20	-	17	754	-	358	13	11	11	11	1000		
12	0.40	1.24	-	1.43	1.25	21	-	17	818	-	410	12	10	10	10	1000		
14	0.40	1.24	-	1.43	1.25	21	-	18	898	-	467	11	10	10	10	1000		
16	0.40	1.24	-	1.43	1.25	22	-	19	981	-	527	11	9	9	9	1000		
19	0.40	1.24	1.24	1.43	1.60	24	23	20	1197	920	600	10	9	9	9	1000		
24	0.40	1.24	1.24	1.43	1.60	27	26	23	1452	1121	747	9	8	8	8	1000		
27	0.40	1.24	1.24	1.43	1.60	28	27	24	1547	1223	823	9	8	8	8	1000		
30	0.40	1.24	1.24	1.43	1.60	29	28	25	1663	1306	904	9	7	7	7	1000		
33	0.40	1.24	1.24	1.43	1.60	30	28	26	1767	1416	988	8	7	7	7	1000		
37	0.40	1.32	1.24	1.43	1.60	31	29	27	1913	1540	1086	8	7	7	7	1000		
44	0.40	1.40	1.32	1.52	1.60	34	33	30	2233	1803	1294	8	6	6	6	1000		
48	0.40	1.40	1.32	1.52	2.00	36	33	31	2576	1905	1395	7	6	6	6	1000		
52	0.40	1.48	1.40	1.52	2.00	37	34	32	2726	2051	1501	7	6	6	6	1000		
56	0.40	1.48	1.40	1.52	2.00	38	35	33	2865	2186	1609	7	6	6	6	1000		
61	0.40	1.48	1.40	1.60	2.00	39	36	34	3042	2310	1747	7	6	6	6	1000		

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 16A - CONTROL CABLES
2.5SQMM MULTICORE CONTROL XIPE INSULATED CABLES ACCORDING TO IEC 60502-1

Number of Cores	Minimum Inner sheath Thickness		Minimum Outersheath Thickness		Nominal Outer sheath Thickness		Round wire Diameter	Approximate Overall Diameter				Net Weight of Cable			Current Ratings			Standard Drum Length			
	mm		mm		mm			Round wire armoured	Flat strip armoured	Unarmoured	Round wire armoured	Flat strip armoured	Unarmoured	In Ground (30 deg. C)	In Duct (30 deg. C)	In Air (40 deg. C)	Amps		Amps	Amps	mtrs
	mm	mm	mm	mm	mm	mm															
2	0.30	1.24	-	1.80	1.40	14	-	12	403	-	198	43	37	39	1000						
3	0.30	1.24	-	1.80	1.40	15	-	13	445	-	227	34	28	30	1000						
4	0.30	1.24	-	1.80	1.40	16	-	14	510	-	269	34	28	30	1000						
5	0.30	1.24	-	1.80	1.40	17	-	15	558	-	292	34	28	30	1000						
6	0.30	1.24	-	1.80	1.40	18	-	16	645	-	342	29	24	26	1000						
7	0.30	1.24	-	1.80	1.40	18	-	16	656	-	355	27	23	25	1000						
8	0.30	1.24	-	1.80	1.40	19	-	17	728	-	402	26	22	24	1000						
9	0.30	1.40	-	1.80	1.40	20	-	18	820	-	452	25	21	22	1000						
10	0.30	1.40	1.24	1.80	1.60	22	20	19	948	696	482	24	20	21	1000						
12	0.30	1.40	1.40	1.80	1.60	23	21	20	1028	778	546	22	19	20	1000						
14	0.30	1.40	1.40	1.80	1.60	24	22	21	1131	872	617	21	18	19	1000						
16	0.30	1.40	1.40	2.00	1.60	24	23	22	1222	944	712	20	17	18	1000						
19	0.30	1.40	1.40	2.00	1.60	26	24	23	1345	1058	804	19	16	17	1000						
24	0.30	1.40	1.40	2.00	1.60	29	28	27	1644	1286	992	17	15	16	1000						
27	0.30	1.40	1.40	2.00	1.60	30	28	27	1753	1403	1085	16	15	16	1000						
30	0.30	1.40	1.40	2.00	1.60	31	29	28	1869	1500	1185	16	13	14	1000						
33	0.30	1.56	1.40	2.00	1.60	32	30	29	2031	1626	1289	15	13	14	1000						
37	0.30	1.56	1.40	2.00	1.60	33	31	30	2184	1768	1409	15	12	13	1000						
44	0.40	1.56	1.56	2.20	2.00	37	35	34	2770	2084	1688	14	11	12	1000						
48	0.40	1.56	1.56	2.20	2.00	38	36	35	2892	2229	1811	14	11	12	1000						
52	0.40	1.56	1.56	2.20	2.00	39	37	36	3072	2356	1940	13	11	12	1000						
56	0.40	1.56	1.56	2.20	2.00	40	38	37	3230	2511	2073	13	11	11	1000						
61	0.40	1.56	1.56	2.20	2.00	41	39	38	3430	2683	2223	12	10	11	1000						

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 16B - CONTROL CABLES
2.5SQMM MULTICORE CONTROL PVC INSULATED CABLES ACCORDING TO IEC 60502-1

Number of Cores	Minimum Inner sheath Thickness		Minimum Outer sheath Thickness		Nominal Outer sheath Thickness	Round wire Diameter	Approximate Overall Diameter			Net Weight of Cable			Current Ratings (TYPE "A" 70 deg. C PVC)			Standard Drum Length
	mm	mm	Round wire armoured	Flat strip armoured			Unarmoured	Round wire armoured	Flat strip armoured	Un-armoured	In Ground (30 deg. C)	In Duct (30 deg. C)	In Air (40 deg. C)	Amps	Amps	
					mm	mm										mm
2	0.40	1.24	-	-	1.43	0.80	13	-	11	332	-	174	32	27	27	1000
3	0.40	1.24	-	-	1.43	0.80	14	-	12	378	-	206	27	24	24	1000
4	0.40	1.24	-	-	1.43	0.80	15	-	13	437	-	250	27	24	24	1000
5	0.40	1.24	-	-	1.43	0.80	16	-	14	479	-	272	27	24	24	1000
6	0.40	1.24	-	-	1.43	1.25	18	-	15	664	-	325	21	18	18	1000
7	0.40	1.24	-	-	1.43	1.25	18	-	15	681	-	342	20	17	17	1000
8	0.40	1.24	-	-	1.43	1.25	19	-	16	760	-	396	19	16	16	1000
9	0.40	1.24	-	-	1.43	1.25	20	-	17	852	-	454	18	15	15	1000
10	0.40	1.24	-	-	1.43	1.25	22	-	19	906	-	474	18	15	15	1000
12	0.40	1.24	-	-	1.43	1.25	22	-	19	1001	-	548	17	14	14	1000
14	0.40	1.24	1.24	1.24	1.43	1.60	24	23	20	1224	946	627	16	14	14	1000
16	0.40	1.24	1.24	1.24	1.43	1.60	25	24	21	1342	1055	709	15	13	13	1000
19	0.40	1.16	1.24	1.24	1.43	1.60	26	25	22	1471	1185	813	14	12	12	1000
24	0.40	1.32	1.24	1.24	1.43	1.60	30	29	26	1823	1443	1015	13	11	11	1000
27	0.40	1.32	1.24	1.24	1.43	1.60	31	29	27	1949	1576	1122	12	10	10	1000
30	0.40	1.32	1.24	1.24	1.43	1.60	32	30	28	2099	1691	1236	12	10	10	1000
33	0.40	1.32	1.32	1.32	1.43	1.60	33	31	29	2236	1848	1353	11	9	9	1000
37	0.40	1.40	1.32	1.32	1.52	1.60	34	33	30	2426	2013	1505	11	9	9	1000
44	0.40	1.48	1.40	1.40	1.60	2.00	39	36	34	3088	2356	1793	10	9	9	1000
48	0.40	1.48	1.48	1.48	1.60	2.00	39	37	34	3259	2541	1936	10	9	9	1000
52	0.40	1.56	1.48	1.48	1.60	2.00	40	38	35	3455	2692	2085	10	8	8	1000
56	0.40	1.56	1.48	1.48	1.69	2.00	41	39	37	3662	2870	2254	9	8	8	1000
61	0.40	1.56	1.56	1.56	1.69	2.00	43	41	38	3867	3088	2429	9	8	8	1000

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor.

TABLE 17 - STANDARD DRUM LENGTH FOR 1kV PVC COPPER POWER CABLES

Conductor cross sectional Area	Unarmoured Cables					Armoured Cables				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	STANDARD LENGTH (MTS) WITH +/-5% TOLERANCE					STANDARD LENGTH (MTS) WITH +/-5% TOLERANCE				
1.5	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2.5	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
6	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
10	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
16	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
25	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
35	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
70	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
95	1000	1000	1000	1000	500	1000	1000	1000	500	500
120	1000	1000	1000	500	500	1000	1000	500	500	500
150	1000	1000	500	500	500	1000	500	500	500	500
185	1000	500	500	500	500	1000	500	500	500	400
240	1000	500	500	500	250	1000	500	500	400	250
300	1000	500	500	250	250	1000	500	250	250	250
400	1000	500	250	250	250	500	400	250	250	250
500	500	400	250	250	250	500	250	250	250	250
630	500	250	250	250	250	500	250	250	250	250
800	500					500				
1000	400					400				

Note : For multicore copper cables above 400sqmm steel drum required.

TABLE 18 - STANDARD DRUM LENGTH FOR 1kV PVC ALUMINIUM POWER CABLES

Conductor cross sectional Area	Unarmoured Cables					Armoured Cables				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	STANDARD LENGTH (MTS) WITH +/-5% TOLERANCE					STANDARD LENGTH (MTS) WITH +/-5% TOLERANCE				
1.5	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
2.5	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
4	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
6	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
10	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
16	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
25	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
35	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
50	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
70	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
95	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
120	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
150	1000	1000	1000	1000	1000	1000	1000	1000	500	500
185	1000	1000	1000	1000	500	1000	1000	500	500	500
240	1000	1000	1000	500	500	1000	500	500	500	500
300	1000	500	500	500	500	1000	500	500	500	500
400	1000	500	500	500	500	1000	500	500	500	500
500	1000	500	500	500	500	1000	500	500	250	250
630	500	500	500	500	500	500	500	250	250	250
800	500					500				
1000	500					500				

Installation

The current ratings are also based on the following methods of installation:

A) Single Core cables:	
<u>Type of Installation</u>	<u>Method of Installation</u>
a) Laid direct in the ground:	<ol style="list-style-type: none">i. Three cables in close trefoil formation orii. Two cables touching in horizontal formation.
b) In air:	<ol style="list-style-type: none">i. Two Single Core cables are installed one above the other & fixed to a vertical wall as follows: the distance between the wall & the surface of the cable being 25 mm in each case.<ul style="list-style-type: none">• Cables of sizes upto & including 185 sq.mm are installed at a distance between centres of twice the overall diameter of cable.• Cables if sizes 240 sq.mm & above are installed at a distance between centres of 90 mm. <p>The ratings for two cables may be applied with safety in case where such cables are installed in horizontal formation, on brackets fixed to a wall, either spaced as indicated above or touching throughout.</p> <ol style="list-style-type: none">ii. Three Single Core cables are installed in trefoil formation touching.
B) Twin & Multi Core cables:	
	Installed single in ground & in air.

A) RATING FACTORS

i) Rating factors related to variation in ambient air temperature

Air temperature in Deg. C		25	30	35	40	45	50
Rating factors	XLPE	1.14	1.10	1.04	1.00	0.95	0.89
	"A" PVC	1.25	1.16	1.09	1.00	0.90	0.81
	"HR" PVC	1.15	1.10	1.05	1.00	0.94	0.88

ii) Rating factors related to variation in ambient ground temperature

Ground temperature in Deg.C		15	20	25	30	35	40	45
Rating factors	XLPE	1.12	1.08	1.04	1.00	0.96	0.91	0.87
	"A" PVC	1.17	1.12	1.06	1.00	0.94	0.87	0.79
	"HR" PVC	1.12	1.08	1.04	1.00	0.95	0.90	0.85

B) RATING FACTORS

i) FOR DEPTH OF LAYING (CABLES LAID DIRECT IN THE GROUND)

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

ii) for variation in thermal resistivity of soil(twin & multi-core Cables laid direct in the ground)

Nominal area of conductor mm ²	for value of thermal Resistivity of soil in deg. C cm/W					
	100	120	150	200	250	300
1.5	1.10	1.05	1.00	0.92	0.86	0.81
2.5	1.10	1.05	1.00	0.92	0.86	0.81
4	1.10	1.05	1.00	0.92	0.86	0.81
6	1.10	1.05	1.00	0.92	0.86	0.81
10	1.10	1.06	1.00	0.92	0.85	0.80
16	1.12	1.06	1.00	0.91	0.84	0.79
25	1.14	1.08	1.00	0.91	0.84	0.78
35	1.15	1.08	1.00	0.91	0.84	0.77
50	1.15	1.08	1.00	0.91	0.84	0.77
70	1.15	1.08	1.00	0.90	0.83	0.76
95	1.15	1.08	1.00	0.90	0.83	0.76
120	1.17	1.08	1.00	0.90	0.82	0.76
150	1.17	1.09	1.00	0.90	0.82	0.76
185	1.18	1.09	1.00	0.89	0.81	0.75
240	1.18	1.09	1.00	0.89	0.81	0.75
300	1.18	1.09	1.00	0.89	0.81	0.75
400	1.19	1.10	1.00	0.89	0.81	0.75
500						
630						

iii) for variation in thermal resistivity of soil (two & three single-core Cables laid direct in the ground)

Nominal area of conductor mm ²	two cables touching, for value of thermal Resistivity of soil in deg. C cm/W						three cables in Trefoil touching, for value of thermal Resistivity of soil in deg. C cm/W					
	100	120	150	200	250	300	100	120	150	200	250	300
1.5	1.15	1.08	1.00	0.91	0.84	0.78	1.18	1.09	1.00	0.90	0.82	0.76
2.5	1.15	1.08	1.00	0.91	0.84	0.78	1.18	1.09	1.00	0.90	0.82	0.76
4	1.15	1.08	1.00	0.91	0.84	0.78	1.18	1.09	1.00	0.90	0.82	0.76
6	1.15	1.08	1.00	0.91	0.84	0.78	1.18	1.09	1.00	0.90	0.82	0.76
10	1.15	1.08	1.00	0.90	0.83	0.77	1.18	1.09	1.00	0.89	0.81	0.75
16	1.17	1.09	1.00	0.90	0.83	0.77	1.19	1.09	1.00	0.89	0.81	0.74
25	1.18	1.09	1.00	0.90	0.82	0.76	1.19	1.09	1.00	0.88	0.80	0.74
35	1.18	1.09	1.00	0.90	0.82	0.75	1.20	1.09	1.00	0.88	0.80	0.74
50	1.18	1.09	1.00	0.90	0.82	0.75	1.20	1.09	1.00	0.88	0.80	0.74
70	1.19	1.09	1.00	0.89	0.81	0.74	1.21	1.10	1.00	0.88	0.80	0.74
95	1.19	1.09	1.00	0.89	0.81	0.74	1.22	1.10	1.00	0.88	0.80	0.74
120	1.21	1.10	1.00	0.89	0.80	0.74	1.22	1.10	1.00	0.88	0.79	0.74
150	1.21	1.10	1.00	0.89	0.80	0.74	1.22	1.10	1.00	88.00	0.79	0.73
185	1.21	1.10	1.00	0.89	0.80	0.74	1.22	1.10	1.00	88.00	0.79	0.73
240	1.21	1.10	1.00	0.89	0.80	0.74	1.22	1.10	1.00	88.00	0.79	0.73
300	1.21	1.10	1.00	0.89	0.80	0.74	1.22	1.10	1.00	0.88	0.79	0.72
400	1.21	1.10	1.00	0.89	0.80	0.74	1.24	1.11	1.00	0.88	0.79	0.72
500	1.21	1.10	1.00	0.89	0.80	0.74	1.24	1.11	1.00	0.88	0.79	0.72
630	1.21	1.10	1.00	0.89	0.80	0.74	1.24	1.11	1.00	0.88	0.79	0.72

A) GROUP RATING FACTORS
For single core bcables laid in Trefoil formation

A) Cable laid in ground in horizontal formation

No of Trefoils in group	Distance/Spacing between trefoils				
	Touching	15 cm	30 cm	45 cm	0.89
2	0.78	0.81	0.85	0.88	0.81
3	0.68	0.71	0.77	0.81	0.88
4	0.61	0.65	0.72	0.76	0.81
5	0.56	0.61	0.68	0.73	0.88

B) Cable laid in Trefoil Ducts in horizontal formation

No of Trefoils in group	Distance/Spacing between trefoils		
	Touching	15 cm	45 cm
2	0.87	0.90	0.91
3	0.79	0.83	0.86
4	0.74	0.79	0.82
5	0.71	0.76	0.80

C) Cable 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

D) Cable laid in open air trench, 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	1.00	0.98	0.96
2	1.00	0.95	0.93
3	1.00	0.94	0.92
6	1.00	0.93	0.90

B) GROUP RATING FACTORS For Multi-core cables

A) Cable laid inside concrete trench with removable covers, on cables trays where air circulation is restricted, The cables are spaced by one cable diameter & trays are in tiers by 300mm. The clearance from the wall is 25 mm.

No of Cable 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) Cable laid on trays exposed to air, The cables are spaced by one cable diameter & trays are in tiers by 300mm. The clearance between the wall & the cable is 25 mm.

No of Cable trays in tier	No. of cables				
	1	2	3	6	9
1	0.95	0.90	0.88	0.88	0.88
2	0.90	0.85	0.83	0.83	0.83
3	0.88	0.83	0.81	0.81	0.81
6	0.86	0.81	0.81	0.79	0.81

C) Cable laid on trays exposed to air, The cables touching & trays in tiers by 300mm. The clearance between the wall & the cable is 25 mm.

No of Cable trays in tier	No. of cables per tray				
	1	2	3	6	9
1	1.00	0.84	0.80	0.75	0.73
2	1.00	0.87	0.76	0.71	0.69
3	1.00	0.78	0.74	0.70	0.68
6	1.00	0.76	0.72	0.68	0.66

D) Cable laid direct in ground in horizontal formation

No of cables in group	Distance/Spacing of cables			
	Touching	15 cm	30 cm	45 cm
2	0.79	0.82	0.87	0.90
3	0.69	0.75	0.79	0.83
4	0.62	0.69	0.74	0.79
5	0.58	0.65	0.72	0.76
6	0.54	0.61	0.69	0.75

E) Cable laid in single way duct/pipes in horizontal formation

No of cables in group	Distance/Spacing of cables			
	Touching	15 cm	30 cm	45 cm
2	0.88	0.90	0.92	0.94
3	0.82	0.84	0.87	0.89
4	0.77	0.80	0.84	0.87
5	0.74	0.78	0.82	0.85
6	0.71	0.76	0.81	0.84

GUIDANCE ON HANDLING, STORING & INSTALLATION OF POWER CABLES


HANDLING (UNLOADING AT SITE) :

Damage to cables can occur due to the incorrect handling to which the drums & cables may be subjected, causing breakdown of the drum flanges & in exceptional cases, movement of the drum barrel takes place. Once the cable is immediately exposed to damage.

The cable drums should not be dropped or thrown from railway wagons or trucks during unloading operations as the shock may cause serious damage to cable layers. A crane should be used for unloading cable drums. When lifting drums with the crane, it is recommended that the lagging should be kept in place to prevent the flanges from crushing on to the cable. If the crane is not available, a ramp should be prepared with approximate inclination. The cable drum should be rolled over the ramp by means of ropes and winches. Additionally a sand bed at the foot of the ramp may be prepared to brake the rolling the cable drum.

Cable ends should always be sealed by means of suitable end sealing materials to prevent moisturisation of cores and armour.

Drums should be rolled in direction of arrow marked on the drum.

ROLL THIS WAY 

STORAGE :

Cables should be stored in a dry covered place to prevent exposure to climatic conditions and wear and tear of wooden drums and it should preferably on a concrete surface/firm surface which will not cause the drums to sink and thus lead to flange rot and extreme difficulty in moving the drums.

All drums should be stored in such a manner as to leave sufficient space between them for air circulation. It is desirable for drums to stand on battens placed directly under the flanges.

In no case should the drums be stored, "On the Flat", i.e., with flange (see fig.)

Cables should be protected from direct rays of the sun by leaving the battens on or covering the cables with thick black polythene sheet.

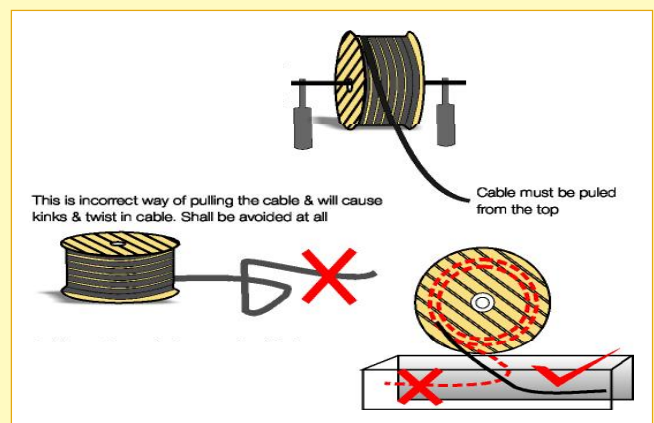
Note:- Cable ends must be sealed with enend caps during storage & transportation.



LAYING :

For laying of cables special cares to be taken to prevent sharp bending, kinking, twisting. Cable should be unwound from drum by proper mounting the cable drum on a cable wheel making sure the spindle is strong enough to carry the weight without bending and that it is lying horizontally in the bearings so as to prevent the drum creeping to one side or the other while it is rotating. It is important that the rolling of the drum to this position should be in accordance with the arrow on the flange-to prevent loose turns from developing during unwinding.

Provision should be made to break the drum to avoid further rolling & buckling of cable during sudden stop. A simple wooden plank can server this purpose.



However, following salient points are to be considered during laying procedure of cables laid in racks and in built-in trenches.

- For laying of cables power cables to be placed at the bottom most layer and control cables at top most layer.
- Single core power cable for use on A.C. system shall be laid in delta formation supported by non-magnetic material. Trefoil clamps of suitable size are to be placed at regular intervals but preferably not more than 800 mm. Axial spacing of two circuits in delta formation shall not be less than 4 times the cable dia.
- In case of multicore power cables, cables shall be laid side by side, with spacings not less than one cable diameter. However derating factors for cables laid on trenches are to be referred.
- Multicore power cables and single core D.C. circuits may be clamped by means of galvanised mild steel saddles but 1.1 KV single core cables should be clamped by means of non-magnetic saddles. The saddles shall not be placed at intervals more than 1500 mm. for horizontal and 1200 mm. for vertical runs.
- Multicore control cables can be laid touching each other on cable racks and wherever required may be taken in two layers. They should be clamped by means of PVC straps both for horizontal and vertical runs (alternatively, fabricated aluminium clamps may be used) at regular intervals.
 - a. If the cables are buried directly in ground I.S. 1255 is to be followed for code of practice. However, generally cables are laid 1000 mm. below finished ground level at any point of cable run and 75 mm. of sand cushioning to be provided.
 - b. In loose soil concrete pillar should be provided for as support and hence pipes are recommended to be used for cable path.

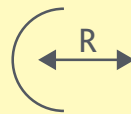
If there is a possibility of mechanical damage, cables should be protected by means of mild steel covers placed on racks.

While laying cables, special care to be taken at bends. Followings are the recommended bending radius for power and control cables.

MINIMUM BENDING RADIUS FOR L.V. CABLES:-

Type of cables	:	<u>Minimum internal radius of bend</u>
• Single core Cables	:	15 D
• Multicore Cables	:	12 D

Where 'D' is the tabulated overall diameter of cable.



MAXIMUM PERMISSIBLE TENSILE STRENGTH FOR CABLES

A) Maximum safe pulling force for cables (when pulled by pulling eye) :-

- For Copper Conductor Cables = 5.0 Kgf x number of cores x conductor cross-section
= 50 N x number of cores x conductor cross-section
- For Aluminium Conductor Cables = 3.0 Kgf x number of cores x conductor cross-section
= 30 N x number of cores x conductor cross-section
(Subjected to maximum of 2000kgf or 20,000 N)

B) Side wall Pressure :- $(\text{Maximum Pulling force(Kgf)} \times 100) / \text{Minimum Bending Radius(mm)}$
(Subject to a maximum of 500kgf or 5,000 N/m)

C) For cables pulled with stocking :-

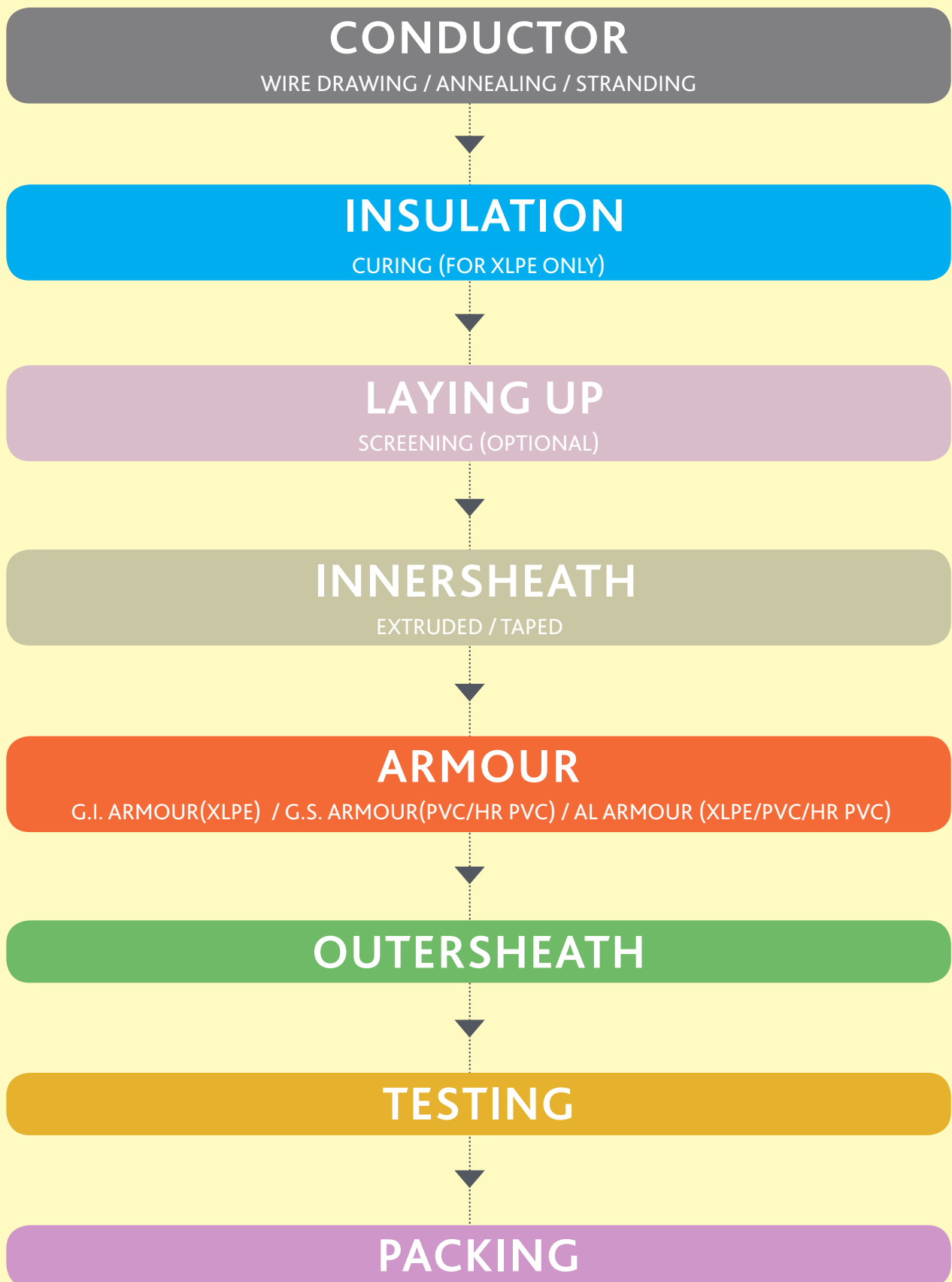
- Armoured cables $P = 9 D^2$
- Unrmoured cables $P = 9 D^2$

Where,

P = Pulling force in Newtons

D = Outer diameter of cables in mm

MANUFACTURING PROCESS FOR LV CABLES



QUALITY, ENVIRONMENT AND SAFETY CERTIFICATIONS



BUREAU VERITAS
Certification

Certification
Awarded to

KEC INTERNATIONAL LIMITED
(RPG CABLES DIVISION)

KEC

PLOT NO 27/3/4, DEMNI ROAD, DADRA, SILVASSA – 396 193 (D & NH), INDIA.

Bureau Veritas Certification (India) Private Limited certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the standards detailed below

STANDARDS

ISO 9001:2008 & ISO 14001:2004

SCOPE OF SUPPLY
DESIGN, MANUFACTURE AND SUPPLY OF PVC AND XLPE LT CABLES.

Original Approval Date of QMS: 24 March 2006
Original Approval Date of EMS: 06 May 2009
Next Recertification Due Before: 23 December 2014

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until: 23 March 2015

To check this certificate validity please +91 22 6895 6300 call:

Further clarifications regarding the scope of this certificate and the applicability of the Management System requirements may be obtained by consulting the organisation.

Certificate Number: **IND12.7116UIQE**



R. K. SHARMA
Director



Bureau Veritas Certification using the accreditation certificate number 008



Certification / Managing Office Address: "Marwah Centre" 6th Floor, Krishnalal Marwah Marg, Opp. Ansa Industrial Estate, Off Saki Vihar Road, Andheri (East), Mumbai – 400 072, India.



BUREAU VERITAS
Certification

KEC INTERNATIONAL LIMITED
RPG CABLES, MYSORE

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Bureau Veritas Certification certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

Standards

ISO 9001:2008, ISO 14001:2004 & BS OHSAS 18001:2007

Scope of certification

- 1) DESIGN, DEVELOPMENT AND MANUFACTURE OF POLYETHYLENE INSULATED JELLY FILLED CABLES (PJFI) AND OPTICAL FIBRE CABLES (OFC) FOR TELECOMMUNICATION AND INDUSTRIAL APPLICATIONS.
- 2) DESIGN, DEVELOPMENT AND MANUFACTURE OF POLY VINYL CHLORIDE (PVC) AND CROSS LINKED POLYETHYLENE (XLPE) INSULATED ALUMINIUM AND COPPER CABLES FOR CONTROL, LT POWER TRANSMISSION AND DISTRIBUTION APPLICATIONS.
- 3) DESIGN, DEVELOPMENT AND MANUFACTURE OF POLY VINYL CHLORIDE (PVC), CROSS LINKED POLYETHYLENE (XLPE) AND POLYETHYLENE (PE) INSULATED COPPER CABLES FOR INSTRUMENTATION, TRANSMISSION AND SIGNALLING APPLICATIONS.

Certification cycle start date: 14 December 2013
Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: 13 December 2016
Original certification date: 14 December 2013

Certificate No. **IND13.589UIQ/EHS** Version : 1 Revision date: 14 December 2013



R. K. SHARMA - Director



Bureau Veritas Certification using the accreditation certificate number 008



Certification body: Brandon House, 180 Borough High Street, London SE1 1LB, United Kingdom
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