6.0 Low Voltage PVC and XLPE Insulated 600/1000V Power Cables to SANS 1507

6.1 Note on PVC insulation

For PVC insulation continuous conductor temperatures up to 70°C are permissible. Care must be exercised in matching the cable to the circuit protection. Under short circuit conditions, a maximum conductor temperature of 160°C is allowed for a maximum period of 1 second.

Note of XLPE insulation

For XLPE insulation, continuous conductor temperature up to 90°C are permissible with excursions of up to 130°C or a maximum of 8 hours continuous per event, with a maximum total of 125 hours per annum.

Table 6.1 : Current rating parameters

	PVC	XLPE
Maximum sustained conductor temperature	70°C	90°C
Ground temperature	25°C	25°C
Ambient air temperature (free air shaded)	30°C	30°C
Ground Thermal Resistivity	1,2 K.m/W	1,2 K.m/W
Depth of laying to top of cable or duct	500mm	500mm

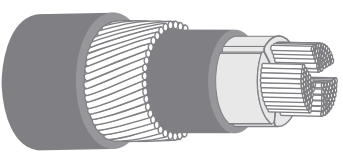
6.2 Physical dimensions of the cables are given in terms of the sketch below and these abbreviations are used in the tables.

C/S OF SINGLE CORE CABLE

D1 = diameter over bedding

d = diameter of armour wires

D2 = diameter over outer sheath



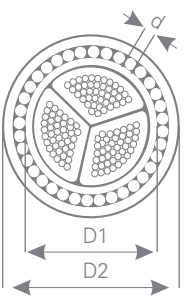


Table 6.2
Electrical and Physical Properties of 3 and 4 core PVC Insulated PVC bedded SWA PVC sheathed 600/1000 V cables manufactured to SANS 1507-3

COPPER CONDUCTORS

Cable Size	Electrical Properties						Physical Properties							
	Current Rating			Impe-dance	3ϕ Volt drop	1ϕ Volt drop	Nominal Diameters						Approx. Mass	
							D1		d		D2			
	Ground	Ducts	Air				3c	4c	3c	4c	3c	4c	3c	4c
(mm²)	(A)	(A)	(A)	(Ω/km)	(mV/A/m)	(mV/A/m)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(kg/km)
1,5	24	20	19	14,48	25,080	28,956	8,51	9,33	1,25	1,25	14,13	14,95	448	501
2,5	32	26	26	8,87	15,363	17,734	9,61	10,56	1,25	1,25	15,23	16,18	522	597
4	42	34	35	5,52	9,561	11,034	11,40	12,57	1,25	1,25	17,02	18,39	667	762
6	53	43	45	3,69	6,391	7,374	12,58	13,90	1,25	1,25	18,40	19,72	790	910
10	70	58	62	2,19	3,793	4,384	14,59	16,14	1,25	1,25	20,41	21,96	996	1169
16	91	75	83	1,38	2,390	2,759	16,55	19,18	1,25	1,60	22,37	25,92	1295	1768
25	119	96	110	0,8749	1,515	1,749	19,46	21,34	1,60	1,60	26,46	28,34	1838	2196
35	143	116	135	0,6335	1,097	1,267	20,89	23,97	1,60	1,60	27,89	31,17	2215	2732
50	169	138	163	0,4718	0,817	0,944	24,26	28,14	1,60	2,00	31,46	36,54	2871	3893
70	210	171	207	0,3325	0,576	0,665	27,07	31,29	2,00	2,00	35,47	40,09	3617	4837
95	251	205	251	0,2460	0,427	0,492	31,19	35,82	2,00	2,00	39,99	44,62	4901	6115
120	285	234	290	0,2012	0,348	0,402	33,38	38,10	2,00	2,00	42,18	47,40	5720	7269
150	320	263	332	0,1698	0,294	0,339	36,68	42,05	2,00	2,50	45,98	52,65	6908	9250
185	361	298	378	0,1445	0,250	0,289	40,82	46,75	2,50	2,50	51,12	57,45	8690	11039
240	416	344	445	0,1220	0,211	0,244	46,43	53,06	2,50	2,50	57,13	64,16	10767	13726
300	465	385	510	0,1090	0,189	0,218	51,10	58,53	2,50	2,50	62,20	70,13	12950	16544

Table 6.3
Electrical and Physical Properties of 3 and 4 core PVC Insulated PVC bedded SWA PVC sheathed 600/1000 V cables manufactured to SANS 1507-3

ALUMINIUM CONDUCTORS

Cable Size	Electrical Properties						Physical Properties							
	Current Rating			Impe-dance	3ϕ Volt drop	1ϕ Volt drop	Nominal Diameters						Approx. Mass	
							D1		d		D2			
	Ground	Ducts	Air				3c	4c	3c	4c	3c	4c	3c	4c
(mm²)	(A)	(A)	(A)	(Ω/km)	(mV/A/m)	(mV/A/m)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(kg/km)
25	90	73	80	1,4446	2,502	2,889	17,76	20,65	1,60	1,60	24,76	27,65	1301	1554
35	108	87	99	1,0465	1,813	2,093	19,33	21,93	1,60	1,60	26,33	29,13	1477	1757
50	129	104	119	0,7749	1,342	1,549	21,87	25,05	1,60	1,60	29,07	32,25	1782	2150
70	158	130	151	0,5388	0,933	1,078	24,76	29,27	1,60	1,60	31,96	37,67	2132	2930
95	192	157	186	0,3934	0,681	0,787	28,68	33,73	2,00	2,00	37,08	42,53	2908	3647
120	219	179	216	0,3148	0,545	0,629	31,09	35,44	2,00	2,00	39,89	44,24	3328	4023
150	245	201	250	0,2607	0,452	0,521	33,99	39,39	2,00	2,50	42,79	49,69	3837	5276
185	278	229	287	0,2133	0,369	0,427	37,80	44,51	2,00	2,50	47,10	54,81	4557	6231
240	324	268	342	0,1708	0,296	0,342	42,60	50,04	2,50	2,50	52,9	61,14	5977	7550

Table 6.4
Electrical and Physical Properties of 3 and 4 core XLPE Insulated PVC bedded SWA PVC sheathed 600/1000 V cables manufactured to SANS 1507-4

COPPER CONDUCTORS

Cable Size	Electrical Properties									Physical Properties							
	Current Rating						Impe-dance	3ϕ Volt drop	1ϕ Volt drop	Nominal Diameters						Approx. Mass	
	Ground		Ducts		Air					D1		d		D2			
										3c	4c	3c	4c	3c	4c	3c	4c
(mm²)	70°C	90°C	70°C	90°C	70°C	90°C	(Ω/km)	(mV/A/m)	(mV/A/m)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(kg/km)
1,5	26	30	21	25	16	22	15,43	26,726	30,861	8,08	8,85	1,25	1,25	13,70	14,47	416	453
2,5	34	40	28	32	21	30	9,45	16,368	18,900	9,18	10,08	1,25	1,25	14,80	15,70	487	521
4	45	52	36	42	28	39	5,88	10,184	11,761	10,06	11,07	1,25	1,25	15,68	16,69	566	650
6	55	64	44	52	35	49	3,93	6,807	7,862	11,25	12,40	1,25	1,25	16,87	18,02	683	778
10	75	87	60	70	48	68	2,33	4,053	4,663	13,25	14,64	1,25	1,25	19,07	20,46	890	1033
16	94	110	76	89	60	85	1,46	2,546	2,924	15,21	17,68	1,25	1,25	21,03	24,42	1191	1544
25	123	143	98	116	107	132	0,9313	1,613	1,863	18,13	19,86	1,60	1,60	25,13	26,86	1693	2018
35	148	172	119	139	132	163	0,6738	1,167	1,348	19,56	22,32	1,60	1,60	26,56	29,52	2025	2511
50	177	206	142	167	163	200	0,5009	0,868	1,002	22,49	25,76	1,60	1,60	29,69	32,96	2606	3242
70	216	252	175	205	206	253	0,3521	0,610	0,704	25,74	29,81	2,00	2,00	32,94	38,21	3323	4503
95	258	302	209	248	251	312	0,2589	0,448	0,518	28,76	33,1	2,00	2,00	37,16	41,90	4442	5650
120	293	344	238	282	291	362	0,2109	0,365	0,422	31,39	35,87	2,00	2,00	40,19	44,67	5335	6731
150	329	387	268	318	334	416	0,1775	0,307	0,355	34,69	40,12	2,50	2,50	43,49	50,42	6403	8708
185	371	435	302	359	383	478	0,1500	0,260	0,300	39,05	44,77	2,50	2,50	49,35	55,07	8184	10343
240	428	498	349	413	453	557	0,1247	0,216	0,249	44,22	50,58	2,50	2,50	54,52	61,68	10073	12932
300	482	558	401	471	520	634	0,1099	0,190	0,219	48,45	55,56	2,50	2,50	58,35	67,16	12076	15575

Table 6.5
Electrical and Physical Properties of 3 and 4 core XLPE Insulated PVC bedded SWA PVC sheathed 600/1000 V cables manufactured to SANS 1507-4

ALUMINIUM CONDUCTORS

Cable Size	Electrical Properties						Physical Properties							
	Current Rating			Impe-dance	3ϕ Volt drop	1ϕ Volt drop	Nominal Diameters						Approx. Mass	
							D1		d		D2			
	Ground	Ducts	Air				3c	4c	3c	4c	3c	4c	3c	4c
(mm²)	(A)	(A)	(A)	(Ω/km)	(mV/A/m)	(mV/A/m)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(kg/km)
25	115	92	108	1,5408	2,669	3,082	15,53	19,16	1,25	1,60	21,53	26,16	925	1377
35	138	111	131	1,1159	1,933	2,232	18,00	20,44	1,60	1,60	25,00	27,44	1307	1549
50	164	132	160	0,8258	1,430	1,652	20,09	23,06	1,60	1,60	27,09	30,26	1550	1872
70	199	161	200	0,5736	0,994	1,147	23,43	27,38	1,60	1,60	30,63	34,98	1911	2371
95	238	194	245	0,4178	0,724	0,836	25,85	30,99	1,60	2,00	33,05	39,39	2254	3158
120	272	221	285	0,3337	0,578	0,667	29,09	33,20	2,00	2,00	37,49	42,00	2929	3584
150	306	249	328	0,2756	0,477	0,551	32,15	36,75	2,00	2,00	40,95	46,05	3457	4274
185	344	283	378	0,2247	0,389	0,449	36,02	42,52	2,00	2,50	45,32	52,82	4132	5650
240	392	325	438	0,1785	0,309	0,357	40,39	50,40	2,50	2,50	50,69	61,50	5375	7024

Table 6.6
Electrical and Physical Propertied of Single core unarmoured PVC insulated PVC sheathed 600/1000 V cables manufactured to SANS 1507-3

STRANDED COPPER CONDUCTORS

Cable Size	Electrical Properties								Physical Properties		
	1 ϕ Cables AC or DC			3ϕ Cables in Trefoil Formation.					Nominal Diameters		Nominal Mass
	Current Rating		Volt Drop per amp per mV	Current Rating			Volt drop per amp per mV	Impe-dance			
	Ground	Air		Ground	Duct	Air			D1	D2	
(mm²)	(A)	(A)	mV	(A)	(A)	(A)	mV	(Ω/km)	(mm)	(mm)	(kg/km)
25	118	126	1,75	127	111	112	1,52	0,8767	5,95	11,91	366
35	156	156	1,27	153	132	141	1,10	0,6356	7,00	12,96	469
50	186	191	0,95	180	155	172	0,82	0,4745	8,15	15,15	632
70	232	246	0,67	221	190	223	0,58	0,3356	9,79	16,57	880
95	281	300	0,50	265	226	273	0,43	0,25	11,54	19,04	1160
120	324	349	0,41	301	256	318	0,36	0,2054	12,96	20,24	1413
150	370	404	0,35	338	287	369	0,30	0,1734	14,39	22,07	1734
185	424	463	0,30	381	323	424	0,26	0,1499	16,10	24,08	2145
240	498	549	0,25	442	372	504	0,22	0,1268	18,71	27,81	2725
300	566	635	0,23	499	419	584	0,20	0,1131	21,45	30,75	3375
400	651	742	0,21	565	472	679	0,18	0,1028	24,30	34,10	4395
500	740	835	0,19	634	532	778	0,17	0,0963	26,51	37,13	5299
630	836	953	0,18	718	603	892	0,15	0,089	33,15	43,62	6965
800	931	1086	0,17	792	689	1020	0,15	0,852	37,70	49,00	9118
1000	1041	1216	0,16	856	741	1149	0,14	0,0819	42,25	53,45	11050

Note: (1) D1 is the diameter over the conductor. (2) D2 is the diameter over the sheath.

Table 6.7

Electrical and Physical Propertied of Single core unarmoured XLPE insulated PVC sheathed 600/1000 V cables manufactured to SANS 1507-4

STRANDED COPPER CONDUCTORS

Cable Size	Electrical Properties								Physical Properties		
	1 ϕ Cables AC or DC			3ϕ Cables in Trefoil Formation.					Nominal Diameters		Nominal Mass
	Current Rating		Volt Drop per amp per mV	Current Rating			Volt drop per amp per mV	Impe-dance			
	Ground	Air		Ground	Duct	Air			D1	D2	
(mm²)	(A)	(A)	mV	(A)	(A)	(A)	mV	(Ω/km)	(mm)	(mm)	(kg/km)
25	169	174	1,866	151	137	137	1,616	0,9332	5,95	11,81	328
35	205	211	1,352	181	164	167	1,710	0,6760	7,00	12,86	426
50	245	257	1,007	213	192	203	0,872	5,3600	8,15	14,38	567
70	302	236	0,710	260	235	257	0,615	0,3552	9,79	16,22	824
95	366	404	0,526	312	281	318	0,456	0,2631	11,54	17,97	1071
120	422	475	0,431	355	319	372	0,373	0,2154	12,96	19,32	1304
150	480	542	0,363	397	356	426	0,315	0,1818	14,39	21,42	1628
185	554	629	0,309	449	402	494	0,268	0,1545	16,10	23,63	1995
240	656	753	0,259	522	466	594	0,224	0,1295	18,71	26,69	2461
300	766	881	0,229	589	524	692	0,199	0,1149	21,45	30,05	3182
400	902	1045	0,207	668	592	807	0,179	0,1035	24,30	33,30	4117
500	1040	1182	0,192	750	664	925	0,167	0,0963	26,51	36,33	5032
630	1229	1417	0,178	848	746	1094	0,154	0,8890	33,15	42,79	6641
800	1366	1603	0,171	942	823	1254	0,148	0,0856	37,70	48,84	8535
1000	1486	1790	0,166	1025	892	1400	0,144	0,0831	42,25	54,21	10676

Note: (1) D1 is the diameter over the conductor. (2) D2 is the diameter over the sheath.