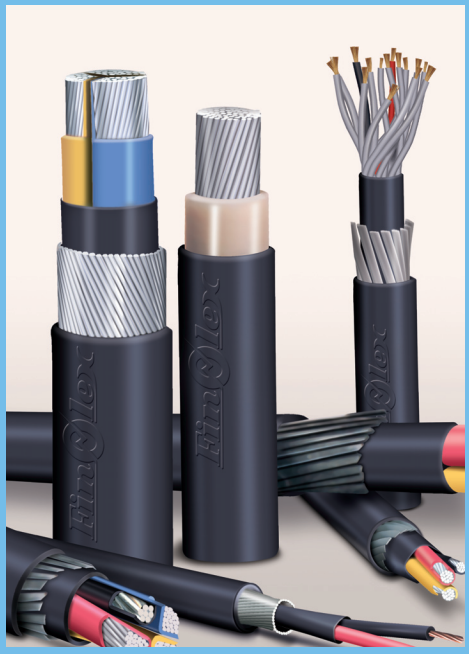
Finolex

PVC Insulated Power & Control Cables



An IS / ISO 9001 Company

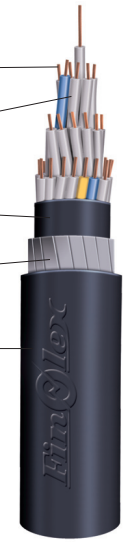
Selected
Superbrand
INDIA
2006-07
Consumer Validated

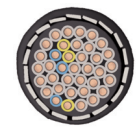
TYPICAL EXAMPLES OF DESIGN & CONSTRUCTION AS PER IS 1554

Power Cable
Steel strip, armoured

	IS Specification	
Conductor : EC Grade Aluminium	8130	**Conductor :** High conductivity, Electrolytic Grade Copper
Insulation : PVC type A or C	5831	**Insulation :** PVC type A or C
Inner Sheath : PVC type ST1 or ST2	5831	**Inner Sheath :** PVC type ST1 or ST2
Armour : Galvanised Steel strip	3975	**Armour :** Galvanised Steel strip
Outer Sheath : PVC type ST1 or ST2 For dimensional details please see Tables I to V	5831	**Outer Sheath :** PVC type ST1 or ST2 For dimensional details please see Tables VII to VIII

Control Cable
Steel strip, armoured





CLASSIFICATION OF PVC COMPOUND

Type	Application	Max. Conductor Temperature
A	Insulation	70°C
C	Insulation	85°C
ST1	Sheath	70°C
ST2	Sheath	90°C

CORE IDENTIFICATION

For Power cables and Control cables upto 5 cores, the cores are identified by different colours as per IS 1554 :

Single core	:	Red, Black, Yellow or Blue
2 core	:	Red and Black
3 core	:	Red, Yellow and Blue
3 ½ core	:	Red, Yellow, Blue, and reduced neutral core in Black
4 core	:	Red, Yellow, Blue and Black
5 core	:	Red, Yellow, Blue, Black and Grey

Where the number of cores exceed 5, two adjacent cores are blue for reference and yellow for direction in each layer. The remaining cores in each layer are grey.

On specific request we can also provide core numbering for Control cables.

PRODUCT CODE

As per IS 1554 / Part - I / 1988, the product is coded by alphabets :

Aluminium Conductor (No abbreviations are used for copper.)	A
PVC insulation	Y
Steel round wire armour	W
Steel strip armour	F
Steel double round wire armour	WW
Steel double strip armour	FF
PVC outer sheath	Y
Al wire armour	AW

This product code is stenciled on the surface of the drum flange.

Note : Conductor construction classified as:

r_e	:	single strand
r_m	:	multi-stranded circular
s_m	:	sector shaped

Note: The entire range of Power and Control cables can be supplied with Flame Retardant Low Smoke (FRLS) sheathing. These cables are also manufactured as per International Standards viz. BS 6346, IEC 60502, etc.

CURRENT RATINGS

The current ratings given in Tables I to VIII are based on normal conditions of installation described below :

1.	Maximum Conductor Temperature	70°C for GPPVC Insulation & 85°C for HRPVC Insulation
2.	Thermal Resistivity of Soil	150°C cm/W
3.	Thermal Resistivity of PVC	650°C cm/ W
4.	Ground Temperature	30°C
5.	Ambient air temperature	40°C
6.	Depth of laying (to the highest point of cable laid direct in the ground)	75 cms

Cables shall only be operated at their full rating if the minimum current at which circuit protection is designed to operate does not exceed 1.5 times (in the case of cables in air or in ducts) or 1.3 times (in the case of cables laid direct in the ground) the values tabulated, in tables I to VIII.

Note :

For cables in air, no reduction in current rating is necessary provided that

1. The horizontal clearance between circuits is:
   (a) not less than six times the overall diameter of an individual cable, and (b) not less than the overall width of an individual circuit, except that the horizontal clearance need not in any case exceed 150 mm.
2. The vertical clearance between circuits is not less than 150 mm.
3. If the number of circuits exceeds 4, they are installed in a horizontal plane.

However, for installation conditions other than above, current rating factors incorporated in IS 3961 Part II may please be applied.

The following points should be taken into consideration before selecting any particular size & type of cable:

1. The system of power & voltage source where the cables are being used.
2. Conditions of installation at site.
3. Current carrying capacity of cable.
4. Voltage drop of the cable.
5. Short circuit capacity of cable.
6. Availability of the selected size of cable.

Short Circuit Rating in kA for One Second duration

Area of Conductor Sq. mm	Aluminium Conductor		Copper Conductor	
	PVC	HRPVC	PVC	HRPVC
1.5	0.1126	0.097	0.169	0.153
2.5	0.1878	0.162	0.283	0.255
4.0	0.3004	0.259	0.452	0.406
6.0	0.4507	0.389	0.679	0.612
10.0	0.7512	0.648	1.132	1.020
16.0	1.200	1.087	1.810	1.632
25.0	1.870	1.620	2.830	2.550
35.0	2.620	2.270	3.960	3.570
50.0	3.750	3.243	5.660	5.100
70.0	5.250	4.540	7.920	7.140
95.0	7.130	6.150	10.750	9.690
120.0	9.000	7.784	13.580	13.340
150.0	11.260	9.730	16.980	15.300
185.0	13.890	12.000	20.940	18.870
240.0	18.020	15.560	27.160	24.480
300.0	22.530	19.460	33.960	30.600
400.0	30.040	25.940	45.280	40.800
500.0	37.560	32.430	56.600	51.000
630.0	47.320	40.860	71.310	64.250

Formula for calculating the Short Circuit for other durations

$$I_t = \frac{I_1}{\sqrt{t}}$$

Where……..

I_1 = Short Circuit Current for one second.

I_t = Short Circuit Current for t seconds.

t = Duration in seconds.

Maximum Conductor temperature during Short Circuit is 160°C for both PVC and HRPVC Cables.

TABLES I TO V : Aluminium Conductor, PVC Insulated, PVC Sheathed Cables

TABLE I : 1 Core, Unarmoured (AYY) / Armoured (AYAWY) Cables – 1100 Volts

Nom. Cross Sectional Area	Unarmoured			Armoured				Max. DC Conductor Resistance at 20°C	A.C. Current Rating							
									In Air				In Ground			
	Nom. Thickness of PVC Insulation	Approx. Overall Dia.	Approx. Weight	Nom. Thickness of PVC Insulation	Nom. Dia. of Aluminium wire for Armour	Approx. Overall Dia.	Approx. Weight		GPPVC Insulation 2 3 Cables Amps		HRPVC Insulation 2 3 Cables Amps		GPPVC Insulation 2 3 Cables Amps		HRPVC Insulation 2 3 Cables Amps	
Sq.mm	mm	mm	kg/km	mm	mm	mm	kg/km	Ohm/km								
2.5	0.9	8.00	70	1.2	1.4	10.2	135	12.1	25	21	30	26	28	24	33	28
4.0	1.0	8.70	81	1.3	1.4	10.9	152	7.41	32	27	38	33	36	31	41	35
6.0	1.0	9.20	100	1.3	1.4	11.5	170	4.61	41	35	50	42	44	39	52	46
10.0	1.0	10.2	120	1.3	1.4	12.9	200	3.08	56	47	69	57	59	51	69	60
16.0	1.0	11.5	150	1.3	1.4	13.8	240	1.91	72	64	88	78	75	66	88	77
25.0	1.2	13.3	210	1.5	1.4	15.6	312	1.20	99	84	121	103	97	86	112	101
35.0	1.2	14.4	250	1.5	1.4	16.6	365	0.868	120	105	146	129	120	100	140	117
50.0	1.4	15.8	320	1.7	1.4	18.0	445	0.641	150	130	184	158	145	120	170	140
70.0	1.4	18.1	415	1.7	1.4	20.7	560	0.443	185	155	226	190	170	140	199	163
95.0	1.6	19.9	520	1.9	1.6	22.9	715	0.320	215	190	264	233	205	175	240	205
120.0	1.6	22.2	630	1.9	1.6	24.8	825	0.253	240	220	292	270	230	195	268	228
150.0	1.8	22.6	750	2.1	1.6	26.8	960	0.206	270	250	330	305	265	220	310	258
185.0	2.0	26.0	900	2.3	1.6	28.6	1125	0.164	305	290	374	356	300	240	351	278
240.0	2.2	29.0	1125	2.5	1.6	31.9	1390	0.125	350	335	430	410	335	270	392	316
300.0	2.4	31.7	1350	2.7	2.0	34.6	1650	0.100	395	380	484	464	370	295	434	345
400.0	2.6	35.7	1720	3.0	2.0	39.2	2115	0.0778	455	435	557	534	410	325	480	378
500.0	3.0	39.0	2140	3.4	2.0	42.9	2635	0.0605	490	480	600	589	435	345	510	403
630.0	3.4	43.7	2710	3.9	2.0	47.7	3250	0.0469	560	550	680	674	485	390	565	456
800.0	3.4	47.2	3300	3.9	2.0	51.2	3915	0.0367	640	630	794	785	530	440	620	515
1000.0	3.4	51.5	4050	3.9	2.5	56.4	4820	0.0291	740	720	895	800	580	490	680	570

Cables with copper conductor can be supplied.

TABLE II : 2 Core, Unarmoured (AYY) / Armoured (AYWY & AYFY) Cables – 1100 Volts

Nom. Cross Sectional Area	Nom. Thickness of PVC Insulation	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
								In Air		In Ground	
		Approx. Overall Dia.	Approx. Overall Weight	Nom. Steel Armour Size mm W F	Approx. Overall Dia.	Approx. Weight		GPPVC Insulation	HRPVC Insulation	GPPVC Insulation	HRPVC Insulation
Sq.mm	mm	mm	kg/km		mm	kg/km	Ohm/km	Amps	Amps	Amps	Amps
2.5	0.9	13.8	165	1.4	15.5	440	12.1	21	26	25	29
4.0	1.0	15.5	200	1.4	15.8	510	7.41	27	33	32	36
6.0	1.0	16.5	230	1.4	17.0	565	4.61	35	42	40	47
10.0	1.0	18.4	275	1.4	19.2	620	3.08	47	57	55	64
16.0	1.0	20.5	364	4x0.8	21.2	620	1.91	59	72	70	82
25.0	1.2	22.0	480	4x0.8	21.2	710	1.20	78	95	90	105
35.0	1.2	23.5	570	4x0.8	22.5	825	0.868	99	100	110	128
50.0	1.4	26.0	710	4x0.8	25.0	1010	0.641	125	153	135	158
70.0	1.4	30.4	920	4x0.8	28.5	1250	0.443	150	183	160	187
95.0	1.6	33.5	1175	4x0.8	31.0	1575	0.320	185	225	190	222
120.0	1.6	37.0	1375	4x0.8	33.5	1790	0.253	210	256	210	245
150.0	1.8	37.0	1660	4x0.8	37.5	2065	0.206	240	294	240	280
185.0	2.0	40.5	1960	4x0.8	40.5	2515	0.164	275	337	275	322
240.0	2.2	45.0	2470	4x0.8	45.0	3070	0.125	325	397	320	374
300.0	2.4	49.0	3000	4x0.8	49.5	3705	0.100	365	445	355	416
400.0	2.6	56.0	3830	4x0.8	55.5	4550	0.0778	420	515	385	450

Cables with conductor area upto 10 sq. mm can be substituted with copper conductor, of one size lower. Please refer Table No. VI

TABLE III : 3 Core, Unarmoured (AYY) / Armoured (AYWY & AYFY) Cables – 1100 Volts

Nom. Cross Sectional Area Sq.mm	Nom. Thickness of PVC Insulation mm	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
								In Air		In Ground	
		Approx. Overall Dia. mm	Approx. Overall Weight kg/km	Nom. Steel Armour Size mm W F	Approx. Overall Dia. mm	Approx. Weight kg/km	Ohm/km	GPPVC Insulation Amps	HRPVC Insulation Amps	GPPVC Insulation Amps	HRPVC Insulation Amps
2.5	0.9	14.4	195	1.4	16.1	445	12.1000	18	22	21	24
4.o	1.0	16.0	235	1.4	16.5	520	7.4100	23	28	28	32
6.0	1.0	17.5	270	1.4	18.0	580	4.6100	30	38	35	41
10.0	1.0	18.5	335	1.4	20.0	695	3.0800	40	49	46	54
16.0	1.0	21.5	455	4x0.8	22.5	730	1.9100	51	63	60	69
25.0	1.2	23.0	630	4x0.8	23.5	900	1.2000	70	86	76	89
35.0	1.2	25.0	755	4x0.8	25.0	1050	0.8680	86	105	92	108
50.0	1.4	27.5	960	4x0.8	28.5	1320	0.6410	105	127	110	129
70.0	1.4	32.0	1250	4x0.8	32.5	1635	0.4430	130	159	135	157
95.0	1.6	35.5	1615	4x0.8	36.0	2045	0.3200	155	190	165	193
120.0	1.6	39.0	1935	4x0.8	39.0	2415	0.2530	180	218	185	215
150.0	1.8	43.0	2300	4x0.8	43.5	2810	0.2060	205	251	210	246
185.0	2.0	46.5	2780	4x0.8	46.0	3305	0.1640	240	294	235	276
240.0	2.2	52.0	3510	4x0.8	52.5	4140	0.1250	280	340	275	322
300.0	2.4	57.5	4330	4x0.8	58.0	5040	0.1000	315	386	305	358
400.0	2.6	65.0	5450	4x0.8	65.0	6185	0.0778	375	445	335	390

Cables with conductor area upto 10 sq. mm can be substituted with copper conductor, of one size lower, Please refer Table No. VI.
Constructional details of 3x500 sq.mm and 3x630 sq.mm will be provided on specific request.

TABLE IV : 3 ½ Core, Unarmoured (AYY) / Armoured (AYFY) Cables – 1100 Volts

Nom. Cross Sectional Area Sq.mm	Nom. Thickness of PVC Insulation mm	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
								In Air		In Ground	
		Approx. Overall Dia. mm	Approx. Overall Weight kg/km	Nom. Steel Armour Size mm	Approx. Overall Dia. mm	Approx. Weight kg/km	Ohm/km	GPPVC Insulation Amps	HRPVC Insulation Amps	GPPVC Insulation Amps	HRPVC Insulation Amps
25	1.2	24.0	730	4x0.8	24.5	970	1.2000	70	86	76	89
35	1.2	26.0	860	4x0.8	26.50	1130	0.8680	86	105	92	108
50	1.4	29.5	1140	4x0.8	30.0	1440	0.6410	105	127	110	129
70	1.4	34.0	1410	4x0.8	34.5	1815	0.4430	130	159	135	157
95	1.6	37.5	1810	4x0.8	38.0	2250	0.3200	155	190	165	193
120	1.6	41.5	2255	4x0.8	42.0	2690	0.2530	180	218	185	215
150	1.8	46.5	2650	4x0.8	46.0	3160	0.2060	205	251	210	246
185	2.0	49.5	3235	4x0.8	50.0	3790	0.1640	240	294	235	276
240	2.2	56.0	4110	4x0.8	56.0	4700	0.1250	280	340	275	322
300	2.4	62.0	5060	4x0.8	62.0	5665	0.1000	315	386	305	358
400	2.6	69.5	5985	4x0.8	70.0	7030	0.0778	375	445	335	390

Constructional details of 3 ½ x 500 sq. mm and 3 ½ x 630 sq. mm will be provided on specific request.

TABLE V : 4 Core, Unarmoured (AYY) / Armoured (AYWY & AYFY) Cables – 1100 Volts

Nom. Cross Sectional Area Sq.mm	Nom. Thickness of PVC Insulation mm	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
								In Air		In Ground	
		Approx. Overall Dia. mm	Approx. Overall Weight kg/km	Nom. Steel Armour Size mm W F	Approx. Overall Dia. mm	Approx. Weight kg/km	Ohm/km	GPPVC Insulation Amps	HRPVC Insulation Amps	GPPVC Insulation Amps	HRPVC Insulation Amps
2.5	0.9	15.5	220	1.4	17.0	460	12.100	18	22	21	24
4.0	1.0	17.5	275	1.4	19.0	540	7.4100	23	28	28	32
6.0	1.0	18.5	320	1.4	20.5	615	4.6100	30	38	35	41
10.0	1.0	21.5	400	4x0.8	22.0	610	3.0800	40	49	46	54
16.0	1.0	24.0	575	4x0.8	24.0	810	1.9100	51	63	60	69
25.0	1.2	24.5	810	4x0.8	25.5	1045	1.2000	70	86	76	89
35.0	1.2	26.5	975	4x0.8	27.5	1240	0.8680	86	105	92	108
50.0	1.4	30.0	1275	4x0.8	31.5	1590	0.6410	105	127	110	129
70.0	1.4	34.5	1625	4x0.8	36.0	1995	0.4430	130	159	135	157
95.0	1.6	38.5	2100	4x0.8	40.0	2510	0.3200	155	190	165	193
120.0	1.6	42.0	2480	4x0.8	44.0	2990	0.2530	180	218	185	215
150.0	1.8	48.5	3070	4x0.8	48.0	3545	0.2060	205	251	210	246
185.0	2.0	53.0	3700	4x0.8	52.5	4255	0.1640	240	294	235	276
240.0	2.2	59.5	4675	4x0.8	59.0	5325	0.1250	280	340	275	322
300.0	2.4	65.5	5810	4x0.8	65.0	6430	0.1000	315	386	305	358
400.0	2.6	73.5	7240	4x0.8	73.0	7980	0.0778	375	445	335	390

Cables with conductor area upto 10 sq. mm can be substituted with copper conductor, of one size lower. Please refer Table No. VI.

TABLES VI to VIII: Copper Conductor, PVC Insulated, PVC Sheathed Cables

TABLE VI: 2 Core, 3 Core & 4 Core Copper Conductor, PVC Insulated, PVC Sheathed, Unarmoured (YY) / Armoured (YWY & YFY) Cables – 1100 Volts

No.of Cores	Nom. Cores Sectional Area Sq.mm	Nom. Thickness of PVC Insulation mm	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
									In Air		In Ground	
			Approx. Overall Dia. mm	Approx. Overall Weight kg/km	Nom. Steel Armour Size mm W F	Approx. Overall Dia. mm	Approx. Weight kg/km	Ohm/km	GPPVC Insulation Amps	HRPVC Insulation Amps	GPPVC Insulation Amps	HRPVC Insulation Amps
2	4	1.0	15.5	250	1.4	16.0	520	4.61	35	43	41	48
2	6	1.0	16.5	300	1.4	17.0	590	3.08	45	55	50	58
2	10	1.0	18.5	400	1.4	19.0	740	1.83	60	73	70	81
2	16	1.0	20.5	555	4x0.8	21.0	820	1.15	78	95	90	105
3	4	1.0	16.0	310	1.4	16.5	590	4.61	30	37	36	42
3	6	1.0	17.5	380	1.4	18.0	690	3.08	39	48	45	53
3	10	1.0	19.5	520	1.4	20.0	875	1.83	52	63	60	69
3	16	1.0	21.5	755	4x0.8	22.5	1025	1.15	66	81	77	90
4	4	1.0	17.5	375	1.4	19.0	685	4.61	30	37	36	42
4	6	1.0	18.5	470	1.4	20.5	810	3.08	39	48	45	53
4	10	1.0	21.5	650	4x0.8	22.0	897	1.83	52	63	60	69
4	16	1.0	23.0	800	4x0.8	24.5	1250	1.15	66	81	77	90

TABLE VII: 1.5 sq. mm, Solid Copper Conductor, PVC Insulated, PVC Sheathed, Unarmoured (YY) / Armoured (YWY & YFY) Multi Core Control Cables – 1100 Volts

No. of cores	Nom. Thickness of PVC Insulation mm	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
								In Air		In Ground	
		Approx. Overall Dia. mm	Approx. Overall Weight kg/km	Nom. Steel Armour Size mm W F	Approx. Overall Dia. mm	Approx. Weight kg/km	Ohm/km	GPPVC Insulation Amps	HRPVC Insulation Amps	GPPVC Insulation Amps	HRPVC Insulation Amps
2	0.8	12.0	155	1.4	14.0	375	12.1	20	24	23	27
3	0.8	12.5	175	1.4	14.5	415	12.1	17	21	21	24
4	0.8	13.5	205	1.4	15.0	465	12.1	17	21	21	24
5	0.8	14.5	245	1.4	16.0	525	12.1	14	17	17	19
6	0.8	15.5	265	1.4	17.0	585	12.1	13	16	15	18
7	0.8	15.5	275	1.4	17.0	595	12.1	12	15	14	17
9	0.8	18.5	350	1.4	20.0	765	12.1	12	14	14	16
10	0.8	18.5	375	1.4	20.5	785	12.1	11	13	13	15
12	0.8	18.0	425	4x0.8	18.5	690	12.1	10	12	12	14
14	0.8	19.0	475	4x0.8	20.0	770	12.1	10	12	11	13
16	0.8	20.0	535	4x0.8	21.0	845	12.1	9	11	11	12
19	0.8	21.5	625	4x0.8	21.5	930	12.1	9	10	10	12
24	0.8	24.5	770	4x0.8	25.0	1160	12.1	8	10	9	11
27	0.8	25.0	845	4x0.8	25.5	1240	12.1	8	9	9	10
30	0.8	26.5	920	4x0.8	27.0	1330	12.1	7	9	9	10
37	0.8	28.0	1100	4x0.8	28.0	1540	12.1	7	8	8	9
44	0.8	31.0	1290	4x0.8	31.5	1805	12.1	6	7	7	8
52	0.8	32.0	1525	4x0.8	32.5	2020	12.1	6	7	7	8
61	0.8	34.5	1750	4x0.8	35.0	2275	12.1	6	7	6	7

Cables with stranded conductor can be made on request.

TABLE VIII : 2.5 sq. mm, Solid Copper Conductor, PVC Insulated, PVC Sheathed, Unarmoured (YY) / Armoured (YWY & YFY) Multi Core Control Cables – 1100 Volts

No. of cores	Nom. Thickness of PVC Insulation mm	Unarmoured		Armoured			Max. DC Conductor Resistance at 20°C	A.C. Current Rating			
								In Air		In Ground	
		Approx. Overall Dia. mm	Approx. Overall Weight kg/km	Nom. Steel Armour Size mm W F	Approx. Overall Dia. mm	Approx. Weight kg/km	Ohm/km	GPPVC Insulation Amps	HRPVC Insulation Amps	GPPVC Insulation Amps	HRPVC Insulation Amps
2	0.9	13.5	200	1.4	15.0	440	7.41	27	32	32	37
3	0.9	14.0	230	1.4	15.5	495	7.41	24	29	27	31
4	0.9	15.0	275	1.4	16.5	560	7.41	24	29	27	31
5	0.9	16.0	330	1.4	18.0	640	7.41	19	23	23	27
6	0.9	17.0	350	1.4	19.0	720	7.41	18	21	21	25
7	0.9	17.0	375	1.4	19.0	740	7.41	17	20	20	23
9	0.9	21.0	480	4x0.8	20.5	795	7.41	16	19	19	22
10	0.9	21.0	515	4x0.8	20.5	830	7.41	15	18	18	20
12	0.9	21.7	605	4x0.8	21.5	915	7.41	14	17	17	19
14	0.9	22.7	685	4x0.8	22.5	1005	7.41	13	16	16	18
16	0.9	23.5	770	4x0.8	23.5	1110	7.41	12	15	15	17
19	0.9	24.5	880	4x0.8	24.5	1235	7.41	12	14	14	16
24	0.9	28.0	1090	4x0.8	29.5	1560	7.41	11	13	13	15
27	0.9	28.5	1200	4x0.8	30.0	1680	7.41	10	12	12	14
30	0.9	29.5	1310	4x0.8	31.0	1810	7.41	10	12	12	13
37	0.9	32.5	1615	4x0.8	33.6	2110	7.41	9	11	11	12
44	0.9	35.0	1900	4x0.8	37.0	2450	7.41	9	10	10	11
52	0.9	36.0	2190	4x0.8	39.5	2810	7.41	8	9	10	11
61	0.9	40.0	2525	4x0.8	41.0	3180	7.41	8	9	9	10

Cables with stranded conductor can be made on request.

RECOMMENDATIONS FOR STORAGE & INSTALLATION OF CABLES

For easy and convenient installation conditions, and desired performance, following recommendations are made:

i) No drums should be stored one above the other.

ii) Drums should be stored on a plain ground without having any projected hard stones above the ground surface. The drums should be stored preferably in the shade.

iii) Drums should be stored and kept in such a way that the bottom cable end does not get damaged.

iv) Drums should be rotated only in the direction marked on the drum.

v) While laying the cable in a trench, the cable end should be pulled with a pulling eye only after mounting the drum on the jack.

vi) 100% drums should be checked for continuity and cross continuity to ensure that there is no internal damage to the cable during transportation.

vii) Insulation resistance should be measured with 500 V megger between the cores and all the cores to earth (Armour).

viii) After the cable is installed, before commissioning, it should be tested for high DC voltage. The recommended volts and duration of the test between each core and metallic armour (earth) is 3 KVDC for 5 minutes. During High Voltage test, all the electrical equipment related to the cable installation must be earthed and adequate clearance should be maintained from the other equipments and from work, to prevent flash over.

ix) Where the cable is to be joined with an existing cable, the sequence of cores at the two ends to be joined should be in the opposite direction i.e., if at one end it is in the clockwise direction, at the other end it should be in the anti-clockwise direction. This is necessary to avoid the crossing of cores while jointing. This will also decide the direction in which the cable is to be pulled.

x) The minimum bending radius for cable should not be less than the values shown below. Wherever possible 25% higher value should be adopted.

8 x overall diameter: Single core cables

as per table I

12 x overall diameter: Multicore cables

as per tables II, III, IV, V, VI, VII & VIII

xi) Avoid excessively high temperature when sealing joints of cable. Cool the sealant to about 100°C before pouring.

FLAME RETARDANT LOW SMOKE (FRLS) CABLES

The occurrence of fires in power plants and industrial complexes and in public places like theatres, hotels, airports, etc., have demonstrated the need for reliable electrical installation, resistant to fire and able to operate during a fire without propagating it. The use of correct electrical installation makes evacuation of buildings easier, minimizes the element of panic and enables the emergency services do their job efficiently, significantly aiding damage control operations and reducing loss of life and property.

Electric cables supplying these circuits must be manufactured and tested to certain standards and specifications concerning their behaviour in fire. Finolex Flame Retardant Low Smoke (FRLS) cables, which use specially developed FRLS compound for sheathing, are resistant to ignition and flame propagation, and reduce smoke emission and release of acid fumes.

Finolex FRLS cables are rigorously tested in-house to ensure that they comply with the required specifications:

Test	Function of the test	Specification	Specified values
Critical Oxygen Index	To determine the percentage of oxygen required for supporting combustion of sheathing material at room temperature.	ASTM-D 2863	Minimum Oxygen Index of 29.
Temperature Index	To determine at what temperature normal oxygen content of 21% in air will support combustion of sheathing material.	ASTM-D 2863 & BICC Hand Book Chapter No. 6	Minimum temperature index of 250°C.
Smoke Density	To determine the visibility (light transmission) under fire of sheathing material.	ASTM-D 2843	Minimum average light transmission of 40%.
Acid Gas Generation	To ascertain the amount of Hydrochloric Acid gas evolved from PVC sheath of cable under fire conditions.	IEC 754-I	Hydrochloric acid gas released 20% maximum.
Flammability test on group of cables	To determine flame propagation of cables in installed conditions.	IEEE-383	In total 20 minutes of burning the 8 feet long cable samples at a temperature of 1500°F the burning of cables shall not go up to the top.
Flammability test	1) To determine ignition resistance and flame propagation under specified conditions. 2) To determine ignition resistance and flame propagation under specified conditions. 3) To determine ignition resistance and resistance to flame propagation, especially for bunch of cables, under specified conditions.	1) Swedish Standard No. SS 424175 Class F3 2) IEC 332-1 3) IEC 332-3	From test sample of 850 mm length, the unburnt portion shall be more than 300 mm from the top. In the calculated time duration of burning the cable sample of 600 mm ± 25 mm length, the length of unburnt portion to be minimum 50 mm from the top. From the test samples of 3.5 m length, the affected portion during burning, shall not reach 2.5 m or above from bottom edge of the burner.

Finolex FRLS sheathed cables have been installed at several electricity plant sites, viz., MSEB, GEB, NTPC, UPSEB/UPRVN, Ahmedabad Electricity Company, BHEL, Nuclear Power Corporation and a host of other public and private sector units. Finolex also offers cables to EIL specifications, having oxygen index of minimum 30.

These FRLS properties can be offered in PVC, HRPVC, XLPE insulated Aluminium / Copper conductor power, control and instrumentation cables, in inner and outer sheath.