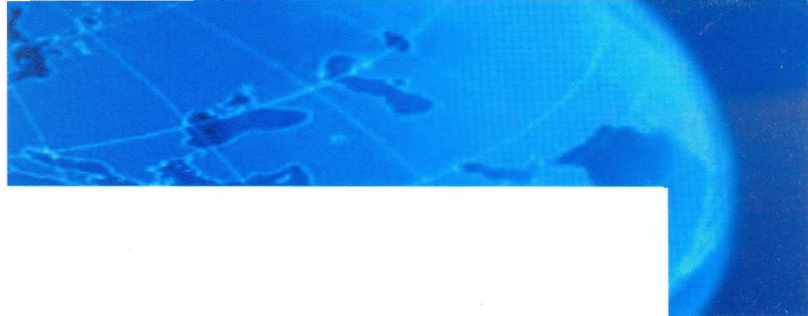
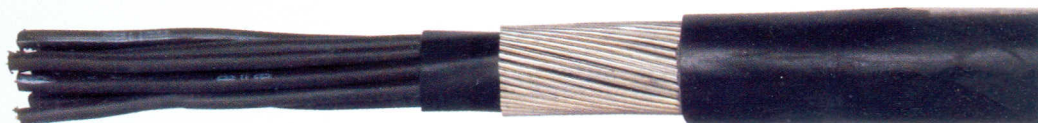




CONTROL CABLES



Control cables are used for control circuits in power plants and other similar industrial installations and signaling network of Railways, with or without FR/FRLS properties in sizes normally upto 61 cores. Voltage grade 650/1100 Volts (U_0/U). Provided with ISI marking against IS 1554 (Pt-1). Conforming to standard specifications like IS 1554 (Pt-1), BS 6346, IEC 227-I, III

Conductor

Solid or stranded, circular annealed, bare or tinned copper wire of 1.5 sq. mm, 2.5 sq. mm, 4.0 sq. mm.

Insulation

Fully colour coded cores using PVC. Core identification by printed characters is also available on order. The three primary colour pigments are magenta (red), yellow, and cyan (blue).

Screen

Screening by Copper Wire Braid, Aluminium Mylar tape or Aluminium Wire.

Drain Wire

Drain wire of solid or stranded, bare or tinned copper wire are normally provided.

Mechanical Protection

Galvanized steel wire, strip or double helical steel tape armour.

Inner and Outer Sheath

PVC; Black or Grey.

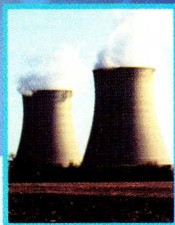


**1.5 sq mm SOLID (1/1.38 mm) CONDUCTOR MULTICORE
CONTROL CABLE -1.1KV GRADE AS PER IS:1554 (PT-1) 88**

No. of Cores	Unarmoured Const.		Round Wire Armoured Const.		Flat Strip Armoured Const.		Current rating in Air (D.C.)		Current rating in air (A.C.)	
							Amp.	Amp.	Amp.	Amp.
	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	Armoured	Unarmoured	Armoured	Unarmoured
2	13.10	150.00	15.35	390.00	-	-	21	20	19	18
3	13.50	180.00	15.80	430.00	-	-	20	18	18	16
4	14.30	205.00	16.60	465.00	-	-	18	17	17	16
5	15.20	240.00	17.50	520.00	-	-	18	16	16	15
6	16.50	280.00	18.45	585.00	-	-	17	16	16	15
7	16.50	290.00	18.45	595.00	-	-	16	15	15	14
8	17.40	330.00	19.70	670.00	-	-	16	15	15	13
9	18.00	370.00	20.50	730.00	-	-	16	15	14	13
10	19.20	400.00	21.70	800.00	-	-	15	15	14	13
12	19.70	440.00	22.20	850.00	21.00	740.00	15	14	13	12
14	21.35	530.00	23.85	1025.00	22.25	810.00	14	13	13	11
15	21.80	560.00	24.30	1055.00	22.70	840.00	14	13	13	11
16	22.30	590.00	24.80	1100.00	23.20	895.00	13	12	12	11
18	23.60	650.00	26.10	1190.00	24.50	965.00	13	12	12	11
19	23.60	670.00	26.10	1225.00	24.50	995.00	13	12	11	11
20	24.05	710.00	26.55	1280.00	24.95	1040.00	13	11	11	11
21	24.45	725.00	26.95	1295.00	25.35	1050.00	13	11	11	10
24	25.60	805.00	28.10	1420.00	26.50	1150.00	12	11	11	10
27	26.70	885.00	29.20	1530.00	27.60	1260.00	12	11	11	10
29	27.40	940.00	29.90	1600.00	28.30	1330.00	11	11	11	10
30	28.75	965.00	30.25	1640.00	28.65	1360.00	11	11	10	10
37	30.00	1150.00	32.70	1900.00	31.10	1610.00	11	10	10	9
40	28.90	1230.00	33.60	1925.00	32.00	1680.00	11	10	10	9
42	31.95	1315.00	34.15	2075.00	32.55	1760.00	10	10	10	8
44	32.50	1370.00	34.70	2140.00	33.10	1810.00	10	9	10	8
52	34.85	1595.00	37.85	2650.00	35.45	2080.00	10	9	9	8
61	37.10	1825.00	40.10	2980.00	37.70	2330.00	9	8	8	8

**1.5 sq mm (7/0.53 mm)MULTISTRAND CONDUCTOR MULTICORE
CONTROL CABLE-1.1 KV GRADE AS PER IS:1554 (PT-1) 88**

No. of Cores	Unarmoured Const.		Round Wire Armoured Const.		Flat Strip Armoured Const.		Current rating in Air (D.C.)		Current rating in air (A.C.)	
							Amp.	Amp.	Amp.	Amp.
	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	Armoured	Unarmoured	Armoured	Unarmoured
2	13.40	160.00	15.70	410.00	-	-	23	21	21	19
3	13.90	190.00	16.20	450.00	-	-	21	19	19	18
4	14.80	210.00	17.50	480.00	-	-	19	18	18	16
5	15.70	250.00	18.00	540.00	-	-	19	18	17	16
6	16.70	290.00	19.00	620.00	-	-	18	17	17	16
7	16.70	300.00	19.00	630.00	-	-	18	16	16	14
8	18.00	340.00	20.50	700.00	-	-	17	16	16	14
9	18.65	380.00	21.15	770.00	-	-	16	16	15	14
10	20.15	430.00	23.05	910.00	-	-	16	15	15	14
12	20.65	470.00	23.55	970.00	21.95	770.00	16	14	14	13
14	22.15	550.00	24.65	1060.00	23.05	850.00	15	14	13	13
15	22.65	580.00	25.15	1100.00	23.55	880.00	14	13	13	12
16	23.15	610.00	25.65	1150.00	24.05	910.00	14	13	13	12
18	24.55	670.00	27.05	1230.00	25.45	1010.00	14	13	13	12
19	24.55	690.00	27.05	1270.00	25.45	1020.00	14	13	13	11
20	25.00	740.00	27.50	1300.00	25.90	1090.00	14	13	13	11
21	25.45	750.00	27.95	1350.00	26.35	1100.00	14	13	13	11
24	26.65	830.00	29.15	1480.00	27.55	1200.00	13	12	12	11
27	27.85	910.00	30.35	1590.00	28.70	1310.00	13	12	11	11
29	28.60	970.00	31.30	1670.00	29.50	1360.00	13	11	11	11
30	28.95	1000.00	31.65	1720.00	29.80	1420.00	12	11	11	10
37	31.80	1220.00	34.00	1970.00	32.40	1670.00	11	11	11	9
40	32.75	1310.00	34.95	2080.00	33.35	1750.00	11	10	10	9
42	33.55	1380.00	36.55	2390.00	34.15	1840.00	11	10	10	9
44	34.15	1430.00	37.15	2470.00	34.75	1890.00	11	10	10	9
52	36.40	1650.00	39.40	2780.00	37.00	2150.00	11	9	9	9
61	38.75	1890.00	42.15	3120.00	39.35	2440.00	10	9	9	8



**2.5 sq mm (1/1.78 mm) SOLID CONDUCTOR MULTICORE
CONTROL CABLE - 1.1 KV GRADE AS PER IS:1554 (PT-1) 88**

No. of Cores	Unarmoured Const.		Round Wire Armoured Const.		Flat Strip Armoured Const.		Current rating in Air (D.C.)		Current rating in air (A.C.)	
	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	Armoured	Unarmoured	Armoured	Unarmoured
2	14.15	190.00	16.45	450.00	-	-	28	26	25	24
3	14.70	230.00	17.00	500.00	-	-	26	24	23	22
4	15.65	270.00	17.95	560.00	-	-	24	23	23	21
5	16.70	320.00	19.00	640.00	-	-	24	23	21	20
6	17.70	370.00	20.10	720.00	-	-	23	22	21	19
7	17.70	390.00	20.10	740.00	-	-	22	21	20	19
8	19.25	450.00	21.70	840.00	20.55	640.00	21	21	19	18
9	20.20	510.00	23.05	1000.00	21.45	790.00	21	20	19	18
10	22.00	580.00	24.50	1090.00	22.90	880.00	21	19	19	18
12	22.60	640.00	25.10	1160.00	23.50	940.00	20	18	18	16
14	23.80	730.00	26.30	1280.00	24.70	1050.00	19	18	17	16
15	24.40	770.00	26.85	1340.00	25.25	1100.00	19	18	17	16
16	24.90	810.00	27.40	1400.00	25.80	1160.00	19	17	17	16
18	26.50	900.00	29.00	1520.00	27.40	1280.00	18	17	16	15
19	26.50	930.00	29.00	1560.00	27.40	1300.00	18	16	16	15
20	27.00	990.00	29.45	1640.00	27.90	1360.00	18	16	16	15
21	27.45	1010.00	29.95	1670.00	28.35	1410.00	18	16	16	14
24	28.85	1130.00	31.50	1850.00	29.75	1550.00	17	16	15	14
27	30.10	1250.00	32.80	2000.00	31.20	1700.00	16	15	14	14
29	30.95	1330.00	33.65	2100.00	32.05	1780.00	16	15	14	14
30	31.85	1400.00	34.05	2140.00	32.45	1850.00	16	14	14	13
37	34.70	1690.00	37.70	2750.00	35.30	2180.00	15	14	13	13
40	35.75	1810.00	38.75	2920.00	36.35	2300.00	15	13	13	12
42	36.40	1890.00	39.40	3020.00	37.00	2400.00	14	13	13	12
44	37.10	1970.00	40.10	3120.00	37.70	2480.00	14	13	13	12
52	39.60	2280.00	43.00	3560.00	40.20	2830.00	14	13	12	12
61	40.60	2660.00	45.60	3980.00	43.20	3260.00	13	12	11	11

**2.5 sq mm (7/0.67 mm) MULTISTRAND CONDUCTOR MULTICORE
CONTROL CABLE - 1.1 KV GRADE AS PER IS:1554 (PT-1) 88**

No. of Cores	Unarmoured Const.		Round Wire Armoured Const.		Flat Strip Armoured Const.		Current rating in Air (D.C.)		Current rating in air (A.C.)	
	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	O.D. Approx in mm	Net wt. Approx. kg/km	Armoured	Unarmoured	Armoured	Unarmoured
2	14.60	200.00	16.90	470.00	-	-	29	27	26	24
3	15.20	240.00	17.50	520.00	-	-	27	25	24	23
4	16.20	280.00	18.50	590.00	-	-	25	24	23	21
5	17.30	330.00	19.60	670.00	-	-	24	23	22	20
6	18.45	390.00	21.00	760.00	-	-	23	22	21	19
7	18.45	400.00	21.00	780.00	-	-	22	21	20	19
8	20.20	470.00	23.10	960.00	21.50	750.00	22	21	19	18
9	21.40	550.00	23.90	1050.00	22.30	830.00	21	20	19	18
10	22.90	600.00	25.45	1140.00	23.85	900.00	20	19	19	18
12	23.55	660.00	26.05	1220.00	24.45	990.00	20	19	18	16
14	24.80	750.00	27.30	1340.00	25.70	1100.00	19	18	18	16
15	25.40	800.00	27.95	1400.00	26.35	1150.00	19	18	17	16
16	26.00	840.00	28.50	1450.00	26.90	1210.00	19	18	17	16
18	27.70	940.00	30.20	1580.00	28.60	1300.00	18	17	16	15
19	27.70	960.00	30.20	1620.00	28.60	1360.00	18	17	16	15
20	28.20	1030.00	30.90	1720.00	29.10	1420.00	18	17	16	15
21	28.70	1040.00	31.40	1750.00	29.60	1460.00	17	16	16	14
24	30.20	1160.00	32.90	1910.00	31.30	1620.00	17	16	15	14
27	32.05	1320.00	34.30	2080.00	32.65	1770.00	16	15	15	13
29	32.95	1410.00	35.95	2420.00	33.55	1850.00	16	15	14	13
30	33.55	1460.00	36.60	2480.00	34.20	1930.00	15	14	14	13
37	36.40	1750.00	39.35	2880.00	37.00	2260.00	15	14	14	13
40	37.50	1870.00	40.50	3020.00	38.10	2400.00	15	14	13	12
42	38.20	1950.00	41.60	3160.00	38.80	2480.00	15	14	13	12
44	38.90	2030.00	42.30	3260.00	39.50	2480.00	14	13	13	12
52	41.60	2350.00	45.00	3700.00	42.60	2980.00	14	13	12	11
61	45.00	2760.00	48.35	4230.00	45.60	3400.00	13	12	11	11

(1) Insulation thickness (Nom) - 0.8mm for 1.5 sq.mm & 0.9mm for 2.5 sq.mm	(9) Minimum bending radius for armoured cable in mm= 12 x cable dia in mm.
(2) Thickness of Inner sheath(minimum) - 0.3mm upto & including 48 cores & 0.4mm above 48 cores for Table-I. - 0.3mm upto & including 43 cores & 0.4mm above 43 cores for Table-II. - 0.3mm upto & including 33 Cores & 0.4mm above 33 cores for Table-III. - 0.3mm upto & including 29 cores & 0.4mm above 29 cores for Table-IV.	(10) Maximum safe pulling force in kgf = 50 x total cross sectional area in sq.mm.
(3) Standard Drum length -500/1000 mtrs +/-5% upto & including 19 cores & 500 mtrs +/-5% above 19 Cores	The current rating given in the above Tables are based on the following assumptions: i) Maximum Conductor Temperature -70°C ii) Thermal resistivity of soil - 150°C cm/w. iii) Thermal resistivity of PVC - 650°C.cm/w. iv) Ground temperature - 30°C v) Ambient air temperature - 40°C vi) Maximum short circuit conductor temperature - 160°C. vii) Max.ambient air temp.- 55°C
(4) Maximum DC resistance of condrt.at 20°C in ohm/km - 12.1 for 1.5 sq.mm & 7.41 for 2.5 sq.mm	
(5) Maximum AC resistance of condrt.at 70 °C in ohm/km - 17.42 for 1.5 sq.mm & 10.67 for 2.5 sq.mm	
(6) Maximum mutual capacitance between core to core in nF/km - 100 at 0.8 KHz.	
(7) Short circuit current in amp.for 1 sec.duration - 176 for 1.5 sq.mm & 287 for 2.5 sq.mm	
(8) Minimum bending radius for unarmoured cable in mm= 10 x cable dia in mm.	

RATING FACTOR FOR VARIATION IN GROUND TEMPERATURE (for cable laid direct in the ground)

Ground temp°C	15	20	25	30	35	40	45
Rating Factor	1.17	1.12	1.06	1.00	0.94	0.87	0.79

RATING FACTOR FOR VARIATION IN GROUND TEMPERATURE (for cable laid direct in duct)

Ground temp°C	15	20	25	30	35	40	45
Rating Factor	1.17	1.12	1.06	1.00	0.91	0.87	0.79

RATING FACTOR FOR VARIATION IN AMBIENT AIR TEMPERATURE

Ground temp°C	25	30	35	40	45
Rating Factor	1.25	1.16	1.09	1.00	0.9

RATING FACTOR FOR MULTI CORE CABLE LAID IN AIR (spacing between cables equal to dia of the cable)

No . of Racks	Number of cables per Rack				
	1	2	3	6	9
1	1.00	0.98	0.96	0.93	0.92
2	1.00	0.95	0.93	0.90	0.89
3	1.00	0.94	0.92	0.89	0.88
4	1.00	0.93	0.90	0.87	0.86

RATING FACTOR FOR MULTICORE CABLE LAID ON RACKS IN AIR (with cable touching)

No . of Racks	Number of cables per Rack				
	1	2	3	6	9
1	1.00	0.84	0.80	0.75	0.73
2	1.00	0.80	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

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