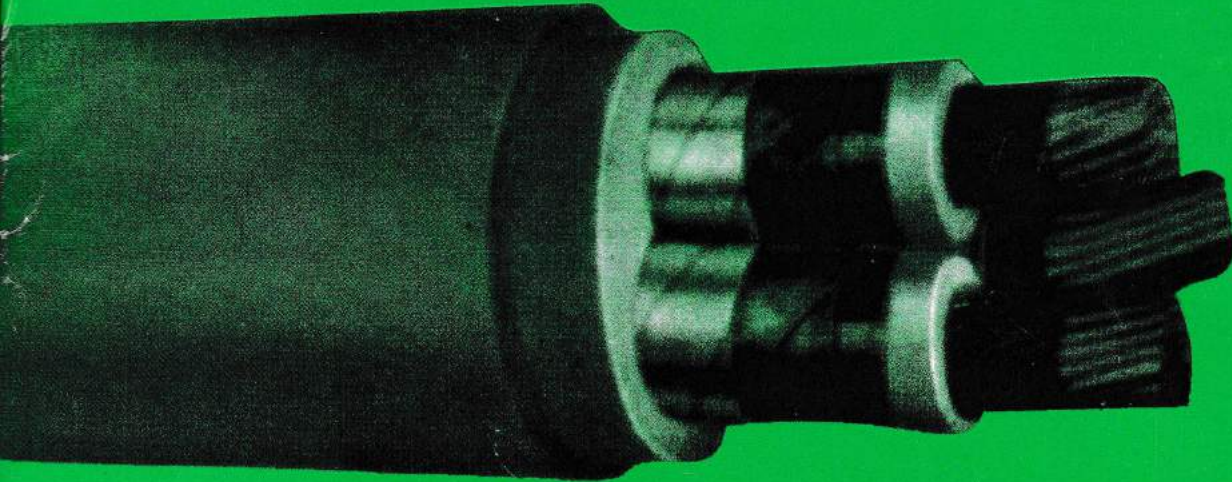
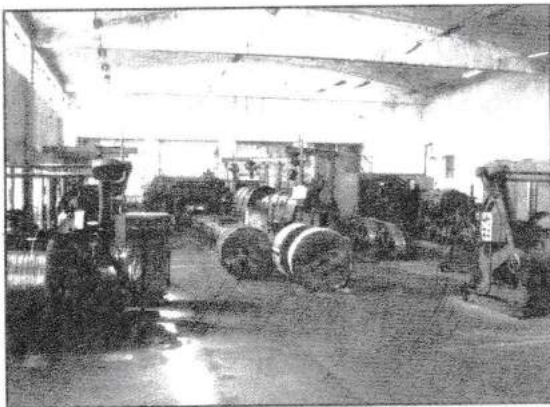
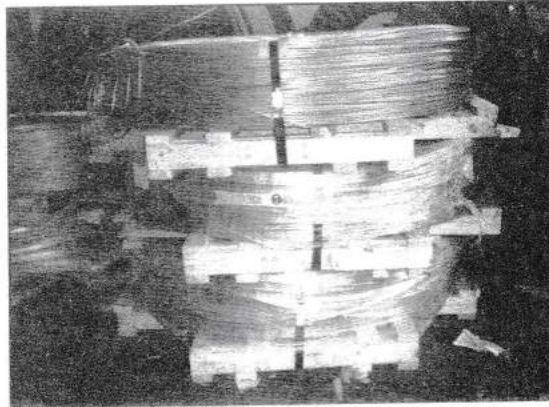




EASTERN CABLES LIMITED



Eastern Cables Limited, a Subsidiary Company of Bangladesh Steel & Engineering Corporation (BSEC), situated at the Port City of Chittagong, is the biggest Cable and Conductor manufacturer in Bangladesh. The range of its products not only includes PVC insulated and PVC sheathed single core and multicore low tension domestic cables but also control, flexible and power cables with copper conductor having continuous permissible voltage grade upto 12 KV. It also enjoys the honour of being the pioneer in this country in the production of armoured and screened cables. The different sizes



constant research and development work over a period of hundred years is being shared by Eastern Cables Ltd. from its very inception. Investment has been made most generously for the procurement of a most modern manufacturing plant and sophisticated laboratory equipments to make quality cables and conductor as per international standard specifications. Quality Control Laboratories and modern PVC compounding plant ensure the Physical, Chemical and Electrical properties of all products as per specifications. The

of Bare and Insulated All Aluminium Conductor (AAC) and Aluminium Conductor Steel Reinforced (ACSR) are also being manufactured here.

Eastern Cables Ltd. manufactures its products strictly according to the Standard specifications. This stamp of quality is ensured by the facts that the cables are being manufactured under licence from the world renowned Kabel-Werke-Reinshagen GmbH of Germany. It is a matter of great pride that the fruits of accumulated experience of Kabel-Werke - Reinshagen enriched by its



(CONTINUED TO THIRD COVER)



GENERAL GUIDE TO THE DIFFERENT NOMENCLATURES & CODE DESIGNATION USED IN THIS PUBLICATION

Nomenclature	Interpretation
VDE	- Union of German Electrical Engineers
B.S.	- British Standard
N	- According to VDE standard (VDE 0250 & VDE 0271)
B	- According to British Standard (B.S. 6004)
I	- According to B.S. 2004 (Imperial system)
Y	- Insulation or sheath of thermoplastic based on PVC (polyvinyl Chloride)
A	- Insulated single core wire
M	- Sheathed wire
F	- Flat cable (VDE 0250 & B.S.)
T	- Supporting wire rope
E	- Earth continuity Conductor
C	- Concentric conductor of copper
H	- Field limiting conducting layers over the conductor and over the insulation
S	- Shield of copper
SE	- Field limiting conducting layers over each individual conductor and insulation and shield of copper over each individual core (the code letter H is left out in this case)
F	- Galvanised steel flat wire armouring (VDE 0271)
R	- Galvanised steel round wire armouring
Gb	- Helical galvanised steel tape
I	- International colour code : Cable possessing a green-yellow identification core
re	- Conductor of single solid wire having circular cross-section
rm	- Conductor of multiple stranded wires having circular cross-section
sm	- Conductor of multiple stranded wires having sector shaped cross-section

Code designation	Interpretation
------------------	----------------

As per VDE 0250

NYA	- PVC insulated single core cable.
NYIFY	- PVC insulated and PVC sheathed flat cable.
NYMT	- PVC insulated and PVC sheathed cable with supporting steel wire rope.



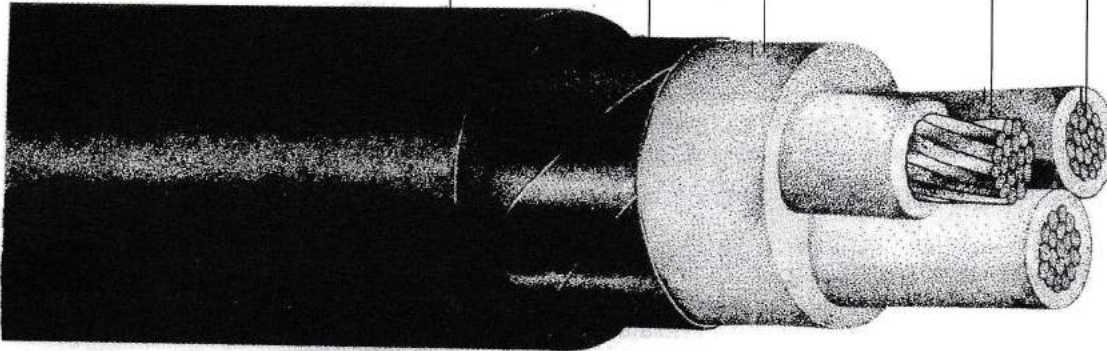
TYPE : BYA

A detailed black and white illustration of a large, cylindrical industrial component, possibly a pipe or a large cable. The main body is dark and textured. A cross-section on the right side reveals internal structure, showing several smaller cylindrical elements arranged in a circular pattern. The overall style is technical and industrial.

TYPE : NYY

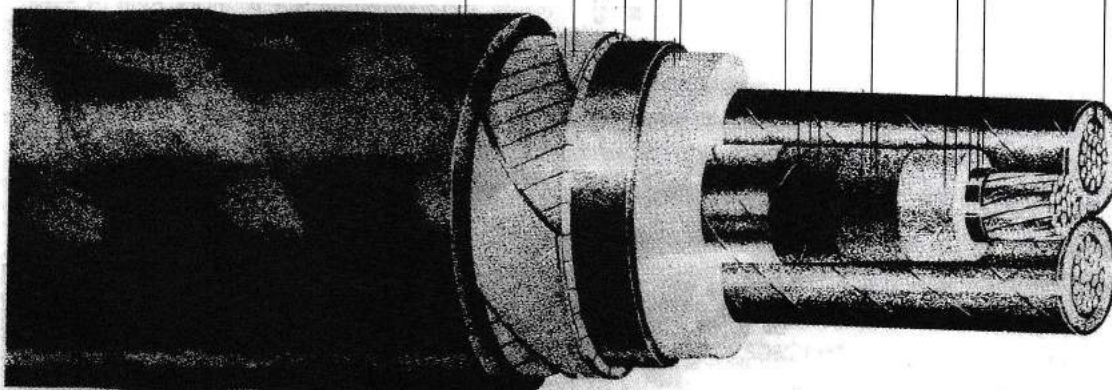
TYPE : NYFGbY

- Cable according to VDE standard (N)
- Conductor of copper, stranded round (rm)
- PVC insulation (Y)
- PVC or rubber filling
- Shield of copper (S)
- PVC Sheath (Y)



TYPE : NYSY

- Cable according to VDE standard (N)
- Conductor of copper, stranded round (rm)
- Field limiting conducting layers over conductor
- PVC insulation (Y)
- Field limiting conducting layers over conductor
- Semi Conducting tape
- Shelf of copper over individual core (SE)
- PVC or rubber filling
- PVC inner Sheath (Y)
- Galvanised steel flat wire (F)
- Helical galvanised steel tape (Gb)
- PVC outer Sheath (Y)



TYPE : NYSEYFGbY



As per **B.S. 6004 & BDS 900**

BYA	- PVC insulated non-sheathed single core cable.
BYFY	- PVC insulated & PVC sheathed flat cable.
BYFYE	- PVC insulated & PVC sheathed flat cable with earth continuity conductor.
BYM	- PVC insulated & PVC sheathed cable.

As per **VDE 0271 & BDS 901**

NY Y	- PVC insulated and PVC sheathed cable.
NY Y-I	- PVC insulated and PVC sheathed cable having international colour code, i.e., one of the cores being coloured green/yellow.
NYFGbY	- Cable with PVC insulation, flat steel wire armouring and helical steel taping over common covering of cores and pvc sheath, i.e., flat wire armoured NY Y type of cable.
NYRGbY	- Cable with PVC insulation, round steel wire armouring and helical steel taping over common covering of cores and PVC sheath, i.e., round wire armoured NY Y type of cable.
NYCY	- Cable with PVC insulation, concentric conductor of copper over common covering of cores and PVC sheath, i.e., NY Y type of cable having a concentric conductor of copper. The conductor of the half core of a three and half core cable or of the fourth core of a four core cable is arranged concentrically over the common covering of the remaining three cores. Similarly copper screening of screened control cable is arranged concentrically around the cores.
NYSY	- Cable with PVC insulation, shield of copper over common covering of cores and PVC sheath. The minimum cross sectional area of the copper shield is 16 mm ²
NYHSY	- Single core cable with PVC insulation, field limiting conducting layers over the conductor and also over the insulation, copper shield and PVC sheath. The minimum cross sectional area of the copper shield is 16mm ²



NYSEY

- Multicore cable with PVC insulation, field limiting conducting layers over each individual conductor and over each individual core copper shield also over each individual core and overall PVC sheath. The minimum total cross sectional area of the copper shield of the individual cores, all of which remain in electrical contact with each other, is 16 mm². The cable may be said as a multicore NYHSY type of cable.

NYSEYFGby

- Multicore cable with PVC insulation, field limiting conducting layers over each individual conductor and core, copper shield also over each individual core, PVC inner sheath over common covering of cores, flat steel wire armouring, helical steel taping and PVC outer sheath, i.e., flat wire armoured NYSEY type of cable.

Definitions

Voltage designation

- The voltage designation indicates the rated voltage E_0/E for which these cables are designed, where E_0 is the power frequency voltage to earth and E is the power frequency voltage between conductors.

Nominal value

- It is the value which must be maintained within the tolerance as laid down in corresponding standard.

Approximate value

- It is the value which should lie within commercial or production technique tolerance.

Service Voltage

- It is the voltage which locally exists between the line conductors or between the conductor and the earth.

Permissible Service Voltage

- It is the maximum permissible voltage with which the cable can be used in continuous undisturbed operation. In case of all voltage grades of cables as per VDE 0250 it is 15% higher than the rated voltage (E) in case of 1 kV cables, as per VDE 0271 it is 20% higher for alternating current and 50% higher for direct current and in case of 6 kV and 10 kV cables as per VDE 0271 it is 20% higher for three phase system and 15% higher for single phase system.



TABLES ON CONSTRUCTION, WEIGHT AND NORMAL CURRENT RATINGS OF WIRES AND CABLES MADE AS PER B.S. 6004 & B.S. 2004

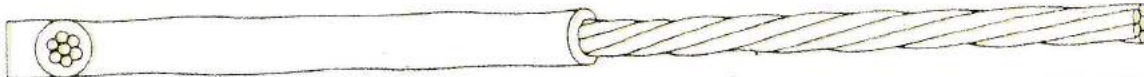
TABLE: 01

450/750 Volts

Type : BYA as per B.S. 6004 & BDS 900 : 2010

Harmonised code designation : HO7V - U for solid conductor

HO7V - R for Stranded conductor



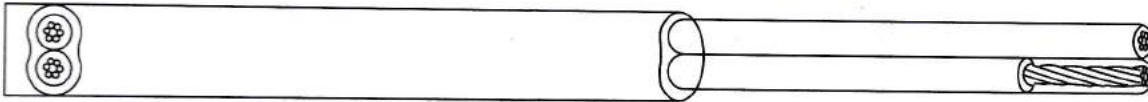
Specification

Plain annealed Copper Conductor, PVC insulated.

Suitable for use in surface mounted or embedded conduits or trunking. Also suitable for field protected installation in lighting fittings and inside appliances upto 1000V a.c. or upto 750V to earth d.c.

Single core

Nominal Cross Sectional Area of Conductor	No. and nominal Diameter of wires	D.C. Resistance of each core at 20°C (Maximum)	Nominal thickness of Insulation	Over all diameter upper limit	Approximate Weight	Current Rating	
						Bunched and Enclosed in conduit two cables single phase at 35°C	Clipped to a surface or on a cable tray bunched and unenclosed two cables single phase at 35°C
mm ²	No/mm	Ohm/km	mm	mm	Kg/Km	Amps	Amps
1 x 0.50 re	1 / 0.80	36.000	0.6	2.14	9		
1 x 0.75 re	1 / 0.98	24.500	0.6	2.33	12		
1 x 1.00 re	1 / 1.13	18.100	0.7	3.00	16	13	16
1 x 1.00 rm	3 / 0.65	18.100	0.7	3.00	17	13	16
1 x 1.30 rm	3 / 0.74	14.036	0.7	3.21	21	15	19
1 x 1.50 re	1 / 1.38	11.900	0.7	3.30	22	16	20
1 x 1.50 rm	3 / 0.80	11.900	0.7	3.30	23	16	20
1 x 1.50 rm	7 / 0.53	11.900	0.7	3.40	23	16	20
1 x 2.00 rm	3 / 0.91	9.108	0.7	3.61	29	20	25
1 x 2.50 re	1 / 1.78	7.140	0.8	3.90	32	22	28
1 x 2.50 rm	7 / 0.67	7.140	0.8	4.20	33	22	28
1 x 3.00 rm	7 / 0.74	5.999	0.8	4.43	42	26	31
1 x 4.00 rm	7 / 0.85	4.470	0.8	4.80	51	30	37
1 x 4.50 rm	7 / 0.91	3.892	0.8	5.00	58	35	41
1 x 6.00 rm	7 / 1.05	2.970	0.8	5.40	71	38	47
1 x 7.00 rm	7 / 1.12	2.605	1.0	6.02	86	42	51
1 x 10.00 rm	7 / 1.35	1.770	1.0	6.80	117	52	63
1 x 14.50 rm	7 / 1.63	1.231	1.0	7.75	166	67	81
1 x 16.00 rm	7 / 1.71	1.120	1.0	8.00	179	70	85
1 x 16.00 rm	19 / 1.05	1.120	1.0	8.00	180	70	85
1 x 25.00 rm	7 / 2.14	0.708	1.2	9.80	276	91	110
1 x 25.00 rm	19 / 1.30	0.708	1.2	9.80	278	91	110
1 x 35.00 rm	19 / 1.53	0.514	1.2	11.00	373	112	136
1 x 50.00 rm	19 / 1.83	0.379	1.4	13.00	532	136	164
1 x 70.00 rm	19 / 2.17	0.262	1.4	15.00	732	173	207
1 x 95.00 rm	19 / 2.52	0.189	1.6	17.00	985	216	253

**TABLE: 02****300/500 Volts**Type : **BYFY** as per B.S. 6004 & BDS 900 : 2010**Specification**

Plain annealed Copper Conductor, PVC insulated two or three cores laid flat and PVC sheathed.

Suitable for use in fixed installations in dry or damp premises and for installation in walls or boards and in channels or embedded in plaster.

Colour of Sheath : Grey

Twin core

Nominal Cross Sectional Area of Conductor	No. and nominal Diameter of wires	Nominal thickness of Insulation	Nominal thickness of Sheath	Over all dimensions upper limit	Approximate Weight	Current Rating	
						Enclosed in conduit one cable single phase at 35°C	Clipped to a surface or on a cable tray one cable single phase at 35°C
mm ²	No/mm	mm	mm	mm	Kg/Km	amps	amps
2 x 1.0 re	1 / 1.13	0.6	0.9	7.4 x 4.7	53	13	15
2 x 1.5 re	1 / 1.38	0.7	0.9	8.4 x 5.4	65	16	18
2 x 2.5 re	1 / 1.78	0.8	1.0	9.8 x 6.2	98	22	26
2 x 4.0 rm	7 / 0.85	0.8	1.0	11.5 x 7.2	152	30	33
2 x 6.0 rm	7 / 1.05	0.8	1.1	13.0 x 8.0	205	37	43

Three Core

Nominal Cross Sectional Area of Conductor	No. and nominal Diameter of wires	Nominal thickness of Insulation	Nominal thickness of Sheath	Over all dimensions upper limit	Approximate Weight	Current Rating	
						Enclosed in conduit one cable single phase at 35°C	Clipped to a surface or on a cable tray one cable single phase at 35°C
mm ²	No/mm	mm	mm	mm	Kg/Km	amps	amps
3 x 1.0 re	1 / 1.13	0.6	0.9	9.8 x 4.7	76	11	12
3 x 1.5 re	1 / 1.38	0.7	0.9	11.5 x 5.4	96	15	16
3 x 2.5 re	1 / 1.78	0.8	1.0	13.5 x 6.2	145	20	22
3 x 4.0 rm	7 / 0.85	0.8	1.1	16.5 x 7.4	229	37	30
3 x 6.0 rm	7 / 1.05	0.8	1.1	18.0 x 8.0	301	33	37



TABLE: 03
300/500 Volts

Type : **BYFYE** as per B.S. 6004 & BDS 900 : 2010



Specification

Plain annealed Copper Conductor, PVC insulated two core flat cable with earth continuity conductor and PVC sheathed.

Suitable for use in fixed installations in dry or damp premises and for installation in walls on boards and in channels or embedded in plaster.

Colour of Sheath : Grey

Twin core

Nominal Cross Sectional Area of Conductor	No. and nominal Diameter of wires	Nominal thickness of Insulation	Nominal thickness of Sheath	Over all dimensions upper limit	Approximate Weight	Current Rating	
						Enclosed in conduit one cable single phase at 35°C	Clipped to a surface or on a cable tray one cable single phase at 35°C
mm ²	No/mm	mm	mm	mm	Kg/Km	amps	amps
2 x 1.0 re	1 / 1.13	0.6	0.9	8.6 x 4.7	68	13	15
2 x 1.5 re	1 / 1.38	0.7	0.9	9.6 x 5.4	81	16	18
2 x 2.5 re	1 / 1.78	0.8	1.0	11.0 x 6.2	114	22	26
2 x 4.0 re	7 / 0.85	0.8	1.0	13.0 x 7.2	177	30	33
2 x 6.0 re	7 / 1.05	0.8	1.1	15.0 x 8.0	244	37	43

* Three core cables are also manufactured on demand.



TABLE: 04

300/500 Volts

Type : **BYM** as per B.S. 6004 & BDS 900 : 2010



Specification

Plain annealed Copper Conductor, PVC insulated, Single, Two, Three or Four cores laid up filled with rubber and PVC sheathed.

Suitable for use in fixed installations in dry or damp premises clipped direct to a surface or on cable tray unenclosed and also for use in conduit enclosed.

Colour of Sheath : Grey

Single core

Normal Cross Sectional Area of Conductor	No. and nominal Diameter of wires	Nominal thickness of Insulation	Nominal thickness of Sheath	Over all diameter	Approximate Weight	Current Rating	
						in conduit single phase at 35°C	Clipped to a surface or on a cable tray one cable single phase at 35°C
mm ²	No/mm	mm	mm	mm	Kg/Km	amps	amps
1 x 1.00 re	1 / 1.13	0.6	0.8	4.5	25	13	16
1 x 1.50 re	1 / 1.38	0.7	0.8	4.9	32	16	20
1 x 2.50 re	1 / 1.78	0.8	0.8	5.8	45	22	28
1 x 4.00 rm	7 / 0.85	0.8	0.9	6.8	73	30	37
1 x 6.00 rm	7 / 1.05	0.8	0.9	7.4	96	38	47
1 x 10.00 rm	7 / 1.35	1.0	0.9	8.8	147	52	63
1 x 16.00 rm	7 / 1.71	1.0	1.0	10.5	218	70	85
1 x 25.00 rm	7 / 2.14	1.2	1.1	12.5	328	91	110
1 x 35.00 rm	19 / 1.53	1.2	1.1	13.5	432	112	136

Twin Core

2 x 1.0 re	1 / 1.13	0.6	1.2	8.8	93	13	15
2 x 1.5 re	1 / 1.38	0.7	1.2	10.0	119	16	18
2 x 2.5 re	1 / 1.78	0.8	1.2	11.5	165	22	26
2 x 4.0 rm	7 / 0.85	0.8	1.2	12.5	228	30	33
2 x 6.0 rm	7 / 1.05	0.8	1.2	14.0	294	37	43
2 x 10.0 rm	7 / 1.35	1.0	1.4	17.5	485	50	60
2 x 16.0 rm	7 / 1.71	1.0	1.4	20.0	673	66	80
2 x 25.0 rm	7 / 2.14	1.2	1.4	24.0	1004	75	88
2 x 35.0 rm	19 / 1.53	1.2	1.6	27.5	1347	92	108



TABLE: 04 Contd.



Three Core

Nominal Cross Sectional Area of Conductor	No. and nominal Diameter of wires	Nominal thickness of Insulation	Nominal thickness of Sheath	Over all diameter	Approximate Weight	Current Rating	
						In conduit single phase at 35°c	Clipped to a surface or on a cable tray single phase at 35°c
mm ²	No/mm	mm	mm	mm	Kg/Km	amps	amps

3 x 1.0 re	1 / 1.13	0.6	1.2	9.2	106	11	12
3 x 1.5 re	1 / 1.38	0.7	1.2	10.5	139	15	16
3 x 2.5 re	1 / 1.78	0.8	1.2	12.0	195	20	22
3 x 4.0 rm	7 / 0.85	0.8	1.2	13.0	268	27	30
3 x 6.0 rm	7 / 1.05	0.8	1.4	15.5	386	33	37
3 x 10.0 rm	7 / 1.35	1.0	1.4	19.0	590	46	51
3 x 16.0 rm	7 / 1.71	1.0	1.4	21.5	856	58	67
3 x 25.0 rm	7 / 2.14	1.2	1.6	26.0	1272	66	77
3 x 35.0 rm	19 / 1.53	1.2	1.6	29.0	1685	81	90

Four Core

4 x 1.0 re	1 / 1.13	0.6	1.2	9.8	124	11	12
4 x 1.5 re	1 / 1.38	0.7	1.2	11.5	164	15	16
4 x 2.5 re	1 / 1.78	0.8	1.2	13.0	224	20	22
4 x 4.0 rm	7 / 0.85	0.8	1.4	14.5	342	27	30
4 x 6.0 rm	7 / 1.05	0.8	1.4	17.0	464	33	37
4 x 10.0 rm	7 / 1.35	1.0	1.4	20.5	719	46	51
4 x 16.0 rm	7 / 1.71	1.0	1.4	23.5	1051	58	67
4 x 25.0 rm	7 / 2.14	1.2	1.6	28.5	1600	66	77
4 x 35.0 rm	19 / 1.53	1.2	1.6	32.0	2085	81	90



CURRENT CARRYING CAPACITY OF CABLES MADE ACCORDING TO B.S. 6004, B. S. 2004 & BDS 900 : 2010

1. Normal Conditions

This basis of the current ratings of cables in tables 01 to 07 has been so chosen for normal ambient temperature of our country of 35°C and for normal laying conditions as follows-

A. For groups of unenclosed systems of single core cables:

- i) The horizontal clearance between the systems is not more than 150 mm and not less than six times the individual cable diameter or one time the overall width of the individual system.
- ii) The vertical clearance between systems is not less than 150 mm.
- iii) If the number of systems is more than four, they are installed in a horizontal plane.

B. For groups of unenclosed multicore cables :

- i) The horizontal clearance between cables is not more than 150 mm and not less than six times the individual cable diameter.
- ii) The vertical clearance between cables is not less than 150 mm.
- iii) If the number of cables is more than four, they are installed in horizontal plane.

2. Deviated conditions

If the actual conditions of installations are not same as normal conditions, the current rating values given in Tables 01 to 07 are to be multiplied with the rating factors as given below:



Variation of Ambient Temperature

TABLE: 05
Rating Factors for Variation of Ambient temperature

Ambient temperature °C	25	30	35	40	45	50	55	60
Rating factors for cable having excess-current protection, which will operate within four hours at 1.5 times of the designed load current	1.13	1.06	1	0.93	0.84	0.76	0.65	0.53
Rating factors of cables having no excess-current protection as above	1.05	1.03	1	0.97	0.94	0.91	0.79	0.65

Grouping of systems or Cables made as per B. S. 6004 : & B. S. 2004 :

TABLE: 06
Group Rating Factors for Single-core Cables in Three-phase System in Air

Number of Systems	2	3	4	5	6	8	10
Rating Factor	0.80	0.69	0.62	0.59	0.55	0.51	0.48

TABLE: 07
Group Rating Factors for Multicore Cables in Air

Number of Cables	2	3	4	5	6	8	10
Rating Factor	0.80	0.70	0.65	0.60	0.57	0.52	0.48

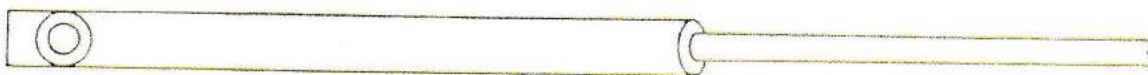


TABLES ON CONSTRUCTION, WEIGHT AND NORMAL CURRENT RATINGS OF WIRES AND CABLES MADE AS PER VDE 0250

TABLE: 8

600/1000 Volts

Type : NYA as per VDE 0250/3.69



Specification

Plain annealed Copper Conductor, PVC insulated.

Suitable for use in motor and switch panels and in distribution equipment; cables of 1.5 mm² and above are for use in conduit over and under plaster, and over insulating bodies over plaster in dry rooms; for continuous permissible service voltage of 690/1150 volts

Single core

Cross Section	No. and approximate Diameter of wires	D.C. resistance at 35°C (Maximum)	Nominal thickness of Insulation	Maximum outer diameter	Approximate Weight	* Current rating at 35°C ambient temp	
						in conduit	in air
mm ²	No/mm	Ohm/km	mm	mm	Kg/Km	amps	amps
1 x 0.5 re	1 / 0.80	37.3545	0.6	2.3	8	-	12
1 x 0.75 re	1 / 0.98	25.3968	0.6	2.5	11	-	14
1 x 1.0 re	1 / 1.13	18.7301	0.6	2.6	14	10	17
1 x 1.5 re	1 / 1.38	12.5926	0.6	2.9	19	14	22
1 x 2.5 re	1 / 1.78	7.5555	0.7	3.5	30	18	30
1 x 4.0 re	1 / 2.26	4.7302	0.8	4.2	47	23	39
1 x 6.0 re	1 / 2.77	3.1428	0.8	4.7	67	30	50
1 x 10.0 re	1 / 3.57	1.8730	1.0	6.0	110	42	69
1 x 16.0 re	1 / 4.52	1.1852	1.0	6.9	168	57	92

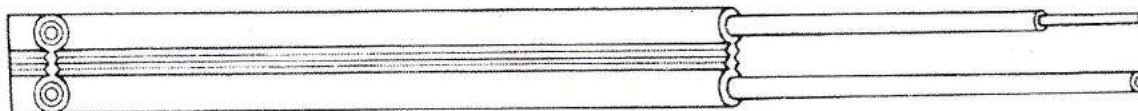
* Current ratings are valid for the cables laid under normal conditions as detailed at page 19



TABLE: 9

220/380 Volts

Type : **NYIFY** as per VDE 0250/3.69



Specification

Plain annealed Copper Conductor, PVC insulated, twin or three core flat cables and PVC sheathed.

Suitable for use in or under plaster in dry rooms for continuous permissible service voltage of 255/440 volts.

Colour of sheath : White

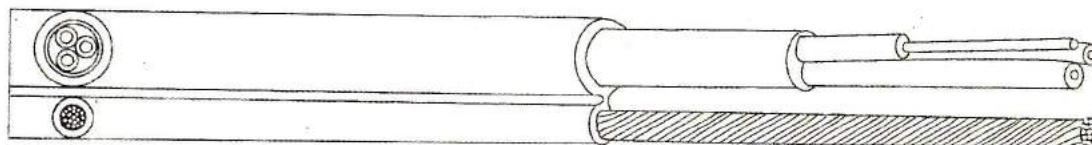
Twin core

Cross Section	No. and approximate Diameter of wires	D. C. resistance at 35°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of sheath	Maximum outer dimensions	Approx. Weight	* Current rating at 35°C ambient temp, under plaster
mm ²	No/mm	Ohm/km	mm	mm	mm	Kg/Km	amps
2 x 1.5 re	1 / 1.38	12.5926	0.4	0.8	4.4 x 12.0	70	17
2 x 2.5 re	1 / 1.78	7.5555	0.5	0.9	5.2 x 13.5	103	23
2 x 4.0 re	1 / 2.26	4.7302	0.6	0.9	6.0 x 15.5	146	31

Three core

3 x 1.5 re	1 / 1.38	12.5926	0.4	0.8	4.4 x 19.0	106	17
3 x 2.5 re	1 / 1.78	7.5555	0.5	0.9	5.2 x 21.5	158	23
3 x 4.0 re	1 / 2.26	4.7302	0.6	0.9	6.0 x 25.0	224	31

* Current ratings are valid for the cables laid under normal conditions as detailed at page 19

**TABLE: 10****300/500 Volts**Type : **NYMT** as per VDE 0250/3.69**Specification**

Plain annealed Copper Conductor, PVC insulated, two, three or four cores laid up, filled and PVC sheathed along with a galvanised steel wire rope under the sheath.

Suitable for use as self supporting aerial cable for continuous permissible service voltage of 345/575 volts.

Colour of sheath : Black

Twin core

Cross Section	No. and approximate Diameter of wires		D.C. resistance at 35°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of sheath	Maximum outer diameter	Approx. Weight	* Current rating at 35°C ambient temp in air
	Copper wires	Steel wires						
mm ²	No/mm	No/mm	Ohm/km	mm	mm	mm	kg/km	amps
2 x 1.5 re	1 / 1.38	19 / 0.6	12.8042	0.6	1.4	9.8	206	17
2 x 2.5 re	1 / 1.78	19 / 0.6	7.7036	0.7	1.4	11.0	251	23
2 x 4.0 re	1 / 2.26	19 / 0.6	4.8254	0.8	1.4	12.5	330	31
2 x 6.0 re	1 / 2.77	19 / 0.6	3.2063	0.8	1.4	13.5	404	41

Three core

3 x 1.5 re	1 / 1.38	19 / 0.6	12.8042	0.6	1.4	10.5	226	17
3 x 2.5 re	1 / 1.78	19 / 0.6	7.7036	0.7	1.4	11.5	281	23
3 x 4.0 re	1 / 2.26	19 / 0.6	4.8254	0.8	1.4	13.0	376	31
3 x 6.0 re	1 / 2.77	19 / 0.6	3.2063	0.8	1.6	15.0	507	41

Four core

4 x 1.5 re	1 / 1.38	19 / 0.6	12.8042	0.6	1.4	11.0	251	17
4 x 2.5 re	1 / 1.78	19 / 0.6	7.7036	0.7	1.4	12.5	319	23
4 x 4.0 re	1 / 2.26	19 / 0.6	4.8254	0.8	1.6	14.5	460	31
4 x 6.0 re	1 / 2.77	19 / 0.6	3.2063	0.8	1.6	16.5	591	41

* Current ratings are valid for the cables laid under normal conditions as detailed at page 19



CURRENT CARRYING CAPACITY OF CABLES MADE ACCORDING TO VDE 0250/3.69

1. General

For a Pvc insulated cable, made as per VDE 0250/3.69, the maximum permissible continuous conductor temperature is 70°C. The current carrying capacity of given cable installed in air, depends on the maximum permissible conductor temperature, ambient temperature, vicinity of other cables and also of other materials which may cause hindrance to normal heat dissipation from the cable surface.

2. Normal Conditions

The basis of Current rating of cables in tables 11, 12 & 13 has been chosen for normal ambient air temperature of our country of 35°C and for normal laying conditions as follows:

A. Cable in conduit:

- i) One or more single core cables installed in conduit.

B. Cable in air:

- i) Single core cable installed free in air with a maximum clearance equal to one diameter between cables and also single core wiring switchgear, distribution gears and bus bar distribution systems.
- ii) Multicore cables or wires installed free in air.

3. Deviated Conditions

If the actual conditions of cable installation are not same as normal conditions, the current rating values given in tables 11, 12 & 13 are to be multiplied with the rating factors as described below.

Variation of Ambient Temperature

When the ambient temperature is under on over 35°C the current carrying capacity of cables as shown in tables 11, 12 & 13 is increased or decreased by a factor according to the following table:

TABLE : 11

Rating Factors for Variation of Ambient Temperature

Ambient Temperature ⁰ C	10	15	20	25	30	35	40	45	50	55	60
Rating Factor	1.31	1.25	1.19	1.14	1.07	1.00	0.93	0.85	0.76	0.66	0.53

Grouping of Cables

When several wires or cables are grouped together their current carrying capacity is reduced. Some forms of groupings have already been considered under normal conditions of installing the cables. For other forms of grouping, the current carrying capacity of the cables would be reduced by factors that can be taken from tables 27 and 28.



TABLES ON CONSTRUCTION, WEIGHT, & NORMAL CURRENT RATING OF WIRES AND CABLES MADE AS PER VDE 0271 & BDS 901

TABLE: 12

600/1000 Volts

Type : NYY as per VDE 0271/3.69 & BDS 901: 2010, BDS IEC 60502 (Part-1)



Specification

Plain annealed Copper Conductor, PVC insulated single, twin, three, three and half or four core laid up, filled with rubber where necessary and PVC sheathed.

Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 720/1200 volts.

Colour of sheath : Black

Single Core

Cross Section	No. and approximate Diameter of wires	D.C. resistance at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
1 x 1.5 re	1 / 1.38	12.3700	0.8	1.8	6.6	60	27	22
1 x 1.5 rm	7 / 0.56	12.3700	0.8	1.8	6.9	66	27	22
1 x 2.5 re	1 / 1.78	7.4220	0.9	1.8	7.2	77	36	30
1 x 2.5 rm	7 / 0.67	7.4220	0.9	1.8	7.5	82	36	30
1 x 4 rm	7 / 0.85	4.6465	1.0	1.8	8.2	106	47	39
1 x 6 rm	7 / 1.05	3.0873	1.0	1.8	8.7	132	59	50
1 x 10 rm	7 / 1.35	1.8399	1.0	1.8	9.7	182	78	69
1 x 16 rm	7 / 1.71	1.1642	1.0	1.8	10.7	252	100	94
1 x 25 rm	7 / 2.14	0.7359	1.2	1.8	12.4	363	130	125
1 x 35 rm	19 / 1.53	0.5343	1.2	1.8	13.7	470	155	160
1 x 50 rm	19 / 1.83	0.3939	1.4	1.8	15.6	645	185	195
1 x 70 rm	19 / 2.17	0.2723	1.4	1.8	17.3	858	225	245
1 x 95 rm	19 / 2.52	0.1964	1.6	1.8	19.4	1129	270	300
1 x 120 rm	37 / 2.03	0.1559	1.6	1.8	21.0	1384	310	350



TABLE: 12 Contd.

Cross Section	No. and approximate Diameter of wires	D.C. resistance at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
1 x 150 rm	37 / 2.27	0.1268	1.8	1.8	23.1	1709	350	405
1 x 185 rm	37 / 2.52	0.1010	2.0	2.0	25.6	2097	390	460
1 x 240 rm	61 / 2.24	0.0769	2.2	2.0	28.6	2708	450	555
1 x 300 rm	61 / 2.50	0.0613	2.4	2.0	31.3	3405	515	640
1 x 400 rm	61 / 2.89	0.0479	2.6	2.2	35.3	4408	585	770
1 x 500 rm	61 / 3.23	0.0380	3.0	2.2	39.2	5436	680	900
1 x 630 rm	127 / 2.52	0.0294	3.0	2.2	43.2	6802	800	1030
1 x 800 rm	127 / 2.85	0.0232	3.0	2.6	48.25	8679	1030	1189
1 x 1000 rm	127 / 3.20	0.0186	3.0	2.6	52.80	10728	1154	1335

Twin core

2 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	11.1	172	25	19
2 x 1.5 rm	7 / 0.56	12.5779	0.8	1.8	11.8	191	25	19
2 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	12.4	222	34	27
2 x 2.5 rm	7 / 0.67	7.5675	0.9	1.8	12.98	239	34	27
2 x 4.0 rm	7 / 0.85	4.7401	1.0	1.8	14.3	308	44	35
2 x 6.0 rm	7 / 1.05	3.1496	1.0	1.8	15.5	382	55	45
2 x 10.0 rm	7 / 1.35	1.8814	1.0	1.8	17.3	517	74	62
2 x 16.0 rm	7 / 1.71	1.1850	1.0	1.8	19.5	707	97	84
2 x 25.0 rm	7 / 2.14	0.7505	1.2	1.8	23.6	1003	125	110
2 x 35.0 rm	19 / 1.53	0.5446	1.2	2.0	26.5	1382	150	140

Three core

3 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	11.6	200	22	16
3 x 1.5 rm	7 / 0.56	12.5779	0.8	1.8	12.3	216	22	16
3 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	12.9	266	30	23
3 x 2.5 rm	7 / 0.67	7.5675	0.9	1.9	13.6	275	30	23
3 x 4.0 rm	7 / 0.85	4.7401	1.0	1.8	15.0	369	38	32
3 x 6.0 rm	7 / 1.05	3.1496	1.0	1.8	16.3	465	48	41
3 x 10.0 rm	7 / 1.35	1.8814	1.0	1.8	18.3	641	64	56
3 x 16.0 rm	7 / 1.71	1.1850	1.0	1.8	21.4	940	83	75
3 x 25.0 rm	7 / 2.14	0.7505	1.2	2.0	25.4	1374	110	98
3 x 35.0 rm	20 - wire	0.5446	1.2	1.8	23.2	1329	130	120
3 x 50.0 rm	20 - wire	0.4022	1.4	2.0	27.1	1811	155	150
3 x 70.0 rm	20 - wire	0.2785	1.4	2.0	30.0	2468	190	190
3 x 95.0 rm	20 - wire	0.2006	1.6	2.0	34.5	3318	225	230



TABLE: 12 Contd.

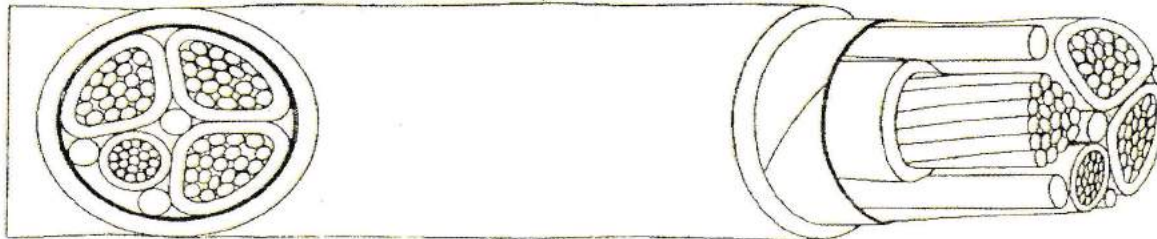
Cross Section	No. and approximate Diameter of wires	D.C. resistance at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. under-ground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 120 sm	39 - wire	0.1590	1.6	2.2	37.2	4091	260	270
3 x 150 sm	39 - wire	0.1288	1.8	2.2	41.1	5056	295	305
3 x 185 sm	39 - wire	0.1030	2.0	2.2	45.3	6162	330	350
3 x 240 sm	39 - wire	0.0783	2.2	2.6	50.9	7997	385	410
3 x 300 sm	39 - wire	0.0624	2.4	2.6	57.3	10059	425	470

Three and Half Core

2 x 25 sm / 16 rm	7 / 2.14 7 / 1.71	0.7505 1.1850	1.2 1.0	2.0	26.7	1587	110	98
3 x 35 sm / 16 rm	20 - wire 7 / 1.71	0.5446 1.1850	1.2 1.0	2.0	25.4	1592	130	120
3 x 50 sm / 25 rm	20 - wire 7 / 2.14	0.4022 0.7505	1.4 1.2	2.0	29.3	2213	155	150
3 x 70 sm / 35 rm	20 - wire 19 / 1.53	0.2785 0.5446	1.4 1.2	2.0	32.4	2937	190	190
3 x 95 sm / 50 rm	20 - wire 19 / 1.83	0.2006 0.4022	1.6 1.4	2.2	38.3	3969	225	230
3 x 120 sm / 70 rm	39 - wire 19 / 2.17	0.1590 0.2785	1.6 1.4	2.2	40.4	4958	260	270
3 x 150 sm / 70 rm	39 - wire 19 / 2.17	0.1288 0.2785	1.8 1.4	2.6	45.4	6021	295	305
3 x 185 sm / 95 rm	39 - wire 19 / 2.52	0.1030 0.2006	2.0 1.6	2.6	51.1	7486	330	350
3 x 240 sm / 120 rm	39 - wire 37 / 2.03	0.0783 0.1590	2.2 1.6	3.0	58.4	9705	385	410
3 x 300 sm / 150 rm	39 - wire 37 / 2.27	0.0624 0.1288	2.4 1.8	3.0	63.8	12101	425	470



TABLE: 12 Contd.



Cross Section	No. and approximate Diameter of wires	D.C. resistance at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps

Four core

4 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	12.4	231	22	16
4 x 1.5 rm	7 / 0.56	12.5779	0.8	1.8	13.15	252	22	16
4 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	13.8	307	30	23
4 x 2.5 rm	7 / 0.67	7.5675	0.9	1.8	14.4	315	30	23
4 x 4.0 rm	7 / 0.85	4.7401	1.0	1.8	16.2	441	38	32
4 x 6.0 rm	7 / 1.05	3.1496	1.0	1.8	17.6	560	48	41
4 x 10.0 rm	7 / 1.35	1.8814	1.0	1.8	19.8	783	64	56
4 x 16.0 rm	7 / 1.71	1.1850	1.0	1.8	23.2	1154	83	75
4 x 25.0 rm	7 / 2.14	0.7505	1.2	2.0	27.6	1698	110	98
4 x 35.0 sm	20 - wire	0.5446	1.2	2.0	25.4	1755	130	120
4 x 50.0 sm	20 - wire	0.0422	1.4	2.0	29.3	2460	155	150
4 x 70.0 sm	20 - wire	0.2785	1.4	2.0	32.4	3260	190	190
4 x 95.0 sm	20 - wire	0.2006	1.6	2.2	38.3	4368	225	230
4 x 120.0 sm	39 - wire	0.1590	1.6	2.2	40.4	5368	260	270
4 x 150.0 sm	39 - wire	0.1288	1.8	2.6	45.4	6718	295	305
4 x 185.0 sm	39 - wire	0.1030	2.0	2.6	51.1	8267	330	350
4 x 240.0 sm	39 - wire	0.0783	2.2	3.0	58.4	10736	385	410
4 x 300.0 sm	39 - wire	0.0624	2.4	3.0	63.8	13417	425	471

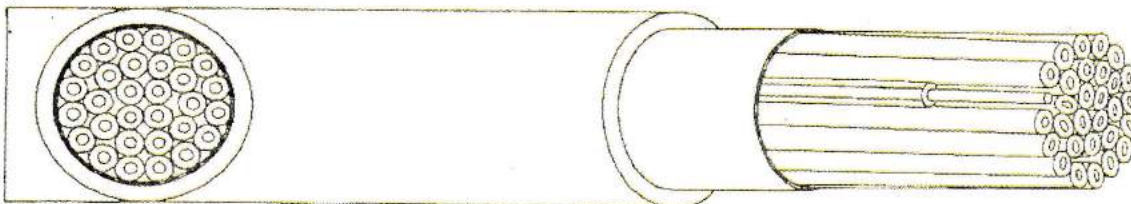
* Current ratings are valid for the cables laid under normal conditions as detailed at page 34



TABLE: 13

600/1000 Volts

Type : **NYY-I** as per **VDE 0271/3.69** & **BDS 901 ; 2010**, **BDS IEC 60502 (Part-1)**



Specification

Plain annealed Copper Conductor, PVC insulated multi cores laid up and PVC sheathed.

For use as control cables. It can be laid indoors, outdoors, underground and in water for continuous permissible service voltage of 720/1200 volts.

Colour of sheath : Black

Multicore

Cross Section	No. and approximate Diameter of wires	D.C. resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
5 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	12.6	220	18	13
7 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	13.5	258	16	12
10 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	16.4	351	13	10
12 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	16.9	399	12	9
16 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	18.5	507	11	8
21 x 1.5 re	1 / 1.38	12.5779	0.8	1.8	20.3	635	9	7
24 x 1.5 re	1 / 1.38	12.5779	0.8	2.0	22.4	712	9	7
30 x 1.5 re	1 / 1.38	12.5779	0.8	2.0	23.6	851	8	6
5 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	14.2	299	24	19
7 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	15.3	360	21	17
10 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	18.8	490	18	14
12 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	19.4	567	16	13
16 x 2.5 re	1 / 1.78	7.5675	0.9	1.8	21.3	727	14	11
21 x 2.5 re	1 / 1.78	7.5675	0.9	2.0	23.5	920	13	10
24 x 2.5 re	1 / 1.78	7.5675	0.9	2.0	26.4	1059	12	9
30 x 2.5 re	1 / 1.78	7.5675	0.9	2.0	27.8	1274	10	8

**TABLE: 13 Contd.**

Cross Section **	No. and approximate Diameter of wires	D.C. resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
5 x 4 rm	7 / 0.85	4.7401	1.0	1.8	16.8	402	31	25
7 x 4 rm	7 / 0.85	4.7401	1.0	1.8	18.2	544	27	22
10 x 4 rm	7 / 0.85	4.7401	1.0	1.8	22.7	708	23	19
12 x 4 rm	7 / 0.85	4.7401	1.0	1.8	23.4	837	21	17

* Current rating are valid when all the cores of the cable carry current and the cable is laid under normal conditions as detailed at page 34.

** Control cables of higher cross-sections are also manufactured on demand.

*** Control cables having any number of cores upto 169 can be manufactured on demand.

TABLE: 14**600/1000 Volts**

Type : NYFGbY

as per VDE 0271/3.69 & BDS 901 ; 2010, BDS IEC 60502 (Part-1)

Specification

Plain annealed Copper Conductor, PVC insulated, two, three & half or four cores laid up, bedded with PVC or tape, Flat wire armouring with helical steel taping and PVC sheathed.

Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 720/1200 volts.

Colour of sheath : Black

Two Core

Cross Section **	No. and approximate Diameter of wires	D.C Resistance of each core at 20°C (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approximate outer diameter	Approximate Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
2 x 1.5 re	1 / 1.380	12.5779	0.8	1.8	14.44	430	25	19
2 x 2.5 re	1 / 1.780	7.5675	0.9	1.8	15.66	500	34	27
2 x 4.0 rm	7 / 0.850	4.7401	1.0	1.8	16.50	577	44	35
2 x 6.0 rm	7 / 1.05	3.1496	1.0	1.8	17.67	675	55	45



TABLE: 14 Contd.

Cross Section	No. and approximate Diameter of wires	D.C Resistance of each core at 20°C (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
2 x 10 rm	7 / 1.350	1.8814	1.0	1.8	19.50	846	74	62
2 x 16 rm	7 / 1.710	1.1850	1.0	1.8	21.66	1091	97	84
2 x 16 rm	19 / 1.040	1.1850	1.0	1.8	21.80	1096	97	84
2 x 25 rm	7 / 2.140	0.7505	1.2	2.0	26.18	1564	125	110
2 x 25 rm	19 / 1.300	0.7505	1.2	2.0	26.40	1567	125	110
2 x 35 rm	19 / 1.530	0.5446	1.2	2.0	28.70	1920	150	140
2 x 50 rm	19 / 1.830	0.5446	1.4	2.0	33.30	2765	175	167

Three Core

Cross Section	No. and approximate Diameter of wires	D.C Resistance of each core at 30°C (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 1.5 re	1 / 1.380	12.5779	0.8	1.8	14.94	461	22	16
3 x 2.5 re	1 / 1.780	7.5675	0.9	1.8	16.23	556	30	23
3 x 4 rm	7 / 0.850	4.7401	1.0	1.8	18.33	710	38	32
3 x 6 rm	7 / 1.050	3.1496	1.0	1.8	19.60	835	48	41
3 x 10 rm	7 / 1.350	1.8814	1.0	1.8	21.60	1051	64	56
3 x 16 rm	7 / 1.710	1.1850	1.0	1.8	23.60	1360	83	75
3 x 25 rm	7 / 2.140	0.7505	1.2	2.0	27.60	1887	110	98
3 x 35 sm	20 - wire	0.5446	1.2	2.0	24.60	1833	130	120
3 x 50 sm	20 - wire	0.4022	1.4	2.0	27.90	2417	155	150
3 x 70 sm	20 - wire	0.2785	1.4	2.0	30.70	3084	190	190
3 x 95 sm	20 - wire	0.2006	1.6	2.2	36.00	4378	225	230
3 x 120 sm	20 - wire	0.1590	1.6	2.2	38.60	5223	260	270
3 x 150 sm	39 - wire	0.1288	1.8	2.2	42.20	6345	295	305
3 x 185 sm	39 - wire	0.1030	2.0	2.6	46.90	7686	330	350
3 x 240 sm	39 - wire	0.0783	2.2	2.6	52.60	9964	385	410
3 x 300 sm	39 - wire	0.0624	2.4	3.0	58.60	12219	425	470

* Current rating are valid when all the cores of the cable carry current and the cable is laid under normal conditions as detailed at page 34.



TABLE: 14 Contd.

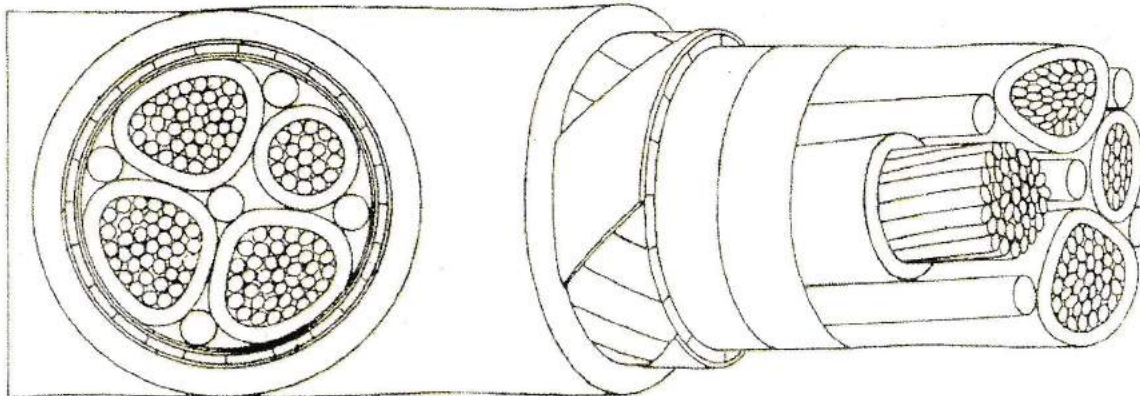
Cross Section	No. and approximate Diameter of wires	D.C Resistance of each core at 20°C (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
2 x 10 rm	7 / 1.350	1.8814	1.0	1.8	19.50	846	74	62
2 x 16 rm	7 / 1.710	1.1850	1.0	1.8	21.66	1091	97	84
2 x 16 rm	19 / 1.040	1.1850	1.0	1.8	21.80	1096	97	84
2 x 25 rm	7 / 2.140	0.7505	1.2	2.0	26.18	1564	125	110
2 x 25 rm	19 / 1.300	0.7505	1.2	2.0	26.40	1567	125	110
2 x 35 rm	19 / 1.530	0.5446	1.2	2.0	28.70	1920	150	140
2 x 50 rm	19 / 1.830	0.5446	1.4	2.0	33.30	2765	175	167

Three Core

Cross Section	No. and approximate Diameter of wires	D.C Resistance of each core at 30°C (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 1.5 re	1 / 1.380	12.5779	0.8	1.8	14.94	461	22	16
3 x 2.5 re	1 / 1.780	7.5675	0.9	1.8	16.23	556	30	23
3 x 4 rm	7 / 0.850	4.7401	1.0	1.8	18.33	710	38	32
3 x 6 rm	7 / 1.050	3.1496	1.0	1.8	19.60	835	48	41
3 x 10 rm	7 / 1.350	1.8814	1.0	1.8	21.60	1051	64	56
3 x 16 rm	7 / 1.710	1.1850	1.0	1.8	23.60	1360	83	75
3 x 25 rm	7 / 2.140	0.7505	1.2	2.0	27.60	1887	110	98
3 x 35 sm	20 - wire	0.5446	1.2	2.0	24.60	1833	130	120
3 x 50 sm	20 - wire	0.4022	1.4	2.0	27.90	2417	155	150
3 x 70 sm	20 - wire	0.2785	1.4	2.0	30.70	3084	190	190
3 x 95 sm	20 - wire	0.2006	1.6	2.2	36.00	4378	225	230
3 x 120 sm	20 - wire	0.1590	1.6	2.2	38.60	5223	260	270
3 x 150 sm	39 - wire	0.1288	1.8	2.2	42.20	6345	295	305
3 x 185 sm	39 - wire	0.1030	2.0	2.6	46.90	7686	330	350
3 x 240 sm	39 - wire	0.0783	2.2	2.6	52.60	9964	385	410
3 x 300 sm	39 - wire	0.0624	2.4	3.0	58.60	12219	425	470

* Current rating are valid when all the cores of the cable carry current and the cable is laid under normal conditions as detailed at page 34.

TABLE: 14 Contd.



Three and half Core

Cross Section **	No. and approximate Diameter of wires	D.C. resistance at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 25 sm / 16 rm	7 / 2.14	0.7505	1.2	2.0	28.9	2143	110	98
	7 / 1.71	1.1850	1.0					
3 x 35 sm / 16 rm	20 - wire	0.5446	1.2	2.0	28.4	2147	130	120
	7 / 1.71	1.1850	1.0					
3 x 50 sm / 25 rm	20 - wire	0.4022	1.4	2.0	33.3	3113	155	150
	7 / 2.14	0.7505	1.2					
3 x 70 sm / 35 rm	20 - wire	0.2785	1.4	2.2	37.1	4006	190	190
	7 / 2.53	0.5446	1.2					
3 x 95 sm / 50 rm	20 - wire	0.2006	1.6	2.2	42.9	5192	225	230
	19 / 1.83	0.4022	1.4					
3 x 120 sm / 70 rm	39 - wire	0.1590	1.6	2.2	45.2	6300	260	270
	19 / 2.17	0.2785	1.4					
3 x 150 sm / 70 rm	39 - wire	0.1288	1.8	2.6	50.4	7499	295	305
	19 / 2.17	0.2785	1.4					
3 x 185 sm / 95 rm	39 - wire	0.1030	2.0	2.6	57.3	9536	330	350
	19 / 2.52	0.2006	1.6					
3 x 240 sm / 120 rm	39 - wire	0.0783	2.2	3.0	64.6	12045	383	410
	37 / 2.03	0.1590	1.6					
3 x 300 sm / 150 rm	39 - wire	0.0624	2.4	3.0	71.4	14655	425	470
	37 / 2.27	0.1288	1.8					

**TABLE: 14 Contd.**

Cross Section	No. and approximate Diameter of wires	D.C. resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps

Four Core **

4 x 16	mm	7 / 1.71	1.1850	1.0	2.0	25.9	1630	83	75
4 x 25	mm	7 / 2.14	0.7505	1.2	2.0	29.8	2272	110	98
4 x 35	sm	20 - wire	0.5446	1.2	2.0	28.4	2311	130	120
4 x 50	sm	20 - wire	0.4022	1.4	2.0	33.3	3375	155	150
4 x 70	sm	20 - wire	0.2785	1.4	2.2	37.1	4313	190	190
4 x 95	sm	20 - wire	0.2006	1.6	2.2	42.9	5604	225	230
4 x 120	sm	39 - wire	0.1590	1.6	2.2	45.2	7600	260	270
4 x 150	sm	39 - wire	0.1288	1.8	2.6	50.4	8222	295	305
4 x 185	sm	39 - wire	0.1030	2.0	2.6	57.3	10319	330	350
4 x 240	sm	39 - wire	0.0783	2.2	3.0	64.6	13117	385	410
4 x 300	sm	39 - wire	0.0624	2.4	3.4	71.4	15978	425	470

* Current rating are valid for the cable laid under normal conditions as detailed at page 34.

** Three and four core cables of smaller cross-section other than tabulated here are also manufactured on demand.

TABLE: 15**600/1000 Volts**

Type : NYFGbY-I / NYRGbY-I

as per VDE 0271/3.69 & BDS 901 ; 2010, BDS IEC 60502 (Part-1)

Specification

Plain annealed Copper Conductor, PVC insulated, multi cores laid up, bedded with PVC or tape, Flat / Round wire armouring with helical steel taping and PVC sheathed. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 720/1200 volts.

Colour of sheath : Black

Multicore ***

Cross Section **	No. and approximate Diameter of wires	D.C Resistance of each core at 20 ^o c (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30 ^o C ambient temp. underground	35 ^o C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	Kg/Km	amps	amps
10 x 1.5 re	1 / 1.38	12.10	0.8	1.8	18.32	641	13	10
12 x 1.5 re	1 / 1.38	12.10	0.8	1.8	19.04	730	12	9



TABLE: 15 Contd.

Cross Section	No. and approximate Diameter of wires	D.C Resistance of each core at 20°C (maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	Amps	Amps
14 x 1.5 re	1 / 1.38	12.10	0.8	1.8	19.54	764	12	9
16 x 1.5 re	1 / 1.38	12.10	0.8	1.8	20.40	843	11	8
20 x 1.5 re	1 / 1.38	12.10	0.8	1.8	21.70	993	9	7
27 x 1.5 re	1 / 1.38	12.10	0.8	2.0	25.18	1236	9	7
7 x 2.5 re	1 / 1.78	7.28	0.9	1.8	17.14	632	21	17
12 x 2.5 re	1 / 1.78	7.28	0.9	1.8	21.29	925	16	13
19 x 2.5 re	1 / 1.78	7.28	0.9	2.0	24.70	1261	13	10
27 x 2.5 re	1 / 1.78	7.28	0.9	2.0	28.85	1658	11	8
37 x 2.5 re	1 / 1.78	7.28	0.9	2.0	32.66	2327	10	7
5 x 1.5 rm	7 / 0.56	12.10	0.8	1.8	16.50	519	18	13
7 x 1.5 rm	7 / 0.56	12.10	0.8	1.8	17.50	606	16	12
10 x 1.5 rm	7 / 0.56	12.10	0.8	1.8	20.60	776	13	10
12 x 1.5 rm	7 / 0.56	12.10	0.8	1.8	21.30	833	12	9
16 x 1.5 rm	7 / 0.56	12.10	0.8	1.8	23.10	978	11	8
21 x 1.5 rm	7 / 0.56	12.10	0.8	2.0	25.30	1194	9	7
5 x 2.5 rm	7 / 0.67	7.28	0.9	1.8	18.10	630	24	19
7 x 2.5 rm	7 / 0.67	7.28	0.9	1.8	19.10	742	21	17
10 x 2.5 rm	7 / 0.67	7.28	0.9	1.8	23.10	987	18	14
12 x 2.5 rm	7 / 0.67	7.28	0.9	2.0	24.20	1108	16	13
16 x 2.5 rm	7 / 0.67	7.28	0.9	2.0	26.20	1290	14	11
21 x 2.5 rm	7 / 0.67	7.28	0.9	2.0	28.20	1555	13	10
12 x 4.0 rm	7 / 0.85	4.56	1.0	2.0	26.70	1360	21	17

* Current rating are valid when all the cores of the cable carry current and the cable is laid under normal conditions as detailed at page 34.

** Control cables of higher cross-sections are also manufactured on demand.

*** Control cables having any number of cores upto 169 can be manufactured on demand.



TABLE: 16

600/1000 Volts

Type : **NYCY** as per VDE 0271/3.69 & BDS 901 ; 2010, BDS IEC 60502 (Part-1)

Specification

Plain annealed Copper Conductor, PVC insulated, three cores laid up, concentric neutral or protective conductor or annealed copper screening over common covering of cores and PVC sheathed.

Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 720/1200 volts.

Colour of sheath : Black

Three and half Core (half core as concentric conductor)

Cross Section	No. and approximate Diameter of wires	D.C. Resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 25 sm / 16c	7 / 2.14	0.7505	1.2	2.0	27.6	1560	110	98
	80 / 0.5	1.1850						
3 x 35 sm / 16c	20 - wire	0.5446	1.2	2.0	24.1	1545	130	120
	80 / 0.5	1.1850						

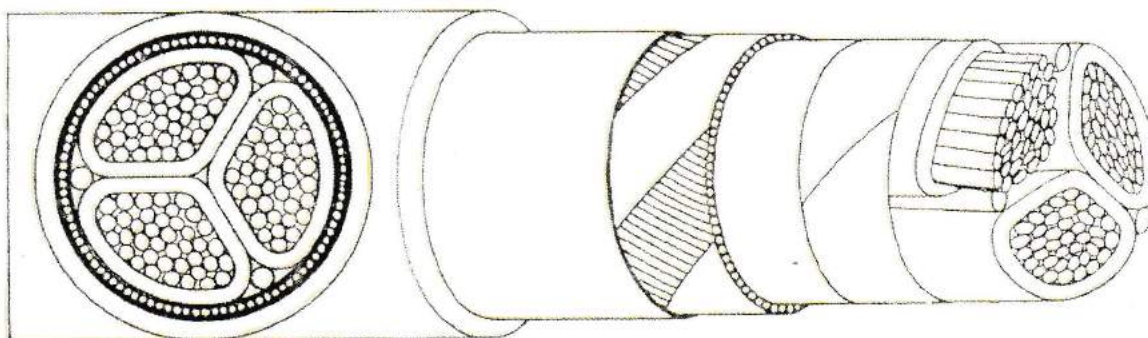




TABLE: 16 Contd.

Cross Section	No. and approximate Diameter of wires	D.C. resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 50 sm / 25c	20 - wire 50 / 0.8	0.4022 0.7505	1.4	2.0	28.9	2146	155	150
3 x 70 sm / 35c	20 - wire 70 / 0.8	0.2785 0.5446	1.4	2.0	31.1	2855	190	190
3 x 95 sm / 50c	20 - wire 59 / 1.05	0.2006 0.4022	1.6	2.2	36.0	3886	225	230
3 x 120 sm / 70c	39 - wire 71 / 1.13	0.1590 0.2785	1.6	2.2	38.6	4862	260	270
3 x 150 sm / 70c	39 - wire 71 / 1.13	0.1288 0.2785	1.8	2.2	42.6	5837	295	305
3 x 185 sm / 95c	39 - wire 67 / 1.35	0.1030 0.2006	2.0	2.6	47.6	7372	330	350
3 x 240 sm / 120c	39 - wire 67 / 1.53	0.0783 0.1590	2.2	2.6	52.6	9377	385	410
3 x 300 sm / 150c	39 - wire 80 / 1.56	0.0624 0.1288	2.4	3.0	58.4	11701	425	470

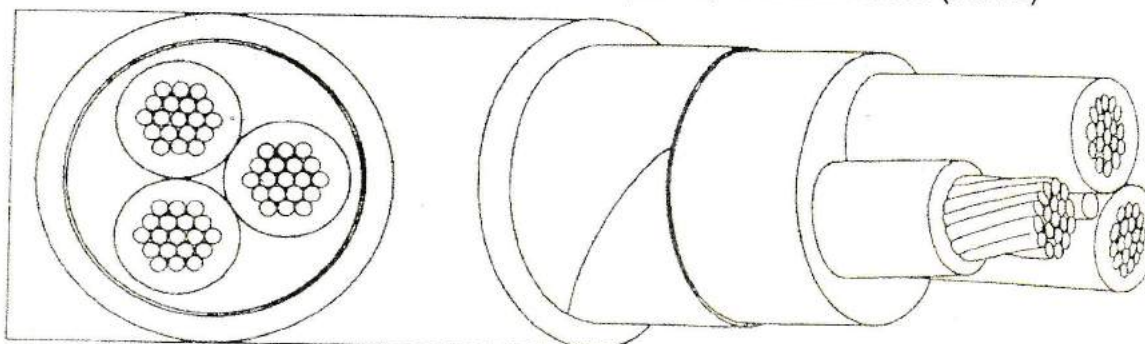
* Current ratings are valid for cable laid under normal conditions as detailed at page 34.



TABLE: 17

3500/6000 Volts

Type : **NYSY** as per VDE 0271/3.69 & BDS 901 ; 2010, BDS IEC 60502 (Part-2)



Specification

Plain annealed Copper Conductor, PVC insulated, three cores laid up, Copper shield over common covering of cores and PVC sheathed.

Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 4200/7200 volts.

Colour of sheath : Red

Three Core

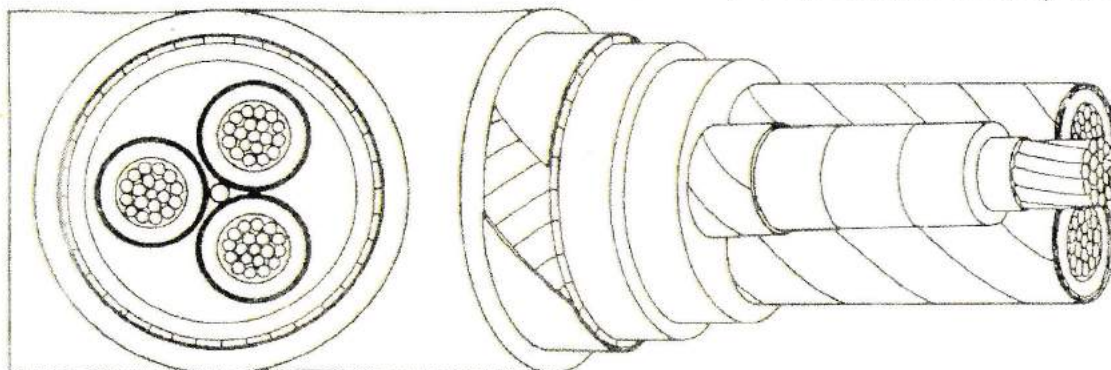
Cross Section	No. and approximate Diameter of wires	D.C. Resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 16 rm	7 / 1.71	1.1850	3.4	2.0	33.1	1715	82	80
3 x 25 rm	7 / 2.14	0.7505	3.4	2.2	36.2	2184	105	105
3 x 35 rm	19 / 1.53	0.5446	3.4	2.2	38.9	2635	125	125
3 x 50 rm	19 / 1.83	0.4022	3.4	2.2	42.2	3286	145	155
3 x 70 rm	19 / 2.17	0.2785	3.4	2.6	47.2	4287	180	190
3 x 95 rm	19 / 2.52	0.2006	3.4	2.6	51.0	5278	215	235
3 x 120 rm	37 / 2.03	0.1590	3.4	2.6	54.9	6326	245	270
3 x 150 rm	37 / 2.27	0.1288	3.4	3.0	59.3	7598	275	305
3 x 185 rm	37 / 2.52	0.1030	3.4	3.0	63.1	8910	305	350
3 x 240 rm	61 / 2.24	0.0783	3.4	3.4	69.7	11249	350	405
3 x 300 rm	61 / 2.50	0.0624	3.4	3.4	74.8	13446	390	460

* Current rating are valid for cable laid under normal conditions as detailed at page 34.

TABLE: 18

6350/11000 Volts

Type : **NYSEYFGbY** as per VDE 0271/3.69 & BDS 901 ; 2010, BDS IEC 60502 (Part-2)



Specification

Plain annealed Copper Conductor, PVC insulated, filed limiting conducting layers ove each conductor and each core insulation, concentric shield of copper over individual cores, three cores laid up, PVC bedded, Flat wire armouring with helical steel taping and PVC sheathed. Suitable for use in indoors, outdoors, underground and in water for continuous permissible service voltage of 7000/12000 volts.
Colour of sheath : Red

Three Core

Cross Section	No. and approximate Diameter of wires	D.C Resistance of each core at 30°C (Maximum)	Nominal thickness of Insulation	Nominal thickness of Sheath	Approx. outer diameter	Approx. Weight	* Current rating	
							30°C ambient temp. underground	35°C ambient temp. in air
mm ²	No/mm	ohm/km	mm	mm	mm	kg/km	amps	amps
3 x 16	rm 7 / 1.71	1.1850	4.0	2.6	49.0	4362	79	79
3 x 25	rm 7 / 2.14	0.7505	4.0	2.6	52.0	5003	100	100
3 x 35	rm 19 / 1.53	0.5446	4.0	2.6	55.0	5716	120	120
3 x 50	rm 19 / 1.83	0.4022	4.0	3.0	59.0	6690	140	145
3 x 70	rm 19 / 2.17	0.2785	4.0	3.0	63.0	7800	170	180
3 x 95	rm 19 / 2.52	0.2006	4.0	3.0	67.0	9231	200	220
3 x 120	rm 37 / 2.03	0.1590	4.0	3.4	72.0	10557	230	250
3 x 150	rm 37 / 2.27	0.1288	4.0	3.4	76.0	12021	260	290
3 x 185	rm 37 / 2.52	0.1030	4.0	3.8	81.0	13888	290	325

* Current ratings are valid for cable laid under normal conditions as detailed at page 34.



CURRENT CARRYING CAPACITY OF CABLES MADE ACCORDING TO VDE 0271 / 3.69 & BDS 901 : 2010

1. General

The current carrying capacity of a cable depends on the maximum permissible conductor temperature, thermal resistivity of the materials from the conductor to the outer sheath surface and the ambient conditions which affect the dissipation of heat from the cable surface. At no point of the cable the maximum conductor temperature (ambient temperature + temperature rise caused by the loading current) is permitted to exceed :

70⁰ C - for PVC insulated cables with E/E₀ upto 6/3.5 kV

65⁰ C - for PVC insulated cables with E/E₀ upto 10/5.8 kV

For a given cable design the inner thermal resistance of the materials between conductor and cable surface is definite and constant. On the contrary, the external thermal resistance surrounding the cable along its way, hence, the external dissipation is dependent on several variable factors as follows:

- a) Thermal resistivity of the soil which depends on the nature of the soil and moisture content.
- b) The variation of thermal resistivity along the cable path for different earth conditions, such as, filled up earth, trenches etc.
- c) The increase of thermal resistivity by the drying of the soil due to continuous full loading of the cable and due to grouping of cables.
- d) Reduced heat dissipation owing to air pockets which may be enclosed under protective covers, in channels, in pipes or in ducts.
- e) Heating of cable due to grouping of cables, proximity of heating pipes or direct sunrays.
- f) Smaller heat dissipation of cables installed free in air.

In order to determine correctly the above conditions the correct measurement of thermal resistivity of earth or air and the ambient temperature along the cable path are to be determined for one complete cycle of the seasons of a year.

2. Normal Conditions

The basis of the current ratings (in tables 15 to 20) has been so chosen that they, without considering any multiplication factor, are suitable for cables laid in our country under the following normal conditions :

A. Cables in Ground :

- i) Temperature of the soil at the depth of laying = 30⁰ C
- ii) Depth of laying = 70 cm.
- iii) Cable way is covered with layers of sand and brick.
- iv) Thermal resistivity of the soil at continuous full loading of the cable = 120⁰C. cm/W.



- v) One single core d. c. cable installed separately, or, one multicore cable installed separately, or, three single core cables in three phase system installed in flat formation with clearance of 7 cm, or in trefoil formation, touching each other.
- vi) The cable way is through a pipe of length not more than 6 meters.

B. Cable in Air :

- i) Ambient air temperature = 35°C
- ii) One single core d. c. cable installed separately free in air, or, one multicore cable installed separately free in air, or, one three phase system, comprising three single core cables, installed separately free in air in flat formation with a clearance of one diameter between individual single-core cables or in trefoil formation each individual single-core cable being in touch with each other.
- iii) One single core d. c. cable, one multicore cable or one three phase system of three single-core cables installed free in air with minimum clearance of -
- 2 cm from floor, wal or roof of the room,
 - twich the cable diameter between two cables and four times the cable diameter between two systems.
 - 30 cm vertically between layers installed one above the other.
- iv) Cable is protected against radiation of heat from sun or any other source.

3. Deviated Conditions

It the actual conditions of cable laying are not same as normal conditions, the current rating value of cables shown in the Tables 15 to 20 are to be multiplied with rating factors given in the following tables :

Variation of Thermal Resistivity of Soil

TABLE : 19

Factors for variation of Specific Thermal Resistivity of Soil for Cables made as per VDE 0271/3.69

Specific thermal resitivity of soil. in $^{\circ}\text{C. cm/W.}$	70	100	120	150	200	250	300
Cross-sectional area of conductors in mm^2	Factor A						
upto 25	1.18	1.07	1	0.93	0.83	0.77	0.77
from 35 upto 95	1.22	1.08	1	0.93	0.82	0.75	0.69
from 120 upto 240	1.23	1.08	1	0.92	0.82	0.74	0.68
from 300 upto 500	1.25	1.09	1	0.93	0.82	0.74	0.69

**TABLE : 20**

Specific thermal resistivity of soil, in $^{\circ}\text{C} \cdot \text{cm/W}$.		70	100	120	150	200	250	300
Type	Voltage E/Eo KV	Factor A						
3 and 4 Core cable	1 / 0.6	1	1	1	1	1	1	1
Twin Core cable	1 / 0.6	0.97	0.99	1	1	1.01	1.01	1.02
Singel core D.C.	1 / 0.6	0.97	0.99	1	1	1.01	1.01	1.02
3 core cable with each core shielded	6 / 3.5							
	10 / 5.8	0.96	0.99	1	1.01	1.02	1.03	1.04
3 unarmoured single core cable	1 / 0.6							
	6 / 3.5	1.01	1	1	0.98	0.97	0.97	0.96
	10 / 5.8							

For variation of Specific Thermal Resistivity of Soil from $12^{\circ}\text{C} \cdot \text{cm/W}$, The current rating values in Tables 15 to 20 are to be multiplied by both the factor A (cross-sectional area) and factor B (Type and voltage) to obtain the actual rating.

Variation of Ambient temperature

TABLE : 21

Rating Factors for Variation of Ambient Temperature for Cables laid Free in Air

Ambient Temperature $^{\circ}\text{C}$	25	30	35	40
Cable with Eo 0.6 & 3.5 kV	1.13	1.06	1.00	0.93
Cable with Eo 5.8 kV	1.15	1.08	1.00	0.91

TABLE : 22

Factors for Variation of Ambient Temperature for Cables laid Underground

Ambient Temperature $^{\circ}\text{C}$	15	20	25	30	35	40
Cable with E/Eo upto 6/3.5 kV	1.18	1.12	1.07	1.00	0.95	0.87
Cable with E/Eo 10/5.8 kV	1.19	1.14	1.07	1.00	0.93	0.85

Grouping in the Ground

TABLE : 23

Group Rating Factors for Multicore Cables and Single-core D.C. Cables in the Ground

Number of cables in the trench	2	3	4	5	6	8	10
Cables laid direct in the Ground in flat formation, clearance 7 cm (thickness of a brick) between cables	0.85	0.75	0.68	0.64	0.60	0.56	0.53

**TABLE : 24**

Group Rating Factors for Single-core Cables in Three-phase System in the Ground

Number of system in the trench	2	3	4
Cables laid direct in the Ground in flat formation, clearance 7 cm between systems and also between individual cables in each system	0.82	0.74	0.68
Cables laid direct in the ground in trefoil formation, touching each other, clearance 25 cm between systems	0.85	0.77	0.72

Grouping in Air

TABLE : 25

Group Rating Factors * for Multicore Cables or Single-core D.C. Cables in air

Arrangement of Cables		Clearance one diameter between adjacent cables and distance from the wall not less than 2 cm					Cables touching each other & in contact with the wall				
Number of adjacently laid cables		1	2	3	6	9	1	2	3	6	9
Cables laid on ground in flat information		0.95	0.90	0.88	0.85	0.84	0.90	0.84	0.80	0.75	0.73
	Number of troughs **										
Cables laid on troughs (air circulation restricted) in flat formation	1	0.95	0.90	0.88	0.85	0.84	0.90	0.84	0.80	0.75	0.73
	2	0.90	0.85	0.83	0.81	0.80	0.95	0.80	0.76	0.71	0.69
	3	0.88	0.83	0.81	0.79	0.78	0.95	0.78	0.74	0.70	0.68
	6	0.86	0.81	0.79	0.77	0.76	0.95	0.76	0.72	0.68	0.66
	Number of racks **										
Cables laid on racks in flat formation	1	1.00	0.98	0.96	0.93	0.92	0.95	0.84	0.80	0.75	0.73
	2	1.00	0.95	0.93	0.90	0.89	0.95	0.80	0.78	0.71	0.69
	3	1.00	0.94	0.92	0.89	0.99	0.95	0.78	0.77	0.70	0.68
	6	1.00	0.93	0.90	0.78	0.86	0.95	0.76	0.72	0.68	0.66
		1	2	3	6	9	1	2	3	6	9
Cables arranged vertically on structures or on wall		1	0.93	0.90	0.87	0.86	0.95	0.78	0.73	0.68	0.66

* These factors are valid only when the ambient temperature is not increased appreciably by the heat generated by the loaded cables.

** The vertical distance from one trough or rack to another is 30 cm.



Grouping in Air (Contd.)

TABLE : 26

Group Rating Factors * for Single-Core Cables in Three-phase Systems in air

Arrangement of Cables		Clearance one diameter between adjacent cables and adjacent systems & distance from the wall not less than 2 cm			Cables in trefoil formation clearance 2 x diameter between systems and distance from the wall not less than 2 cm.		
Number of adjacently laid systems		1	2	3	1	2	3
Cables laid on ground in flat information		0.92	0.89	0.88	0.95	0.90	0.88
	Number of troughs **						
Cables laid on troughs (air circulation restricted) in flat formation	1	0.92	0.89	0.88	0.95	0.90	0.88
	2	0.87	0.84	0.83	0.90	0.85	0.83
	3	0.84	0.82	0.81	0.88	0.83	0.81
	6	0.82	0.80	0.79	0.86	0.81	0.79
	Number of racks **						
Cables laid on racks in flat formation	1	1.00	0.97	0.96	1.00	0.98	0.96
	2	0.97	0.94	0.93	1.00	0.95	0.93
	3	0.96	0.93	0.92	1.00	0.94	0.92
	6	0.94	0.91	0.90	1.00	0.93	0.90
Number of cables laid one above another		1	2	3	-	-	-
Cables arranged vertically on structures or on walls		0.94	0.91	0.89	-	-	-
Cables arranged vertically on structures or on walls touching them		0.89	0.86	0.84	-	-	-

* These factors are valid only when the ambient temperature is not increased appreciably by the heat generated by the loaded cables.

** The vertical distance from one trough or rack to another is 30 cm.



Cables under Protective Covers

TABLE : 27

Rating Factors for Cables in Ground under Protective Covers

Condition of Laying	Cables laid direct in the ground and covered with protective covers for cables	Cables laid direct in the ground, covered with protective covers & the space between cable and cover well filled with sand
Rating factors	0.80	0.90

Cables in Trench, Pipes and Pipe Blocks

In these cases the current rating factors may vary very widely. The permissible values of rating factors for individual cases are to be determined separately by special arrangements.

An example to calculate Current Rating at Deviated Conditions

Three cables of the type NYY 4 x 95 sm, 600/1000 v. laid direct in the ground at 70 cm depth and covered with protective covers, clearance 7 cm between cables, thermal resistivity of the soil at continuous load 100°C cm/W and the ambient temperature in ground 25°C . To find the actual permissible current carrying capacity of the cables.

Current rating of the cable in the ground under normal conditions according to Table 15 = 230 amp

Rating factors :

For grouping of three cables according to Table 25 = 0.75

For cables under protective cover, according to Table 29 = 0.8

For lower thermal resistivity of soil, according to Table 22 = 1.08×1

For lower ambient temperature, according to Table 24 = 1.07

Therefore, the permissible current rating of each of the three cables

$$= 230 \times 0.75 \times 0.8 \times 1.08 \times 1 \times 1.07 = 159 \text{ amp}$$

**TABLE: 28****600/1000 Volts****Type : Service Drop Cables****Specification**

PVC insulated cores stranded service Cable with Copper Conductor. The wires of one core shall be hard drawn and that of balance core/cores shall be plain annealed.

**a) Duplex Cables**

Cross Section	No. and approximate Diameter of wires	D. C Resistance of each core at 20°C (Maximum)	Nominal thickness of Insulation	Cable diameter	Approximate Weight	Current Rating at 35°C ambient temp.
mm ²	No/mm	ohm/Km	mm	mm	Kg/Km	Amps
2.5 re / 2.5 re	1.78 / 1.78	7.280	1.60	9.96	92.80	27
4 rm / 4 re	7 x 0.85 / 2.26	4.560	1.60	11.70	131.50	35
4 rm / 4 rm	7 x 0.85 / 7 x 0.85	4.560	1.60	12.00	138.00	35
6 rm / 6 re	7 x 1.05 / 2.77	3.030	1.60	12.30	176.00	45
6 rm / 6 rm	7 x 1.05 / 7 x 1.05	3.030	1.60	12.70	181.00	45
10 rm / 10 rm	7 x 1.35 / 7 x 1.35	1.810	1.60	14.50	266.00	62
16 rm / 16 rm	7 x 1.71 / 7 x 1.71	1.140	1.60	16.60	393.00	84
25 rm / 25 rm	7 x 2.14 / 7 x 2.14	0.722	1.60	19.20	589.00	110

b) Quadruplex Cables

Cross Section	No. and approximate Diameter of wires	D. C Resistance of each core at 20°C (Maximum)	Nominal thickness of Insulation	Cable diameter	Approximate Weight	Current Rating at 35°C ambient temp.
mm ²	No/mm	ohm/Km	mm	mm	Kg/Km	Amps
3 x 4 rm / 4 re	7 x 0.85 / 2.26	4.560	1.60	15.00	275.00	32
3 x 4 rm / 4 rm	7 x 0.85 / 7 x 0.85	4.560	1.60	15.05	280.00	32
3 x 4 rm / 6 re	7 x 0.85 / 2.77	4.560	1.60	15.20	290.00	32
3 x 4 rm / 6 rm	7 x 0.85 / 7 x 1.05	4.560	1.60	15.50	295.00	32
3 x 6 rm / 6 rm	7 x 1.05 / 7 x 1.05	3.030	1.60	16.00	370.00	41
3 x 10 rm / 10 rm	7 x 1.35 / 7 x 1.35	1.810	1.60	18.50	535.00	56
3 x 16 rm / 16 rm	7 x 1.71 / 7 x 1.71	1.140	1.60	21.00	792.00	75
3 x 25 rm / 25 rm	7 x 2.14 / 7 x 2.14	0.722	1.60	24.40	1168.00	98

**TABLE: 29****600 / 1000 Volts**Type : **NYAB****Specification**

PVC insulated plain annealed flexible Stranded Copper Conductor, Permissible Service Voltage is 690 / 1150 Volts.

Colour insulation : Black

Cross Section	No. & Approx. dia. of wires	Thickness of Insulation	Approx. Outer dia	Approx. Wt.	D.C. Resistance at 20°C (Maximum)	Current Rating at 35°C ambient temp.
mm ²	No/mm	mm	mm	Kg/Km	ohm/km	amps
1 x 0.75 rm	7 / 0.40	0.80	2.40	12.00	24.000	--
1 x 4 rm	19 / 0.53	1.00	4.60	43.00	4.470	041
1 x 6 rm	19 / 0.65	1.00	5.30	75.00	2.920	052
1 x 10 rm	49 / 0.55	1.20	7.20	122.00	1.770	072
1 x 16 rm	49 / 0.63	1.20	8.40	191.00	1.120	098
1 x 25 rm	84 / 0.62	1.40	10.80	300.00	0.708	131
1 x 35 rm	133 / 0.59	1.40	12.00	396.00	0.514	167
1 x 50 rm	133 / 0.70	1.60	14.50	572.00	0.379	204
1 x 70 rm	189 / 0.70	1.60	16.50	748.00	0.262	256
1 x 95 rm	259 / 0.70	1.80	19.50	1015.00	0.189	314
1 x 120 rm	336 / 0.68	1.80	21.00	1255.00	0.150	366
1 x 150 rm	392 / 0.70	2.00	23.50	1560.00	0.122	423

TABLE: 30**200 Volts**Type : **Welding Cable****Specification**

Plain annealed flexible Stranded Copper Conductor Covering with PVC tape or Cotton tape and PVC sheathed.

Colour of sheath : Black

Cross Section	No. & Approx. dia. of wires	Thickness of tape	Thickness of sheath	Approx. Outer dia	Approx. Wt.	D.C. Resistance at 20°C (Maximum)	Current Rating at maximum duty cycle of 60%
mm ²	No/mm	mm	mm	mm	Kg/Km	ohm/km	Amp
1 x 25 mm	168 x 0.44	0.10	2.0	12.30	326.0	0.708	169
1 x 35 rm	228 x 0.44	0.10	2.0	13.40	430.0	0.514	215
1 x 50 rm	323 x 0.44	0.10	2.0	15.30	575.0	0.379	264
1 x 70 rm	456 x 0.44	0.10	2.2	18.00	779.0	0.262	330
1 x 95 rm	627 x 0.44	0.10	2.2	19.70	935.0	0.189	405
1 x 120 rm	814 x 0.44	0.10	2.2	23.20	1297.0	0.150	473
1 x 185 rm	1220 x 0.44	0.10	2.2	25.57	1941.0	0.0972	620



TABLE: 31
600 / 1000 Volts
Type : NYYF

Specification

Plain Annealed flexible Stranded Copper Conductor, PVC insulated single, twin, three & four core laid up, filled with PVC or rubber where necessary and PVC sheathed, for permissible service Voltage of 720/1200 Volts.

Colour of sheath : Black

Single Core :

Cross Section	No. & Approx. dia. of wires	Thickness of Insulation	Thickness of sheath	Approx. Outer diameter	Approx. Wt.	D.C. resistance at 20°C (Maximum)	Current Rating at 35°C ambient temp.
mm ²	No/mm	mm	mm	mm	Kg/Km	ohm/km	amps
1 x 4	rm 19 / 0.53	1.00	1.40	7.40	87.00	4.470	41
1 x 6	rm 19 / 0.65	1.00	1.40	8.10	116.00	2.920	52
1 x 10	rm 49 / 0.55	1.20	1.40	10.00	175.00	1.770	72
1 x 16	rm 49 / 0.65	1.20	1.40	11.20	252.00	1.120	98
1 x 25	rm 84 / 0.62	1.40	1.40	13.60	375.00	0.708	131
1 x 35	rm 133 / 0.59	1.40	1.40	14.80	480.00	0.514	167
1 x 50	rm 133 / 0.70	1.60	1.60	17.70	686.00	0.379	204
1 x 70	rm 189 / 0.70	1.60	1.60	19.70	876.00	0.262	256
1 x 95	rm 259 / 0.70	1.80	1.60	22.70	1164.00	0.189	314
1 x 120	rm 336 / 0.68	1.80	1.80	24.60	1437.00	0.150	366
1 x 150	rm 392 / 0.70	2.00	1.80	27.10	1844.00	0.122	423

Three Core :

1.5	rm	7 / 0.53	0.80	1.40	11.68	176.00	12.100	17
2.5	rm	7 / 0.69	0.90	1.40	11.95	220.00	7.280	24
4	rm	19 / 0.53	1.00	1.40	13.53	269.00	4.560	33
6	rm	19 / 0.65	1.00	1.60	15.44	408.00	3.030	43
10	rm	49 / 0.53	1.20	1.60	19.55	637.00	1.810	58
16	rm	49 / 0.65	1.20	1.60	22.94	955.00	1.440	78
25	rm	84 / 0.62	1.40	1.80	28.92	1494.00	0.722	102
35	rm	133 / 0.59	1.40	1.80	31.92	1909.00	0.524	125

Four Core :

1.5	rm	7 / 0.53	0.80	1.40	11.66	198.00	12.100	17
2.5	rm	7 / 0.69	0.90	1.40	13.12	266.00	7.280	24
4	rm	19 / 0.53	1.00	1.60	15.31	339.00	4.560	33
6	rm	19 / 0.65	1.00	1.60	17.00	498.00	3.030	43
10	rm	49 / 0.53	1.20	1.60	21.71	781.00	1.810	58
16	rm	49 / 0.65	1.20	1.60	25.46	1135.00	1.110	78
25	rm	84 / 0.62	1.40	1.80	32.16	1640.00	0.722	102
35	rm	133 / 0.59	1.40	1.80	35.52	2360.00	0.524	125

* Much flexible stranded cables may be produced as per demand.

**TABLE: 32****ALL ALUMINIUM STRANDED CONDUCTORS (AAC) :**

As per B. S. 215, Part-1 & BDS 1036 : 2006

Nominal Alu. Area	Code Name	Over all dia. of Conductor	Cross Sectional area of Conductor	No. & Dia of each Wire	Calculated Breaking Load (Minimum)	D. C Resistance at 20°C (Maximum)	Approx. Weight	Current Rating	
								at 60°C rise over 40°C ambient temp (100°C)	at 35°C rise over 40°C ambient temp (75°C)
mm ²		mm	mm ²	No/mm	Kg	Ohm/km	Kg / Km	Amps	Amps
22	MIDGE	6.18	23.33	7 / 2.06	407	1.2270	64	143	105
25	GNAT	6.63	26.85	7 / 2.21	468	1.0660	74	157	115
35	MOSQUITO	7.77	36.88	7 / 2.59	614	0.7762	101	192	140
40	LADY BIRD	8.37	42.80	7 / 2.79	698	0.6313	118	218	157
50	ANT	9.30	52.83	7 / 3.10	845	0.5419	145	242	174
60	FLY	10.20	63.55	7 / 3.40	1010	0.4505	174	273	196
70	BLUE BOTTLE	10.98	73.65	7 / 3.66	1156	0.3668	203	309	221
75	EARWIG	11.34	78.55	7 / 3.78	1218	0.3645	215	312	223
80	GRASS HOPPER	11.73	84.05	7 / 3.91	1302	0.3214	230	336	239
90	CLEGG	12.51	95.60	7 / 4.17	1482	0.2825	262	365	259
100	WASP	13.17	105.95	7 / 4.39	1632	0.2702	290	379	268
100	BEETLE	13.35	106.38	19 / 2.67	1776	0.2539	292	393	278
125	BEE	14.70	132.00	7 / 4.90	2033	0.2046	361	450	317
150	CIRCKET	16.08	157.95	7 / 5.36	2432	0.1710	433	505	354
150	HORNET	16.25	157.62	19 / 3.25	2621	0.1825	434	491	343
175	CATERPILLAR	17.65	185.95	19 / 3.53	2919	0.1452	508	564	392
200	CHAFER	18.90	213.22	19 / 3.78	3305	0.1349	587	597	414
250	COCKROACH	21.10	265.75	19 / 4.22	4120	0.1082	731	688	474
300	BUTTERFLY	23.25	322.66	19 / 4.65	4971	0.08916	888	780	533
350	DRONE	25.06	372.44	37 / 3.58	5842	0.07739	1021	846	575
400	CENTIPEDE	26.46	415.22	37 / 3.78	6435	0.06944	1145	907	613
450	MAYBUG	28.63	486.11	37 / 4.09	7528	0.05930	1341	1003	674
500	SCORPION	29.89	529.84	37 / 4.27	8172	0.05442	1461	1059	710
600	CICADA	32.55	628.34	37 / 4.65	9678	0.04590	1732	1179	785



TABLE: 33

ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR).

As per B. S. 215, Part-2 & BDS 1037 : 2003

Nominal Alu. Area	Code Name	Corss Sectional Area		No. & Dia of Wires		Over all dia. of Conductor	Calculated Breaking Load (Minimum)	D. C Resistance at 20°C (Maximum)	Approx. Weight			Current Rating	
		Conductor	Aluminium	Alu	Steel				Alu	Steel	Total	at 60°C rise over 40°C ambient temp (100°C)	at 35°C rise over 40°C ambient temp (75°C)
mm ²		mm	mm ²	No/mm	No/mm	Kg	Ohm/km	Kg / Km	Kg/Km	Kg/Km	Kg/Km	Amps	Amps
20	SQUIRREL	24.48	20.98	6 / 2.11	1 / 2.11	6.33	806	1.3680	58	27	85	136	100
25	GOPHER	30.62	26.24	6 / 2.36	1 / 2.36	7.08	980	1.0930	72	34	106	158	115
30	WEASEL	36.88	31.61	6 / 2.59	1 / 2.59	7.77	1168	0.9077	87	41	128	178	129
40	FERRET	49.48	42.41	6 / 3.00	1 / 3.00	9.00	1550	0.6766	117	55	172	215	155
50	RABBIT	61.70	52.88	6 / 3.35	1 / 3.35	10.05	1871	0.5426	145	69	214	247	178
60	MINK	73.65	63.12	6 / 3.66	1 / 3.66	10.98	2220	0.4546	173	82	255	277	198
60	SKUNK	100.10	63.22	12 / 2.59	7 / 2.59	12.95	5398	0.4566	174	290	464	290	206
70	HORSE	116.20	73.37	12 / 2.79	7 / 2.79	13.95	6241	0.3936	203	33.5	538	320	226
70	RACCOON	91.98	78.83	6 / 4.09	1 / 4.09	12.27	2759	0.3669	216	102	319	319	226
100	CAT	110.84	95.00	6 / 4.49	1 / 4.49	13.47	3472	0.3007	259	122	381	362	256
100	DOG	118.50	105.00	6 / 4.72	7 / 1.57	14.15	3335	0.2733	287	107	394	385	272
100	HARE	122.48	104.98	6 / 4.72	1 / 4.72	14.16	3836	0.2730	287	136	423	385	272
150	WOLF	194.90	158.10	30 / 2.59	7 / 2.59	18.13	7057	0.1828	436	290	726	503	350
150	DINGO	167.50	158.70	18 / 3.35	1 / 3.35	16.75	3640	0.1815	437	69	506	497	347
175	LYNX	226.20	183.40	30 / 2.79	7 / 2.79	19.53	8137	0.1576	505	337	842	554	383
175	CARACAL	194.50	184.30	18 / 3.61	1 / 3.61	18.05	4191	0.1563	507	80	587	547	380
200	PANTHER	261.50	212.10	30 / 3.00	7 / 3.00	21.00	9407	0.1363	586	388	974	608	419
200	JAGUAR	222.30	210.60	18 / 3.86	1 / 3.86	19.30	4747	0.1367	580	91	671	597	413
250	BEAR	326.12	264.42	30 / 3.35	7 / 3.35	23.45	11360	0.1093	728	486	1214	702	479
300	GOAT	400.00	324.30	30 / 3.71	7 / 3.71	25.97	13838	0.08912	893	596	1489	801	543
300	BATANG	338.60	323.01	18 / 4.78	7 / 1.68	24.16	7102	0.08914	890	122	1012	790	539
350	BISON	431.20	381.70	54 / 3.00	7 / 3.00	27.00	12308	0.07572	1053	390	1443	877	593
400	ZEBRA	484.50	428.90	54 / 3.18	7 / 3.18	28.62	13450	0.06740	1186	435	1621	945	636
450	ELK	588.46	477.13	30 / 4.50	7 / 4.50	31.50	20221	0.06059	1313	877	2190	1027	686
450	CAMEL	537.66	475.96	54 / 3.35	7 / 3.35	30.15	14909	0.06074	1314	486	1800	1011	677
500	MOOSE	597.00	528.48	54 / 3.53	7 / 3.53	31.77	16286	0.05480	1462	540	2002	1080	721



TABLE: 34

ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR).

As per ASTM B 232 & BDS 1037 : 2003

Nominal Alu. Area	Code Name	Corss Sectional Area		No. & Dia of Wires		Over all dia. of Conductor	Calculated Breaking Load (Minimum)	D. C Resistance at 20°C (Maximum)	Approx. Weight			Current Rating	
		Conductor	Aluminium	Alu	Steel				Alu	Steel	Total	at 60°C rise over 40°C ambient temp (100°C)	at 35°C rise over 40°C ambient temp (75°C)
AWG/MCM		mm ²	mm ²	No/mm	No/mm	mm	Kg	ohm/Km	Kg/Km	Kg/Km	Kg/Km	Amps	Amps
6	TURKEY	15.52	13.30	6 / 1.68	1 / 1.68	5.03	541	2.160	37	17	54	102	75
4	SWAN	24.71	21.18	6 / 2.12	1 / 2.12	6.35	847	1.350	57	28	85	137	101
3	SWALLOW	31.14	26.69	6 / 2.38	1 / 2.38	7.14	1014	1.074	73	35	108	159	116
2	SPARROW	39.19	33.59	6 / 2.67	1 / 2.67	8.03	1290	0.854	92	43	135	185	134
2	SPARATE	42.11	33.59	7 / 2.47	1 / 3.30	8.26	1649	0.854	92	67	159	186	135
1	ROBIN	49.48	42.41	6 / 3.00	1 / 3.00	9.00	1589	0.676	116	55	171	215	155
1/0	RAVEN	62.44	53.52	6 / 3.37	1 / 3.37	10.11	1984	0.536	146	70	216	249	179
2/0	QUAIL	78.55	67.33	6 / 3.78	1 / 3.78	11.34	2400	0.426	184	88	272	289	206
3/0	PIGEON	99.30	85.12	6 / 4.25	1 / 4.25	12.75	3000	0.337	232	110	342	336	239
4/0	PENGUIN	125.09	107.22	6 / 4.77	1 / 4.77	14.31	3780	0.268	294	139	433	390	275
266.8	WAXWING	142.48	134.98	18 / 3.09	1 / 3.09	15.45	3113	0.214	371	59	430	447	313
266.8	PARTRIDGE	156.86	134.87	26 / 2.57	7 / 2.00	16.28	5111	0.215	372	173	545	449	314
300.0	OSTRICH	176.90	152.19	26 / 2.73	7 / 2.12	17.28	5754	0.190	419	194	613	486	339
336.4	MERLIN	179.68	170.22	18 / 3.47	1 / 3.47	17.35	3926	0.169	469	74	543	520	362
336.4	LINNET	198.38	170.55	26 / 2.89	7 / 2.25	18.31	6418	0.170	470	217	687	523	363
336.4	ORIOLE	210.28	170.50	30 / 2.69	7 / 2.69	18.83	7881	0.170	471	312	783	528	366
397.5	CHICKADIL	212.09	200.93	18 / 3.77	1 / 3.77	18.85	4500	0.144	554	87	641	577	398
397.5	BRANT	227.68	201.56	24 / 3.27	7 / 2.18	19.61	6640	0.144	555	205	760	580	401
397.5	IBIS	234.07	201.34	26 / 3.14	7 / 2.44	19.88	7388	0.144	554	258	812	582	402
397.5	LARK	247.77	200.90	30 / 2.92	7 / 2.92	20.44	9229	0.145	556	370	926	585	403
477.0	PELICAN	255.77	242.30	18 / 4.14	1 / 4.14	20.70	5335	0.119	664	105	769	653	450
477.0	FLICKER	272.99	241.58	24 / 3.58	7 / 2.39	21.49	7809	0.120	666	248	914	652	448
477.0	HAWK	280.98	241.65	26 / 3.44	7 / 2.67	21.80	8855	0.120	666	309	975	655	450
477.0	HEN	297.57	241.27	30 / 3.20	7 / 3.20	22.40	10772	0.120	666	444	1110	661	453
556.5	OSPREY	298.17	282.47	18 / 4.47	1 / 4.47	22.35	6219	0.102	775	122	897	722	495
556.5	PARAKEET	318.90	282.31	24 / 3.87	7 / 2.58	23.22	9005	0.103	777	288	1065	720	492
556.5	DOVE	328.50	282.58	26 / 3.72	7 / 2.89	23.55	10286	0.103	778	360	1138	723	494
556.5	EAGLE	347.89	282.07	30 / 3.46	7 / 3.46	24.21	12594	0.103	778	518	1296	730	497
605.0	PEACOCK	345.92	306.13	24 / 4.03	7 / 2.69	24.20	9778	0.0946	846	313	1159	760	518
605.0	SQUAB	355.64	305.83	26 / 3.87	7 / 3.01	24.51	11030	0.0947	845	392	1237	763	519
636.0	GROSBEAK	374.70	321.90	26 / 3.97	7 / 3.09	25.15	11400	0.0900	892	412	1304	839	628



TABLE: 35

INSULATED ALUMINIUM STRANDED CONDUCTOR. (TYPE-8. AS PER B.S. 6485)



Code Name	Stranding Number/ Diameter of wires	Corss Sectional Area of Conductor	Weight of Bare Conductor	Diameter of Bare Conductor	Minimum thickness of insulation	Nominal overall diameter of insulated conductor	Calculated breaking load (minimum)	weight of insulated conductor
	number x mm	mm	kg/km	mm	mm	mm	kg	kg/km
MIDGE	7 X 2.06	23.32	65	6.18	0.80	7.78	407	95
GNAT	7 X 2.21	26.84	75	6.63	0.80	8.23	468	110
ANT	7 X 3.10	52.84	145	9.30	0.80	11.30	845	215
EARWIG	7 X 3.78	78.58	215	11.34	0.80	13.74	1218	315
WASP	7 X 4.39	106.00	290	13.17	0.80	15.17	1632	389

Other different types & sizes can also be produced as per demand.

TABLE: 36

PVC COVERED ALUMINIUM CONDUCTOR STEEL REINFORCED (ACSR).

As per B. S. 6485: Type : - 16 & BDS 1037; 2003

Nominal Alu. Area	Code Name	Corss Sectional Area		No. & Dia of Wires		Over all dia. of bare Conductor	Calculated Breaking Load (Minimum)	D. C Resistance at 20°C (Maximum)	Minimum thickness of Insulation			Current Rating at 30°C rise over 40°C ambient temp (70°C)
		Conductor	Aluminium	Alu	Steel							
mm ²		mm ²	mm ²	No/mm	No/mm	mm	Kg	Ohm/km	mm	mm	Kg/Km	Amps
25	GOPHER	30.62	26.24	6 / 2.36	1 / 2.36	7.08	980	1.0930	1.6	10.70	190	103
50	RABBIT	61.70	52.88	6 / 3.35	1 / 3.35	10.05	1871	0.5426	1.6	14.10	330	162
100	DOG	118.50	105.00	6 / 4.72	7 / 1.57	14.15	3335	0.2733	1.6	18.20	550	256
150	WOLF	194.90	158.10	30 / 2.59	7 / 2.59	18.13	7057	0.1828	1.6	22.20	920	342
15	DINGO	167.50	158.70	18 / 3.35	1 / 3.35	16.75	3640	0.1815	1.6	20.80	680	334
175	LYNX	226.20	183.40	30 / 2.79	7 / 2.79	19.53	8137	0.1576	1.6	23.60	1050	378
175	CARACAL	194.50	184.30	18 / 3.61	1 / 3.61	18.05	4191	0.1563	1.6	22.10	780	369
200	PANTHER	261.50	212.10	30 / 3.00	7 / 3.00	21.00	9407	0.1363	1.6	25.00	1190	418
200	JAGUAR	222.30	210.60	18 / 3.86	1 / 3.86	19.30	4747	0.1367	1.6	23.30	870	404

**TABLE: 37****BARE ALUMINIUM WIRE AS PER ASTM B 230 AND ASTM B 609**

Sl. No.	Description	REB Item No.	Size	No. & approximate dia. of wire	Approximate Conductor dia.	Calculated Breaking Load	D.C. Resistance at 20°C (Max)	Weight
				No/mm.	mm.	Kg.	Ohm/Km	Kg/Km
1.	Hard drawn Aluminium Grounding Wire	D-4	4 AWG	1 / 5.189	5.189	342 (Min)	1.310	57.145
2.	Annealed Aluminium Tie Wire	D-5	4 AWG	1 / 5.189	5.189	167 (Max)	-	57.145
3.	Annealed Aluminium Binding Wire	-	4 AWG	1 / 4.15	4.15	95-135	-	37.0

TABLE: 38**BARE COPPER CONDUCTOR & WIRE AS PER ASTM B3 AND ASTM B2**

Sl. No.	Description	REB Item No.	Size	No. & approximate dia. of wire	Approximate Conductor dia.	Calculated Breaking Load	D.C. Resistance at 20°C (Maximum)	Weight
				No/mm.	mm.	Kg.	Ohm/Km	Kg/Km
1.	Annealed Copper Wire	D-6	6 AWG	1 / 4.115	4.115	346 (Max)	1.377	118.219
2.	Medium Hard Drawn stranded Copper Cond.	D-7	3 AWG	3 / 3.37	7.239	1070	0.670	239.594
3.	Medium Hard Drawn stranded Copper Cond.	D-8	1 / 0 AWG	7 / 3.119	9.347	2155	0.338	485.141
4.	Medium Hard Drawn stranded Copper Cond.	D-9	4 / 0 AWG	7 / 4.417	13.259	3694	0.163	953.912
5.	Medium Hard Drawn stranded Copper Cond.	D-10	2 / 0 AWG	19 / 2.13	10.64	2162	0.265	622.000
6.	Medium Hard Drawn stranded Copper Cond.	DS-9	4 / 0 AWG	19 / 2.68	13.41	3393	0.167	975.000
7.	Medium Hard Drawn stranded Copper Cond.	DS-10	2 / 0 AWG	19 / 2.131	10.64	2166	0.2712	613.000
8.	Medium Hard Drawn stranded Copper Cond.	DS-37	350 MCM	37 / 2.47	17.30	5662	0.101	1620.000
9.	Medium Hard Drawn stranded Copper Cond.	DS-38	500 MCM	37 / 2.952	20.60	10231	0.070	2297.000



TABLE: 39

XLPE Insulated Aluminium Cables with ACSR Messenger & Single core Copper Cables
As per ICEA - S - 66 - 524 & ASTM B - 231.

Nominal Alu. Area	Conduct Assembly	Conductor Materials		Size			No. & Approx Dia. of each Strand			Conductor Dia.		Insula- tion thick- ness	Over all core dia.	Over all cable dia.	DC Resistance at 20°C (Max.)		Breaking Load		Cable Weight
		Phase AAC	Mess- enger ACSR	AWG	AAC	ACSR	AAC	ACSR		Phase AAC	Mess- enger ACSR				Phase AAC	Messenger ACSR			
								Alu	Steel										
					mm ²	mm ²	No/mm	No/mm	No/mm	mm	mm	mm	mm	mm	Ohm/km		Kg	Kg	Kg/Km
D-11	DUPLEX	AAC	ACSR	6	13.38	13.30	7/1.56	6/1.68	1/1.68	4.68	5.04	1.143	6.97	12.01	2.170	2.1600	266	541	113
D-12	DUPLEX	AAC	ACSR	3	26.61	26.69	7/2.20	6/2.38	1/2.38	6.60	7.14	1.143	8.89	16.03	1.080	1.0740	468	1014	213
D-14	QUADRUPLX	AAC	ACSR	3	26.61	26.69	7/2.20	6/2.38	1/2.38	6.60	7.14	1.143	8.89	21.43	1.080	1.0740	468	1014	421
D-15	QUADRUPLX	AAC	ACSR	1/0	53.52	53.52	7/3.12	6/3.37	1/3.37	9.36	10.11	1.524	12.41	29.91	0.540	0.5350	939	1926	836
D-20	QUADRUPLX	AAC	ACSR	4	21.12	21.18	7/1.96	6/2.12	1/2.12	5.88	6.36	1.143	8.17	19.69	1.363	1.3500	416	847	343
D-24	QUADRUPLX	AAC	ACSR	4/0	107.41	107.22	7/4.42	6/4.77	1/4.77	13.26	14.31	1.524	16.31	39.31	0.269	0.2676	1810	3818	1583
D-25	QUADRUPLX	AAC	ACSR	6	13.38	13.30	7/1.56	6/1.68	1/1.68	4.68	5.04	1.143	6.97	16.80	2.170	2.1600	266	541	231
D-16	SINGLE CORE	Cu(MHD)	-	3	26.76	-	7/3.37	-	-	7.28	-	1.524	10.33	10.33	0.670	-	1070	-	293
D-17	SINGLE CORE	Cu(MHD)	-	1/0	53.52	-	7/3.12	-	-	9.36	-	1.575	12.51	12.51	0.338	-	2155	-	547
D-18	SINGLE CORE	Cu(MHD)	-	4/0	107.41	-	7/4.42	-	-	13.26	-	1.575	16.41	16.41	0.163	-	3694	-	1065

TABLE: 40

All Aluminium Alloy stranded conductors (AAAC) ; as per ASTM B399.

Sl. No.	Code Name	Size		No. & diameter of Wires	Conductor overall diameter	D. C. resistance at 20°C (Maximum)	Ultimate conductor strength	Conductor weight	Current Rating at	
									75°C	100°C
		kc mil	mm ²	No/mm	mm	Ohm/Km	kg	kg/km	amps	amps
1.	AMES	77.47	39.19	7 / 2.67	8.03	0.85314	1270	108	134	185
2.	AZUSA	123.30	62.44	7 / 3.37	10.11	0.53500	2023	172	175	250
3.	ALLIANCE	246.90	125.09	7 / 4.77	14.30	0.26780	3883	345	275	390
4.	DARIEN	559.50	283.67	19 / 4.36	21.79	0.11806	8528	782	457	665
5.	GREELY	927.20	469.62	37 / 4.02	28.14	0.07146	13835	1296	622	920



SELECTION OF CABLES

1. General

For proper selection of a cable, the following particulars should be known:

Power to be transferred

Number of cores

Shape of core

Conductor material

Service Voltage

Nature of current (e. g., A. C. 50 cycle)

Nature of cable laying (e. g. laying in earth, laying in air)

Purpose of use

Length of cable

2. Selection of Cross-Section

The cross-section of a cable is dependent on three factors-allowable heating of the conductor, allowable voltage drop and short circuit loading capacity.

The maximum allowable heating of the cable conductors :

The maximum allowable rise of temperature of conductor as well as the corresponding current-loading for every cross-section have been explained in previous chapters.

The current can be determined from the following relation :

a) for D. C.
$$I = \frac{W}{V}$$

b) for A. C. single phase
$$I = \frac{W}{V \cos \phi}$$

c) for A. C. three phase
$$I = \frac{W}{V\sqrt{3} \cos \phi}$$

Where W = Power in KW

V = Voltage in KV (phase to phase voltage for three phase A.C)

I = Current in ampere

$\cos \phi$ = Power factor

After calculating the current and selecting the type of cable the cross-section can be determined by comparing the current ratings with the cross-sections given in table of corresponding type of cable. The rating factors for deviated condition, if any, should be considered before the determination of cross-section.



3. Determination of voltage Drop :

The Voltage drop can be calculated from the following formulae :

When Current is known
Direct Current (2 wire circuit) :

$$e = \frac{2 \cdot L \cdot I}{\lambda \cdot A} \quad (\text{Volt})$$

$$e = \frac{2 \cdot L \cdot I}{\lambda \cdot A \cdot V} 100 \quad (\%)$$

Single phase A. C. (2 wire circuit) :

$$e = \frac{2 \cdot L \cdot I}{\lambda \cdot A} \cos \phi \quad (\text{Volt})$$

$$e = \frac{2 \cdot L \cdot I}{\lambda \cdot A \cdot V} \cos \phi 100 \quad (\%)$$

Three phase A.C. :

$$e = \frac{L \cdot I \cdot \sqrt{3}}{\lambda \cdot A} \cos \phi \quad (\text{Volt})$$

$$e = \frac{L \cdot I \cdot \sqrt{3}}{\lambda \cdot A \cdot V} \cos \phi 100 \quad (\%)$$

When power is known

$$e = \frac{2 \cdot L \cdot W}{\lambda \cdot A \cdot V} \quad (\text{Volt})$$

$$e = \frac{2 \cdot L \cdot W}{\lambda \cdot A \cdot V \cdot V} 100 \quad (\%)$$

$$e = \frac{2 \cdot L \cdot W}{\lambda \cdot A \cdot V} \quad (\text{Volt})$$

$$e = \frac{2 \cdot L \cdot W}{\lambda \cdot A \cdot V \cdot V} 100 \quad (\%)$$

$$e = \frac{L \cdot W}{\lambda \cdot A \cdot V} \quad (\text{Volt})$$

$$e = \frac{L \cdot W}{\lambda \cdot A \cdot V \cdot V} 100 \quad (\%)$$

Using these formulae the cross-section can be determined from the given voltage-drop.

Meaning of the alphabets in the above formulae :

V = Service Voltage (Volt)

e = Voltage drop (Volt) or (%)

I = Current (Amp)

W = Effective Power (Watt)

A = Conductor cross-section (mm²)

L = Cable length (m)

λ = Conductivity (m/ohm, mm²) : for copper = 56 at 20°C
for aluminium = 34 at 20°C

$\cos \phi$ = Power factor



4. The Insulation Resistance

The insulation resistance depends on

- the dimensions of the cable (c.s.a. of conductors, thickness of insulation and length of the cable),
- type and composition of the insulation (P.V.C., P.E., rubber, paper etc.),
- the moisture content of the insulation (especially of cables with impregnated paper insulation) and
- the temperature.

Normally the level of the insulation resistance is not a value by which the operational reliability of a cable may be judged. Only the forced ingress of moisture may cause the insulation resistance to drop to a point where a deterioration of the cable's reliability must be expected. This is the reason why the test regulations for power cables issued in the various countries do not give specific insulation resistance values. The following table (a) and (b) shows the minimum values of newly manufactured cables, which are exceeded by far in most cases.

The relationship between the insulation resistance and the temperature is shown in the diagram Fig. - C for PVC cables with the basis value at $20^{\circ}\text{C} = 1$.

It must be kept in mind that the insulation resistance values of joints and sealing ends influence the result of insulation resistance tests, which means that the wet surface of a sealing end, for example, may cause the values to be misleading.

Minimum Insulation Resistance of PVC Cables

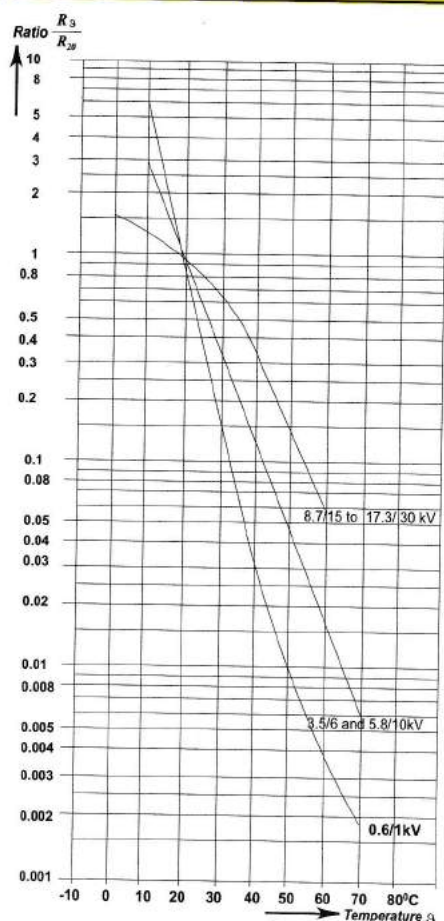
(a) Single-core PVC cables with concentric conductor or screen and multi-core PVC cables with separately screened cores (e.g. NYCY, NYSY, NYHSY, NYSEY)

Rated Voltage U_0 / U	Cross-sectional Area of Conductors mm^2	Insulation Resistance at 20°C Conductor against Screen or Concentric Conductor approx $M \Omega \cdot \text{km}$
0.6 / 1 kV	up to 4	60
	up to 25	30
	up to 95	20
	Over 95	15
3.5 / 6 kV	up to 50	80
	up to 150	50
	Over 150	30
6.35 / 11 kV	up to 50	90
	up to 150	60
	Over 150	40
11.6 / 20 kV	up to 70	500
	Over 70	250
17.3 / 30 kV	all cross-sections	500



(b) Multi-core PVC cables with screen surrounding the laid-up cores (e. g. NYCY, NYFGbY)

Rated Voltage U_0 / U	Cross-sectional Area of Conductors mm^2	Insulation Resistance at 20°C	
		1 Conductor against the others and the screen approx $M \Omega - \text{km}$	All Conductors against the Screen approx. $M \Omega - \text{km}$
0.6 / 1 kV	up to 4	60	30
	up to 25	40	20
	up to 50	30	15
	Over 50	30	15
3.5 / 6 kV	up to 50	100	80
	up to 150	60	50
	Over 150	40	30



$$\frac{R_9}{R_{20}} = f(\theta)$$

R_9 Insulation
resistance at
temperature θ

R_{20} Insulation
resistance
at 20°C

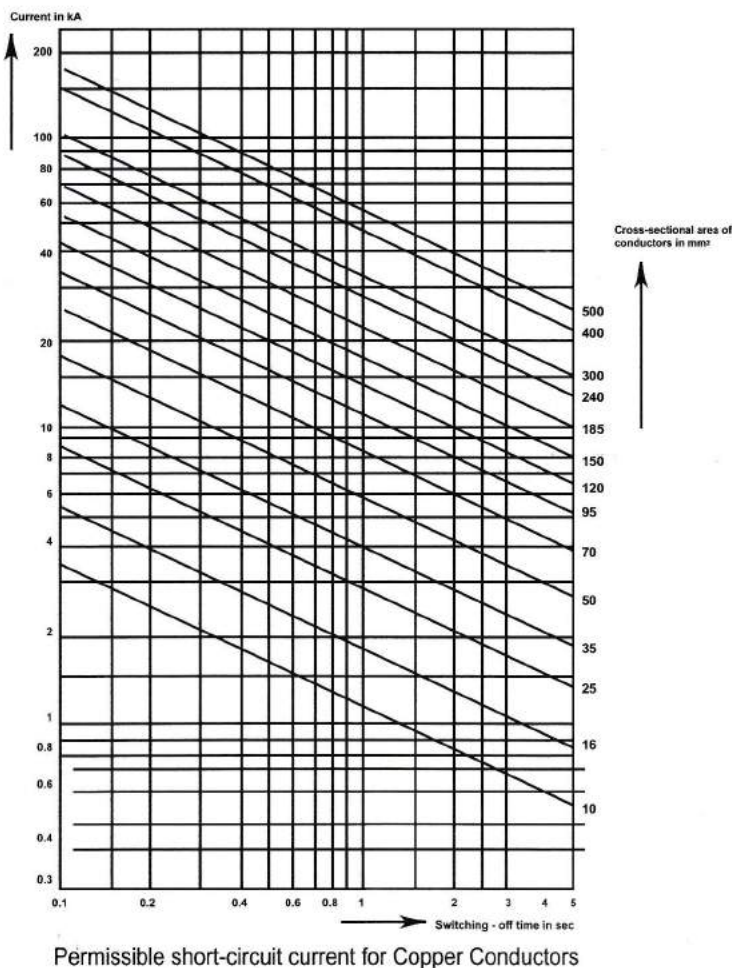
Fig. C

Insulation Resistance of P.V.C Cables, as a Function of the Temperature (mean Values). More or Less Considerable Deviations may Occur, Depending on the Composition of the P.V.C. Compound.



5. SHORT CIRCUIT LOADING CAPACITY

The possible short circuit current which a cable will be subject to for a short time is dependent on the short circuit conductor of the circuit, the connected short circuit, the damping apparatus e. g. Transformer, Reactor etc. and as well as the distance of the short circuit point from the generating station. The short



circuit current should, therefore, be calculated for every point of the circuit. From this calculated short circuit current and the known switching-off time, the cross-section can be determined from the diagram illustrating the short circuit capacity for PVC cables upto voltage $E/E_0=10/5.8$ kV and various cross-sections. Whereas the allowable conductor temperature for continuous full load operation are 70°C and 65°C for cables upto 6kV and of 10kV respectively, the corresponding limiting temperatures of conductors at short circuit are 160°C and 155°C . It is evident from the curve that the shorter the switching-off time the smaller is the cross-section, the greater is the economy.



6. SOME USEFUL FORMULAS

ELECTRICAL FORMULAS FOR DETERMINING AMPERES. HORSEPOWER, KILOWATTS AND KILOVOLT-AMPERES

DESIRED DATA	ALTERNATING CURRENT			DIRECT CURRENT
	Single - Phase	Two - Phase Four - Wire	Three - Phase	
Amperes when kva is shown	$\frac{kva \times 1000}{E}$	$\frac{kva \times 1000}{2 \times E}$	$\frac{kva \times 1000}{1.73 \times E}$	$\frac{kva \times 1000}{E}$
Amperes when kilowatts are shown	$\frac{kw \times 1000}{E \times pf}$	$\frac{kw \times 1000}{2 \times E \times pf}$	$\frac{kw \times 1000}{1.73 \times E \times pf}$	$\frac{kw \times 1000}{E}$
Amperes when horsepower is shown	$\frac{hp \times 746}{E \times \% \text{ Eff} \times pf}$	$\frac{hp \times 746}{E \times \% \text{ Eff} \times pf}$	$\frac{hp \times 746}{1.73 \times E \times \% \text{ Eff} \times pf}$	$\frac{hp \times 746}{E \times \% \text{ Eff}}$
Kilovolt-Amperes	$\frac{I \times E}{1000}$	$\frac{I \times E \times 2}{1000}$	$\frac{I \times E \times 1.73}{1000}$	$\frac{I \times E}{1000}$
Kilowatts	$\frac{I \times E \times pf}{1000}$	$\frac{I \times E \times 2 \times pf}{1000}$	$\frac{I \times E \times 1.73 \times pf}{1000}$	$\frac{I \times E}{1000}$
Horsepower	$\frac{I \times E \times \% \text{ Eff} \times pf}{746}$	$\frac{I \times E \times 2 \times \% \text{ Eff} \times pf}{746}$	$\frac{I \times E \times 1.73 \times \% \text{ Eff} \times pf}{746}$	$\frac{I \times E \times \% \text{ Eff}}{746}$

In three-wire, two phase circuits, the current in the common conductor is 1.41 times that in either other conductor

E - volts ; I - amperes; % Eff - percent efficiency.
pf - power factor; kva - kilovolt ampere
hp - horsepower; kw - kilowatts



TABLE : 41

DIFFERENT CONDUCTOR SIZES

Comparison of Conductor Sizes of different Specifications :

Imperial Standard Size : B. S. S. (old)			Metric Standard size B. S. S. (new), VDE	
Construction	N o m i n a l	A r e a		
inch	inch ²	mm ²	mm ²	
1 / .044	0.0015	0.98	1.0	Δ
3 / .029	0.0020	1.28	1.3	*
3 / .036	0.0031	1.97	2.0	*
7 / .029	0.0046	2.98	3.0	+
7 / .036	0.0071	4.59	4.5	+
7 / .044	0.0106	6.87	7.0	+
7 / .052	0.0145	9.59	10	+
7 / .064	0.0225	14.53	14.5	+
19 / .044	0.0289	18.64	16	x
19 / .052	0.0404	26.03	25	x
19 / .064	0.0611	39.43	35	⊙
19 / .072	0.0774	49.91	50	⊙
19 / .083	0.1028	66.32	70	⊙
37 / .072	0.1506	97.19	95	⊙
37 / .083	0.2002	129.16	120	⊙
37 / .093	0.2513	162.15	150	⊙
37 / .103	0.3083	198.90	185	⊙
61 / .093	0.4144	267.33	240	⊗
61 / .103	0.5083	327.92	300	⊗
91 / .093	0.6182	398.81	400	⊗
91 / .103	0.7582	489.19	500	⊗
127 / .103	1.0582	684.71	630	◇
-	-	-	800	◇
-	-	-	1000	◇

- Δ Single solid wire.
- + 7-wire round strand.
- x 7-wire or 19-wire round strand.
- ⊙ 19-wire round or 20-wire sector shaped strand.
- ⊗ 37-wire round or 39-wire sector shaped strand.
- ⊗ 61-wire round or 39-wire sector shaped strand.
- ⊗ 91-wire round strand.
- ◇ 127-wire round strand.
- * 3 wire round strand.



EASTERN CABLES LIMITED

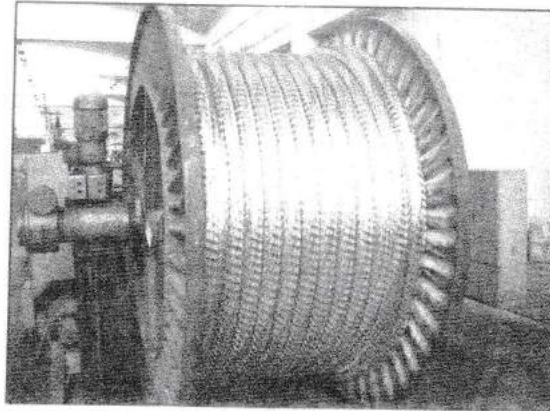
AT A GLANCE

- ❖ Largest manufacturer of Cables & Conductors in Bangladesh producing export quality Cable since 1971.
- ❖ Machinery of German and Japan Origin.
- ❖ Modern & sophisticated manufacturing process & stringent quality control measures ensure physical, chemical and electrical properties of International Standard.
- ❖ Fully capable to manufacture any type & sizes of PVC cables having voltage upto 12 KV & cross section upto 1000 mm² as per VDE, BS, ASTM, JS, BDS etc.
- ❖ XLPE insulated LT cable / conductor are also manufactured.
- ❖ Totally safe, reliable as well as durable.
- ❖ Less electricity consumption.
- ❖ Company Name / Type & size of cable is printed / embossed on each metre of its length to ensure genuinity.
- ❖ Guaranteed After Sales Service.
- ❖ Wide spread Dealer / Agent network all over the country.
- ❖ Be it industry, Business center or Dwelling house, only "Eastern Cables" can ensure highest safety & longevity at lowest cost.

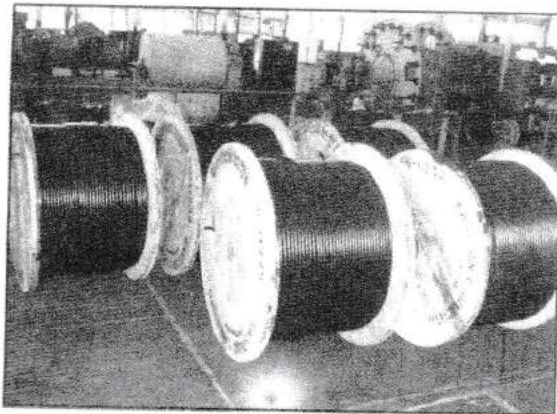


CONTINUED FROM SECOND COVER)
manufacturing techniques are of constant concern of our research and development team. Moreover, technical data on the latest development are also being received through visits & training in leading cable manufacturing enterprises of the world to ensure that our products are always abreast of time and technology.

PVC cables are manufactured in Eastern Cables Ltd. mainly according to Bangladesh Standard (BDS), German Metric Standard (VDE), British Metric Standard (new B.S.S) and British Imperial Standard (old B.S.S). Bare and



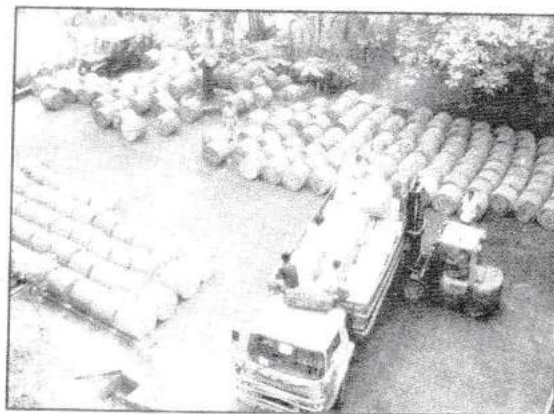
abroad Eastern Cables Ltd. manufactures domestic cables following old British Imperial Standard B.S. 2004



After fulfilling the local demand Eastern Cables Ltd. is exporting substantial quantity of different types and sizes of cables to various countries of the world including USSR, Kuwait, U.A.E., Singapore etc. Eastern Cables Ltd. is also receiving orders after competing in various International Tenders floated within the country and successfully executed such orders and earned huge amount of foreign exchange. The Programme for manufacturing of Crosslinked Polyethylene (XLPE) insulated upto 33 KV cables is under execution.

Insulated AAC and ACSR Conductors are also manufactured here according to B.S. and ASTM. On demand cables and Conductors are also manufactured here according to any International Standard.

Eastern Cables Ltd. at present manufactures various types and sizes of domestic, control, flexible and Power PVC cables of continuous permissible service voltage upto 12 KV and having cross-sectional area upto 1000mm² following mainly the latest German Standards, VDE 0250 / 3.69, VDE 0271 / 3.69 and B.S 6004: Moreover, to meet the demand from home and





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