IS : 694
IS : 1554
IS : 7098
IS : 14255

TECHNICAL CATALOGUE

SURAJ™

SURAJ CABLES

MORE POWER TO YOU

MAKE IN INDIA

SURAJ™ SURAJ CABLES

INDEX

CHAIRMAN'S MESSAGE

Our excellent technology and quality in energy and information delivery have been recognized ever since our founding many decades ago. As a result, Suraj Cables has grown into a leading cable maker that is recognized all over the world and not only for its product and service quality but also for its honesty and integrity.

We deliver the best value in the industry in terms of price, quality, best sales support, and timely delivery. Our esteemed customers vary from Govt. companies, leading corporates to builders, contractors, and dealers. We never compromise in terms of our technology and have use the best of machines and engineers in the industry to manufacture reliable and superior value products. I truly believe that each of us must find meaning in our work because the best work happens when you know that it's not just work but is something that will improve other people's lives. This is what drives each of us at Suraj Cables. Behind Suraj Cables' amazing achievements are our people. They are our most valuable asset and the foundation of all our goals. Our competitiveness and sustainable growth depend on them.

The macroeconomics of India has never looked stronger and our continued investment has been driven by our confidence that over the next two decades India will easily be one of the top five largest nations in the world fuelled by the demand of its own population and energized by the sheer potential of a young workforce unparalleled anywhere else in the world. No other nation has this opportunity "ahead" of it.
While India still has many challenges to overcome, there is no denying the fact that India today is in a uniquely advantageous situation with an overall macroeconomics stacked in its favour and therefore has the best opportunity to tackle its most difficult problems. Suraj Cables has continued to invest through the most difficult times of the economy and very distinctly sees the days ahead as a period for it to capitalize and build on the platform that it has built for itself over the past decade.

It is our promise that we will continue to invest and do our part to help the people wherever we operate. While "Thinking Big. Doing Better" has been the philosophy that has always driven us, it is the Doing Better part that makes us humane. We will make continued efforts to capitalize on our competencies to improve the quality of life, make the future brighter and richer, and "Enable the Cabled World". We will become a warm-hearted company that fulfils social responsibilities through open communication with our customers and, for that matter, transform the company from a company representing India into the world's best cable manufacturer. We believe in our motto of bringing more power to you and we do bring More Power to You, literally.

Thankyou.
Suresh Singhal & Ajay Singhal

VISION

Our vision is to be the best performing wire and cable company in the industry. Relentlessly focus on the customer and innovate in the Utility, Communications, Industrial and Construction markets.

Our purpose is to work together to power and connect people's lives and to enable the society to flourish and progress and that we do this reliably and safely through the high performance of our cables. We drive innovation to meet the changing and developing energy and communication needs of our communities today, tomorrow and into the future. By focusing on our strengths, building stronger connections between our people and with our customers, we can and will succeed.

MISSION

Our mission is to provide our customers with superior cable solutions based on state-of-the-art technology and consistent excellence in execution, ultimately delivering sustainable growth and profit.

Whoever the client, Wherever they are, However harsh the environment they operate in, We're committed to keeping them connected. Every day, we all have the chance to bring our vision to life in our actions. No matter how big, or small, the things we do on a daily basis build up over time and help us deliver on our mission.

CLIENTELE


एनटीपीसी NTPC
Bharat Petroleum
भेल BHEL
CPCL
दामोदर DVC
DHBVN
DAE
GAIL
HP
ओएनजीसी ONGC
मॉयल MOIL
एनएचपीसी NHPC
NPCIL
STERLING & WILSON
WBSEDCL
उत्तराखण्ड पावर कारपोरेशन लि०
adani Power
TATA TATA POWER
STRANSCO
TNPL
APGENCO
RCF
NPCL
NCC NCC Limited
एन बी सी सी NBCC A Navratna CPSE
MAHAVITARAN
ऑयल इंडिया लिमिटेड Oil India Limited
KSEB
CESC LIMITED
NDMC नई दिल्ली नगरपालिका परिषद
GETCO
IndianOil
ABB
BESCOM
सेल SAIL
namma metro
thyssenkrupp
पावरग्रिड
ESSAR
iCON
बेस्ट
NRL
CPDCL
JVVNL
BSES
NHAI
DELHI INDIRA GANDHI INTERNATIONAL AIRPORT
THE RAMCO CEMENTS LIMITED RAMCO
indus TOWERS
DTL दिल्ली ट्रांसको लिमिटेड
ADITYA BIRLA GROUP
ONGC एमआरपीएल MRPL
IFFCO
KALPA-TARU
TechnipFMC
भारत इलेक्ट्रॉनिक्स BHARAT ELECTRONICS QUALITY. TECHNOLOGY. INNOVATION.
CPWD
LANCO

SURAJ CABLES

ABOUT US

Suraj Cables an ISO 9001:2015 and ISO 14001:2015 company is India's leading Cables and Wires manufacturer with a glorious track record of over three decades. Our manufacturing facilities at Murthal (Haryana), Kundli (Haryana) and Narela (Delhi) in India, addresses to the specific needs with state of-the-art machinery and technology. Since our inception in **1988**, Suraj Cables has grown exponentially over the **last 30 years**, the company has established itself as a leading Cables, Wires and Conductors manufacturer from India and put together an integrated value chain that is unique and, in many ways, unparalleled anywhere in the world.

With over three decades of operations, the group has built up a portfolio spanning a comprehensive range of cables and with continuous advancement of technology there are plans to extend this range further. Currently, the range includes Low Voltage XLPE and PVC Power Cables up to and including 1.1 kV grade, Control Cables up to 1.1 kV for any number of Cores/Pairs, HT and LT Aerial Bunched Cables, PVC and Rubber Insulated Power Cables, Telecom Cables, Railway Cables, Fire Survival Cables and Specialised Cables including Mining Cables, Solar Cables, Marine Cables, etc. With the rise in emphasis on Renewal Energy, Suraj Cables also introduced the complete range of Solar Cables under the brand **SolarCab™** in 2018. Our Murthal plant which is under construction will further increase our production capacity and will add Medium Voltage and High Voltage Power Cables up to and including **66KV**, Instrumentation Cables, Data Cables and Signalling Cables for **RDSO** (Research Designs & Standard Organisation) division of Indian Railways to our existing range.

Our Products are type tested and approved by globally recognised & autonomous testing laboratories / organisations such as, **ERDA, CPRI, NABL** and **Tag Corporation**. Our facilities are **ISO 9001:2015** and **ISO 14001:2015** certified and our products are **CE** Certified.

We are guided by our motto- **More Power to You**. Suraj Cables believes in bringing more power to you, literally, and helps you connect to your loved ones and family by providing quality product, customer satisfaction and carrying along a dedicated and motivated work force.

Our major Indian clients include National Thermal and Power Corporation (NTPC), Bharat Heavy Electricals Limited (BHEL),BSES, Larsen & Toubro (L&T), Tata Projects, Indian Oil Corporation Ltd. (IOCL), Hindustan Petroleum Corporation Ltd. (HPCL), Airport Authority of India (AAI), Power Grid Corporation of India (PGCIL), UHBVN, MPPKVVCL, CSPDCL and many more.

- OVER 30 YEARS OF EXPERIENCE
- ERDA, CPRI, TUV, PDIL APPROVED CABLES
- AN ISO 9001 AND 14001 COMPANY
- CE CERTIFIED
- AVAILABLE AS PER IS, BS, IEC AND OTHER INTERNATIONAL SPECIFICATIONS

SURAJ™ SURAJ CABLES

CERTIFICATIONS

IS 14255

IS 694

IS 1554

IS 7098

CE

ISO 9001-2015

ISO 14001 2015

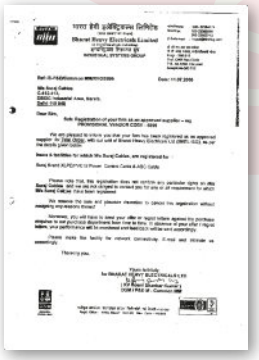
MSME REGISTRATION

NSIC REGN

CIDC CERIFICATE

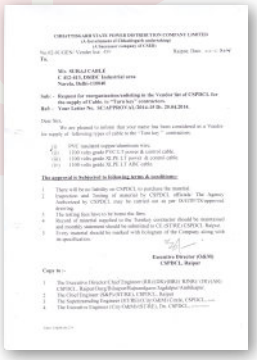
APPROVALS (Many More)

APGENCO

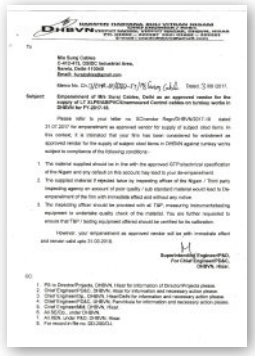


BHEL

NTPC

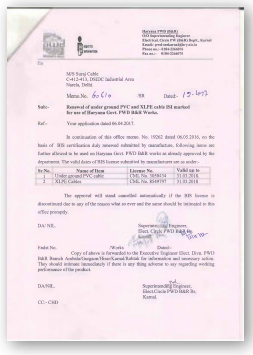


CSPDCL

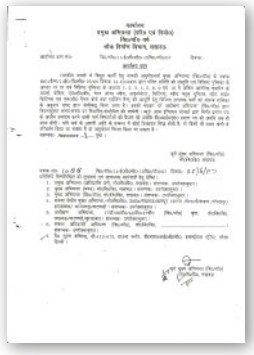


DHBVN

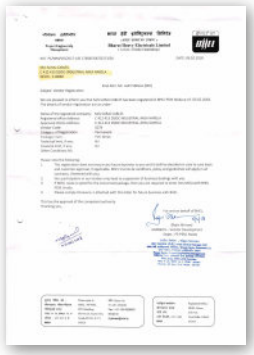
PGCIL



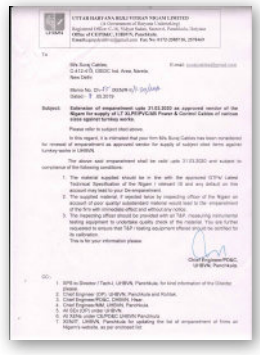
PWD (B&R)



PWD LKO



BHEL PEM



UHBVNL

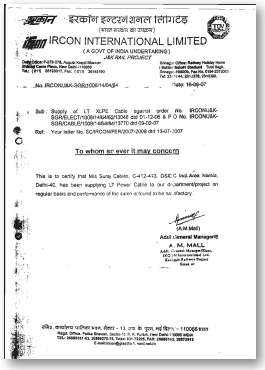
SURAJ CABLES

PERFORMANCE CERTIFICATES

BPCL

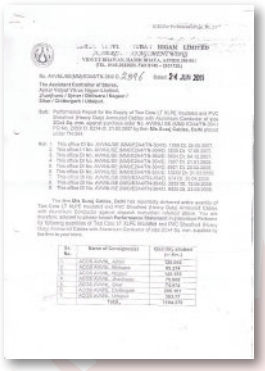
BSES

DTL

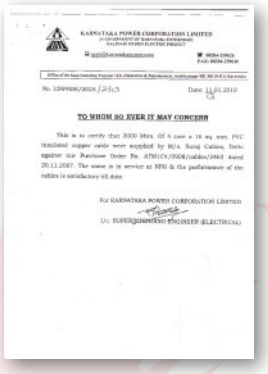


IRCON

GEPDEC



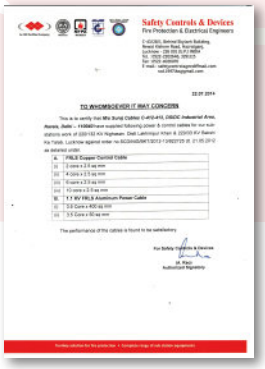
AVVNL



KPCL

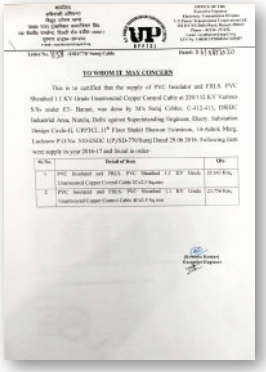
MP-INDORE-ABC

NKG



SC&D

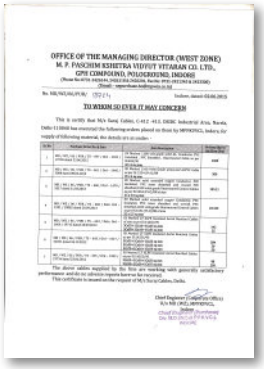
REW



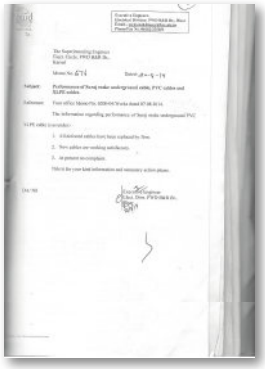
UPPTCL

MPMKVVCL BHOPAL

JE



MPMKVVCL INDORE



PWD

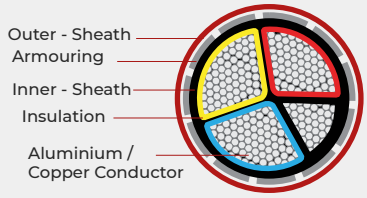
(Many More)

TYPES & SIZES	OPTIONS & CONSTRUCTION	CROSS SECTIONAL VIEW

LV POWER CABLE

PVC/XLPE Power cables 1.1 kV
Sizes:
Single Core 6 sq. mm - 1000 sq. mm
Multicore 6 sq. mm - 630 sq. mm
Referred Standard: IS:1554(P-1), IS:7098(P-1), IEC: 60502 (P-1), BS: 5467, BS: 6724, BS: 6346, BS: 7889
Make: SURAJ

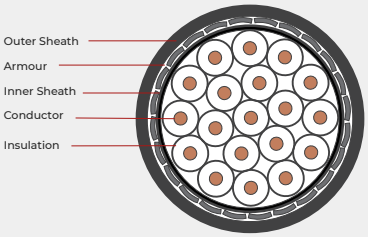
Conductor - Stranded / Solid, Circular Shaped Aluminium / Copper
Insulation - PVC / HR PVC
Inner Sheath - PVC / HR PVC / FRLS / PVC
Unarmoured / Armoured - G.S. Round Wire/ Flat Strip or Aluminum Wire / Flat Strip
Outer Sheath - PVC/HR PVC/FRLS PVC/LSZH PVC
Optional : Double Armoured for mining cables



CONTROL CABLES

Annealed electrolytic copper conductor, PVC/XLPE insulated, PVC sheathed 650 V / 1100 V
Sizes: 1.5 sq. mm / 2.5 sq. mm upto 100 core
4 sq. mm & 6 sq. mm upto 24 core (or as per client's requirement)
Referred Standard: IS:1554(P-1), IS:7098(P-1), IEC: 60502 (P-1), BS: 5467, BS: 6724, BS: 6346, BS: 7889
Make: SURAJ

Conductor - Solid/Stranded, Plain /Tinned Copper
Insulation - PVC/HR PVC/XLPE
Innersheath - PVC/HR PVC/FRLS/Zero Halogen
Unarmoured / Armoured - G.S. Round Wire / Flat Strip
Outersheath - PVC/HR PVC/FRLS/Zero Halogen
Additional Option: Overall shielding with Aluminium mylar tape with 100% coverage & 25% overlap on laid up cores for static noise reduction

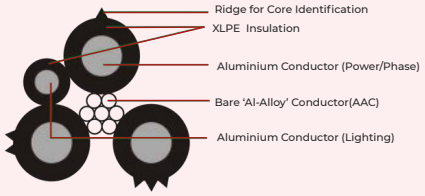


AERIAL BUNCHED CABLE (ABC)

PE/XLPE insulated 1.1 kV
Size: 16 sq. mm. to 400 sq. mm.

Referred Standard: IS:14255, BS: 7870-5, BS:625, HD: 626, VDE: 00276 Part 626, IEC : 60502-1&2, NFC: 33-209, BS: 6485, IS:398 PART-4, IS: 7098 PART 1, IS: 1554 (P-1)
Make: SURAJ

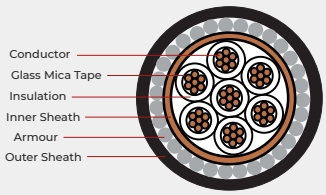
Conductor - Stranded Circular compacted Aluminium
Insulation - PE/XLPE
Messenger conductor - All Aluminium Alloy-Bare/ Insulated
Street Light Cond. - Stranded Circular Compacted Aluminium, Bare/Insulated
Optional - Another layer of UV resistant PVC sheathing over insulated phase conductors



FIRE SURVIVAL CABLES

Size: Fire Alarm Power Cable: 1-5 core upto 1000 sq mm
Fire Alarm Control Cables: Upto 61 Core-0.5-4 sq mm
Referred Standard: IS: 1554(P-1), IS: 9968, BS: 5467, VDE-0207, BS-6346, IEC 60331, BS: 5746, IEC 60502-1, BS-7846, BSEN-6081 I & II, IEC: 60092, NEK-606, BS:6883, BS: 6387
Make: SURAJ

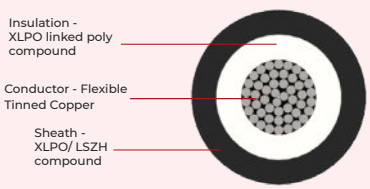
Conductor - Solid/Stranded, Plain /Tinned Copper
Heat Barrier - Mica Tape
Insulation - XLPE
Innersheath - LSZH Compound
Armoured - G.S. Round Wire/ Flat Strip
Outersheath - LSZH Compound



SOLAR CABLES

Tinned copper XLPO insulated & LSZH sheathed 1100 VAC/1800 VDC
Size: Single Core 2.5 to 630 Sq. MM.
Multicore to 400 sq. MM.
Referred Standard: TUV Specifications 2PFG - 1169/08-2007, BS EN 50618
Make: SURAJ

Conductor - Flexible tinned copper
Insulation - Cross linked polyolefin compound
Sheath - XLPO/ LSZH Compound
Optional - Insulation/Sheath of PVC/ HR/FR/FRLS/ FRLSH PVC/ XLPE



SURAJ™

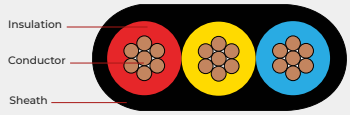
SURAJ CABLES

TYPES & SIZES	OPTIONS & CONSTRUCTION	CROSS SECTIONAL VIEW

FLAT CABLES

Stranded Plain copper, PVC insulated & PVC sheathed of 1.1 kV
Sizes: 2 Core & 3 core - 1.5 sq. mm upto 120 sq. mm
Referred Standard: IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05
Make: SURAJ

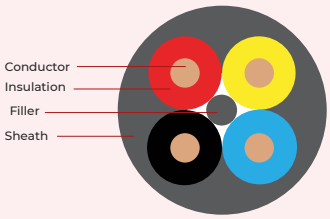
Conductor - Stranded Plain Copper
Insulation - PVC / HR PVC
Sheathing - PVC / HR PVC



MULTICORE FLEXIBLE CABLES

Multistrand, flexible, bright annealed electrolytic copper conductor, PVC insulated and sheathed upto 1100 V
Sizes: Two, Three or Four core upto 400 sq. mm
Referred Standard: IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05
Make: SURAJ

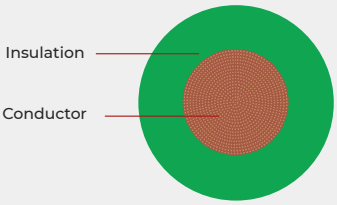
Conductor : Multi stranded plain/ tinned copper
Insulation - PVC / HR PVC / FRLS / Zero Halogen
Unsheathed /Sheathed - PVC / HR PVC / FRLS



SINGLE CORE FLEXIBLE CABLES

Multistrand Flexible, upto 1100 V grade PVC Cables
Sizes: Single core 1.0 sq. mm - 1000 sq. mm
Referred Standard: IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05
Make: SURAJ

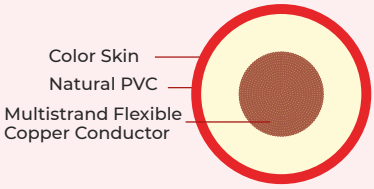
Conductor - Bright Annealed plain/tinned Copper
Insulation - PVC/ HR PVC/ FRLS PVC / Zero Halogen



HOUSE WIRES

PVC Flexible Sheathed Wires 1.1 kV grade
Sizes: 0.50 sq. mm upto 10 sq. mm
Referred Standard: IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05
Make: SURAJ

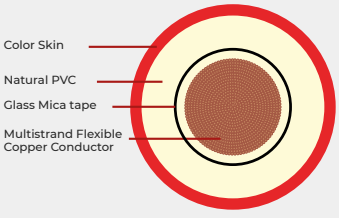
Conductor - Stranded annealed Copper
Insulation - (FR) - Flame retardant PVC ; Flame Retardent Low Smoke(FRLS) PVC / Zero Halogen(FRLSH) PVC



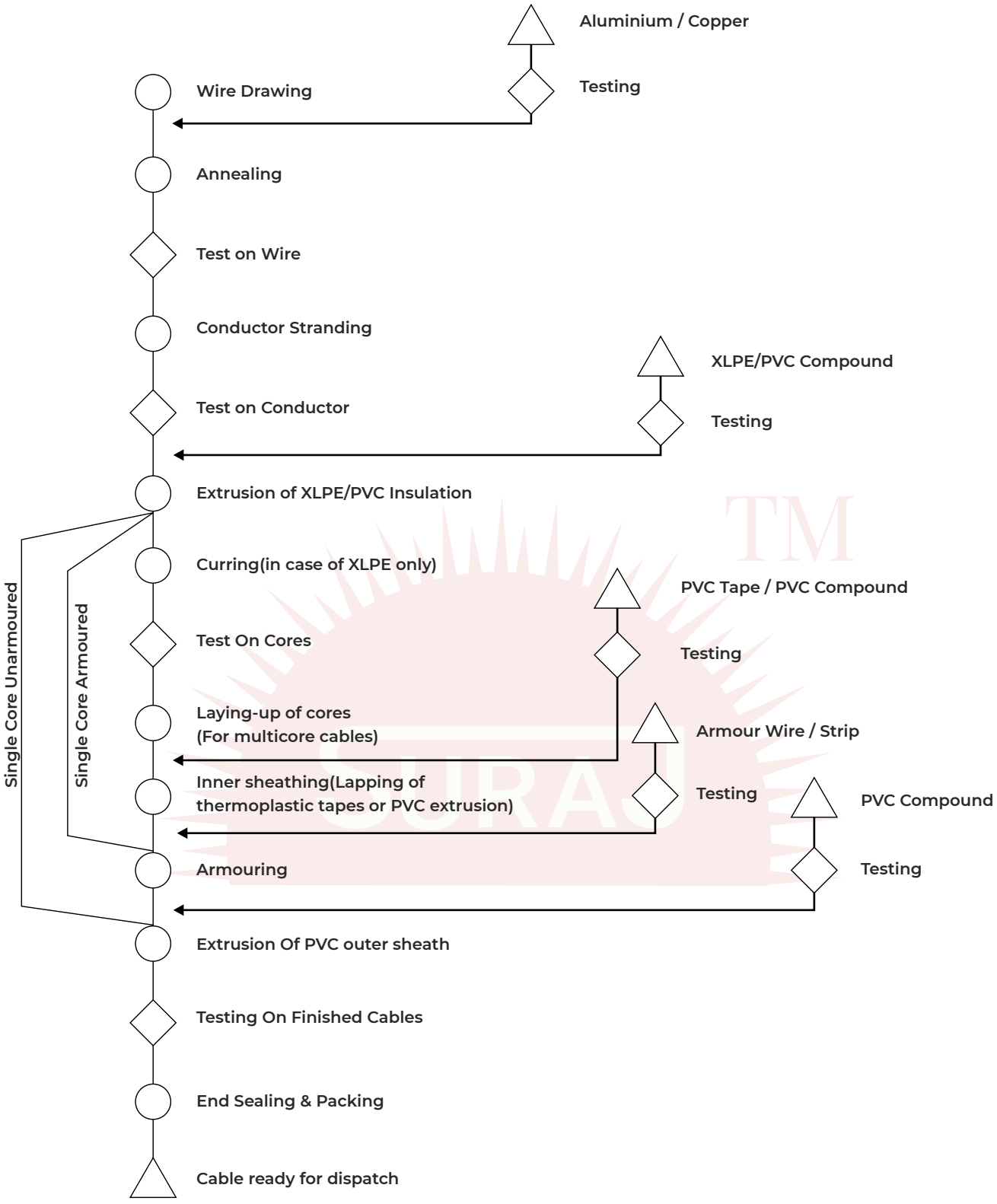
FIRE SURVIVAL WIRES

Flexible Cables upto 450/750 V
Sizes: Single Core 1.0 upto 240 sq. mm
Referred Standard: IS: 1554(P-1), IS: 9968, BS: 5467, VDE-0207, BS-6346, IEC 60331, BS: 5746, IEC 60502-1, BS-7846, BSEN-6081 I & II, IEC: 60092, NEK-606, BS:6883, BS: 6387
Make: SURAJ

Conductor - Stranded Flexible Copper
Insulation - Glass mica tape & HFFR Compound



MANUFACTURING PROCESS



Note: In process quality assurance checks are carried out at each stage of manufacturing as per our Quality Assurance Plan

Stock Process Test

CABLE CONSTRUCTION

ELEMENT	XLPE	PVC / HR PVC
CONDUCTOR	Electrolytic Copper (Plain or Tinned) and Aluminium conductor in form of Solid, Stranded Circular, Compacted Circular and Shaped as per IS 8130, IEC 60228 & BS EN 60228. The sector shaped conductor are manufactured with pre-spiral lay which gives compact shape to the cable with reduced diameter at laid up stage.	
INSULATION	90°C thermoset dielectric, is applied as insulation over the conductor by extrusion process. Cross Linked Polyethyelene (XLPE) as per IS 7098-1, IEC 60502-1, BS 7655.	Thermoplastic dielectric, is applied as insulation over the conductor by extrusion process. We offer both general purpose PVC of 70°C (Type A) and Heat Resistant PVC of 85°C (Type C) Poly-Vinyl Chloride (PVC) as per IS 5831, IEC 60502-1, BS 7655. Low Smoke Zero Halogen (LSZH) as per IEC 60502-1.
LAYING UP OF CORES	The multi-cores are Laid-up with appropriate machines to form a compact circular shape, PVC fillers can be applied (wherever necessary) to provide circular shape.	
INNERSHEATH	PVC / LSZH innersheath is applied as a protection over the laid up cores, Innersheath can be offered in two forms Extruded or Taped. Extruded PVC bedding of ST1/ST2/LSZH as per IS 5831, IEC 60502-1, BS 7655. Cables with special properties of FR and FRLS can be offered Taped Bedding of Thermoplastic tape to be compatible with temperature rating of the cable as per IS 7098-1, IEC 60502-1.	PVC / LSZH innersheath is applied as a protection over the laid up cores, Innersheath can be offered in two forms Extruded or Taped. Extruded PVC bedding of ST1 or ST2 PVC as per IS 5831, IEC 60502-1, BS 7655. Cables with special properties of FR and FRLS can be offered Taped Bedding of Thermoplastic tape to be compatible with temperature rating of the cable as per IS 1554-1, IEC 60502-1.
ARMOUR	Galvanised Steel Round Wire as per IS 3975, IEC 60502-1, BS 10257. Galvanised Steel Flat Strip as per IS 3975, IEC 60502-1. For Single Core cables to be used in AC circuits Aluminium Round Wire or Flat Strip armour is provided to avoid magnetic hysteresis losses. For cables to be used in mines, required armour conductance (may be 75% to 40%) can be achieved by Double wire armour or by incorporating Tinned Copper Wires with Galvanised Steel Wires	
OUTERSHEATH	PVC / LSZH outersheath is applied by extrusion process generally black in colour with sequential length marking and required details printed with non-contact ink jet/laser printer and also embossing can be provided. Cables with special properties of **FR** and **FRLS** can be offered. Poly-Vinyl Chloride (PVC) as per IS 5831, IEC 60502-1, BS 7655. Low Smoke Zero Halogen (LSZH) as per IEC 60502-1.	

NOTE: Special construction of cable as per client's requirement can also be done.

1. Test on Raw Material Stage

SURAJ CABLES XLPE Cables are manufactured from high quality Raw Materials which are tested in our laboratory strictly according to our works standards. For XLPE/ PVC Cables, the Raw Material used and tests conducted are as under.

i. Aluminium / copper wire

Conductor resistance, wire diameter tensile strength annealing and wrapping test.

ii. XLPE / PVC compound

Density, tensile strength, elongation at break, volume resistivity and shrinkage test.

iii. Steel strip / wire

Dimensions, tensile strength elongation at break, torsion, resistivity and zinc coating test.

2. Production shop preventive test i.e. process inspection

The Process control tests are carried out at every stage of manufacture for checking the adequate manufacturing process, and taking necessary steps to remove any defects.

The following are the process inspections carried out by us for XLPE/PVC cables.

i. Conductor stranding

a. Dimensions
b. Surface and shape of conductor
c. Lay and direction of lay
d. D.C. resistance
e. No. of wires in each conductor

ii. Insulation

a. Dimension of cores
b. Thickness of insulation
c. Surface

iii. Curing (in case of XLPE Cables only)

a. Temperature
b. Pressure
c. Time
d. Hot-set-test

iv. Laying up

a. Sequence of cores
b. Direction of laying up and lay
c. Circularity of cable
d. Diameter over laid up cores
e. Application of filler in the interstices

v. Inner sheath

a. Surface
b. Concentricity
c. Thickness
d. Diameter over inner sheath

vi. Armouring

a. Lay and direction of lay of armouring wire / strips
b. No. of wires / strips
c. Uniformity of application
d. Diameter over armouring
e. Dimension of wires-strips

vii. Outer sheath

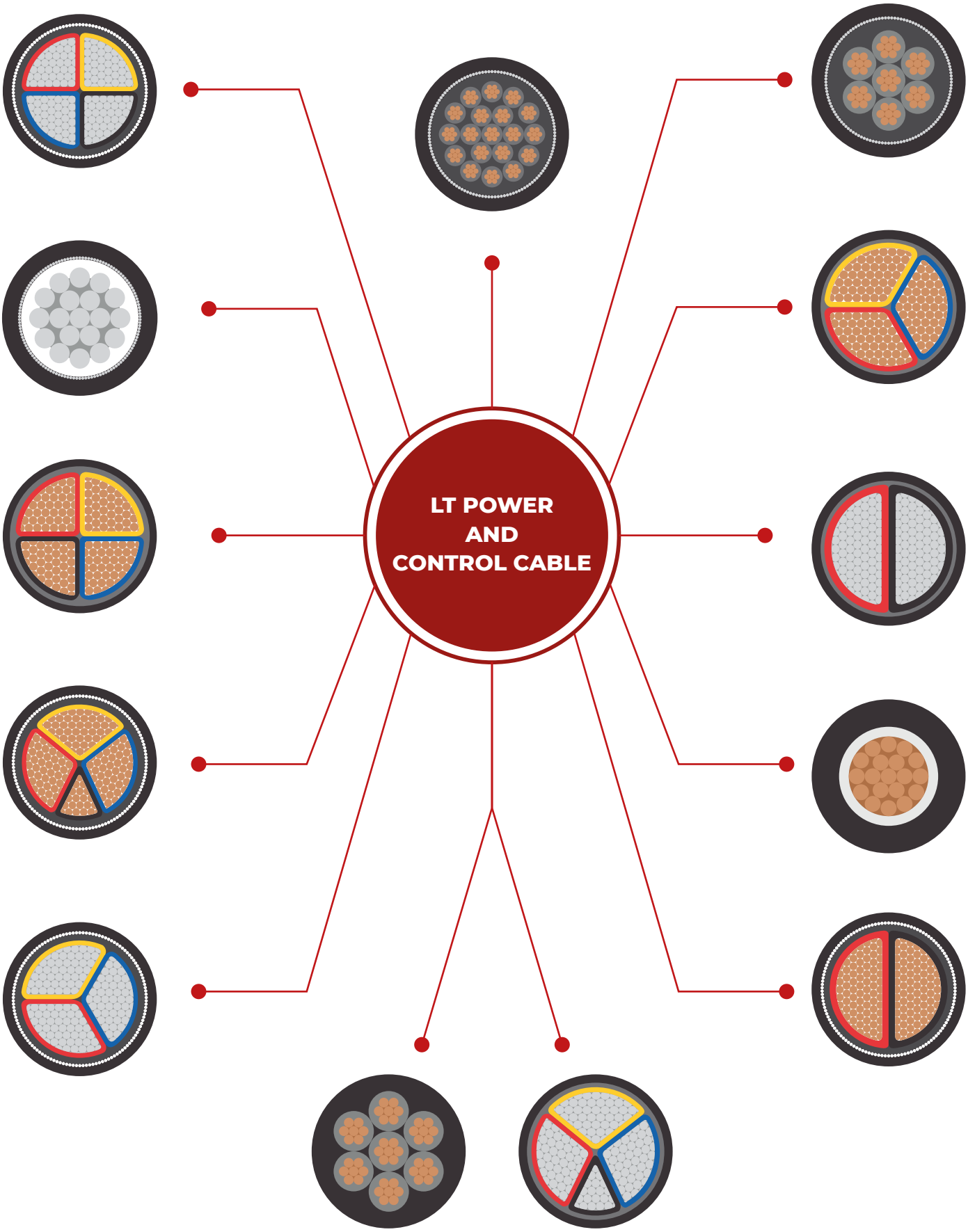
a. Thickness
b. Concentricity
c. Diameter over sheath
d. Surface
e. Embossing with requisite information on outer sheath

3. Finished Cable Test

SURAJ CABLES have a well equipped air-conditioned laboratory with state-of-the-art Testing equipment. All routine, acceptance and type tests are conducted as per relevant specifications and testing schemes.

Example-

IS : 7098
IS : 694
IS : 1554
IS : 14255 etc.


LT POWER
AND
CONTROL CABLE

XLPE insulated heavy duty cables were introduced worldwide in mid sixties. These cables have overcome the limitations of PVC Insulated Cables such as thermal degradation, poor moisture resistance and thermoplastic nature.

The Cables are suitable for use on AC single phase or three phase (earthed or unearthed) systems for rated Voltage up to and including 1100 Volts. These Cables can be used on DC Systems for rated Voltage up to and including 1500 Volts to earth.

The advantages of XLPE Insulated cables in comparison to PVC insulated cables are as under:

- LT-XLPE Cables have longer life as compared to conventional PVC Cables
- LT-XLPE Cables have a higher conductor temperature rating i.e. 90^0C
- LT-XLPE Cables have a higher emergency overload capacity 120^0C
- Max. temperature limit under short circuit conditions for LT-XLPE Cables is 250^0C. Hence XLPE Cables have higher short circuit rating
- Insulation resistance of LT-XLPE Cable is excellent & superior to Identical PVC Cables
- LT-XLPE Cables have high corrosion resistance in polluted atmosphere
- LT-XLPE Cables have better properties of resistance to chemical and corrosive gases
- LT-XLPE Cables have low installation cost because of light weight, dimensions and are far more flexible
- LT-XLPE Cables have better properties to withstand vibrations, hot impacts
- Jointing of LT-XLPE Cables is easier and quicker

RATING FACTORS (XLPE)

The current ratings in Table - 1 & 2 based on the normal conditions of installation as described below:

1. Maximum condr. temperature 90°C
2. Ambient air temperature 40°C
3. Ground temperature 30°C
4. Depth of laying (for cable laid directly in ground) 75 cm(1.1 kV)
5. Thermal resistivity of soil 150° C cm/W
6. Max-short-circuit conductor temperature 250° C cm/W
7. Max Ambient Air temperature 55° C

Installation method and Rating factors are given in tables 1 to 4:

Table 1

Rating for variations in ground temperature for cables laid directly in ground and in ducts

Ground temperature °C	15	20	25	30	35	40	45	50
Rating Factor	1.12	1.08	1.03	1.00	0.96	0.91	0.87	0.82

Table 2

Rating Factors for Variation in Ambient Air Temperature

Air temperature °C	25	30	35	40	45	50	55
Rating Factor	1.14	1.10	1.04	1.00	0.95	0.90	0.84

Table 3

Rating Factors of groups of cables laid directly in Ground in Horizontal formation

No. of Cables	Rating factor for Axial spacing			
	Touching	15 cm	30 cm	45 cm
2 cables	0.79	0.82	0.87	0.90
3 cables	0.69	0.75	0.79	0.83
4 cables	0.62	0.69	0.74	0.79
5 cables	0.58	0.65	0.72	0.76
6 cables	0.54	0.61	0.69	0.75

Table 4

Rating Factors for Variation in Depth of laying in Ground

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

TABLE 5A- CURRENT RATINGS - XLPE CABLES
SINGLE CORE(2 CABLES) UNARMOURED / ARMOURED CABLES ACCORDING TO IS 7098-1

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

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

TABLE 5B- CURRENT RATINGS - XLPE CABLES
SINGLE CORE(3 CABLES) UNARMOURED / ARMOURED CABLES ACCORDING TO IS 7098-1

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

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

TABLE 5C- CURRENT RATINGS - XLPE CABLES
TWO CORES UNARMOURED / ARMOURED CABLES ACCORDING TO IS 7098-1

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

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

TABLE 5D- CURRENT RATINGS - XLPE CABLES
3,3.5,4,5 CORES UNARMOURED / ARMOURED CABLES ACCORDING TO IS 7098-1

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

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

TABLE 5E THICKNESSES - XLPE CABLES

INSULATION, INNERSHEATH, OUTERSHEATH THICKNESSES OF XLPE INSULATED CABLES ACCORDING TO IS 7098-1

Conductor cross sectional Area	Nominal Insulation Thickness		Minimum Innersheath Thickness				Minimum Outersheath Thickness (Flat strip armoured cable)					Minimum Outersheath Thickness (Round wire armoured cable)					Nominal Outersheath Thickness (Unarmoured cable)				
	Single Core Armoured	Multicore & Single Core Unarmoured	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core
sqmm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.50	-	0.70	0.30	0.30	-	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
2.50	-	0.70	0.30	0.30	-	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
4	-	0.70	0.30	0.30	-	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
6	-	0.70	0.30	0.30	-	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
10	-	0.70	0.30	0.30	-	0.30	-	-	-	-	-	-	1.24	1.24	-	1.40	1.80	1.80	1.80	-	1.80
16	1.00	0.70	0.30	0.30	-	0.30	-	-	1.24	-	1.40	1.24	1.40	1.40	-	1.40	1.80	1.80	1.80	-	1.80
25	1.20	0.90	0.30	0.30	0.30	0.30	-	1.40	1.40	1.40	1.40	1.24	1.40	1.40	1.40	1.40	1.80	2.00	2.00	2.00	2.00
35	1.20	0.90	0.30	0.30	0.30	0.30	-	1.40	1.40	1.40	1.40	1.24	1.40	1.40	1.40	1.40	1.80	2.00	2.00	2.00	2.00
50	1.30	1.00	0.30	0.30	0.30	0.30	-	1.40	1.40	1.40	1.56	1.24	1.40	1.56	1.56	1.56	1.80	2.00	2.00	2.00	2.00
70	1.40	1.10	0.30	0.40	0.40	0.40	-	1.56	1.56	1.56	1.56	1.24	1.56	1.56	1.56	1.56	1.80	2.00	2.20	2.20	2.20
95	1.40	1.10	0.40	0.40	0.40	0.40	1.40	1.56	1.56	1.56	1.56	1.40	1.56	1.56	1.56	1.72	1.80	2.20	2.20	2.20	2.20
120	1.50	1.20	0.40	0.40	0.40	0.50	1.40	1.56	1.56	1.72	1.72	1.40	1.56	1.72	1.72	1.88	1.80	2.20	2.20	2.20	2.40
150	1.70	1.40	0.40	0.50	0.50	0.50	1.40	1.72	1.72	1.72	1.88	1.40	1.72	1.88	1.88	2.04	2.00	2.20	2.40	2.40	2.60
185	1.90	1.60	0.50	0.50	0.50	0.50	1.40	1.72	1.88	1.88	2.04	1.40	1.88	2.04	2.04	2.20	2.00	2.40	2.60	2.60	2.80
240	2.00	1.70	0.50	0.60	0.60	0.60	1.40	1.88	2.04	2.04	2.20	1.40	2.04	2.20	2.20	2.36	2.00	2.60	2.80	2.80	3.00
300	2.10	1.80	0.60	0.60	0.60	0.70	1.56	2.04	2.20	2.20	2.36	1.56	2.20	2.36	2.36	2.52	2.00	2.80	3.00	3.00	3.20
400	2.40	2.00	0.60	0.70	0.70	0.70	1.56	2.36	2.52	2.52	2.68	1.56	2.36	2.68	2.68	2.84	2.20	3.00	3.20	3.40	3.60
500	2.60	2.20	0.70	0.70	0.70	0.70	1.56	2.52	2.68	2.68	2.84	1.56	2.68	2.84	2.84	3.00	2.20	3.40	3.60	3.60	3.80
630	2.80	2.40	0.70	0.70	0.70	0.70	1.72	2.68	2.84	3.00	3.00	1.72	2.84	3.00	3.00	3.00	2.20	3.60	3.80	4.00	4.00
800	3.10	2.60	-	-	-	-	1.72	-	-	-	-	1.88	-	-	-	-	2.40	-	-	-	-
1000	3.30	2.80	-	-	-	-	1.88	-	-	-	-	2.04	-	-	-	-	2.60	-	-	-	-

TABLE 5F - OVERALL DIAMETER (OD) - XLPE CABLES
OVERALL DIAMETER OF XLPE INSULATED CABLES ACCORDING TO IS 7098-1

Conductor cross sectional Area	Approximate O.D. (+/-2 mm) - Unarmoured					Approximate O.D. (+/-2 mm) - Flat strip armoured					Approximate O.D. (+/-2 mm) - Round wire armoured					Nominal Diameter of Round wire armour				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.50	7.0	12	12	-	13	-	-	-	-	-	-	13	14	-	15	-	1.40	1.40	-	1.40
2.50	7.5	12	13	-	14	-	-	-	-	-	-	14	15	-	16	-	1.40	1.40	-	1.40
4	8.0	14	14	-	15	-	-	-	-	-	-	15	16	-	17	-	1.40	1.40	-	1.40
6	9.0	15	15	-	17	-	-	-	-	-	-	16	17	-	18	-	1.40	1.40	-	1.40
10	10	17	17	-	19	-	-	-	-	-	-	18	19	-	21	-	1.40	1.40	-	1.40
16	11	16	17	-	19	-	17	18	-	21	13	18	20	-	22	1.40	1.40	1.60	-	1.60
25	12	19	21	23	23	-	20	22	24	24	14	21	23	25	25	1.40	1.60	1.60	1.60	1.60
35	13	21	23	25	25	-	22	24	26	26	16	23	25	27	27	1.40	1.60	1.60	1.60	1.60
50	14	23	25	28	28	-	24	26	29	30	17	25	28	31	31	1.40	1.60	1.60	1.60	1.60
70	16	26	29	32	33	-	28	30	33	34	19	29	32	35	36	1.40	1.60	2.00	2.00	2.00
95	18	29	32	36	36	20	30	33	37	37	21	32	35	39	39	1.60	2.00	2.00	2.00	2.00
120	20	31	34	38	39	22	32	35	39	40	23	34	37	41	43	1.60	2.00	2.00	2.00	2.00
150	22	34	38	43	44	23	36	39	43	45	25	38	42	46	48	1.60	2.00	2.00	2.00	2.50
185	24	39	43	47	49	25	39	43	48	49	27	42	47	52	53	1.60	2.00	2.50	2.50	2.50
240	26	43	48	53	55	28	44	49	54	55	29	47	52	57	59	1.60	2.50	2.50	2.50	2.50
300	29	48	53	59	60	30	48	53	59	61	32	52	57	63	65	1.60	2.50	2.50	2.50	3.15
400	32	53	59	66	67	34	54	60	66	68	36	57	64	71	73	2.00	2.50	3.15	3.15	3.15
500	36	59	65	73	75	38	60	66	73	75	40	64	71	78	82	2.00	3.15	3.15	3.15	4.00
630	40	66	73	81	83	42	66	73	82	84	44	71	80	89	90	2.00	3.15	4.00	4.00	4.00
800	44	-	-	-	-	46	-	-	-	-	49	-	-	-	-	2.00	-	-	-	-
1000	49	-	-	-	-	51	-	-	-	-	55	-	-	-	-	2.50	-	-	-	-

TABLE 5G - WEIGHTS - XLPE CABLES

APPROX NET WEIGHT OF COPPER CONDUCTOR , XLPE INSULATED CABLES ACCORDING TO IS 7098-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	64	163	183	-	213	-	-	-	-	-	-	357	389	-	431
2.5	77	198	227	-	269	-	-	-	-	-	-	403	445	-	510
4	96	249	292	-	350	-	-	-	-	-	-	478	546	-	628
6	120	312	374	-	454	-	-	-	-	-	-	578	651	-	768
10	168	436	534	-	658	-	-	-	-	-	-	750	859	-	1039
16	231	448	607	-	775	-	-	779	-	983	310	766	1008	-	1224
25	313	669	919	1095	1180	-	860	1130	1350	1434	403	1100	1381	1621	1721
35	410	868	1210	1390	1563	-	1079	1441	1664	1837	509	1347	1735	1979	2167
50	540	1139	1604	1871	2083	-	1393	1878	2187	2423	651	1681	2232	2580	2792
70	737	1542	2221	2586	2892	-	1861	2557	2963	3267	858	2186	3102	3593	3898
95	995	2098	3002	3495	3926	1078	2433	3379	3910	4365	1174	3005	4009	4626	5090
120	1228	2561	3687	4360	4909	1318	2915	4083	4852	5361	1424	3517	4775	5601	6173
150	1502	3095	4542	5230	5996	1578	3520	4997	5746	6505	1695	4208	5781	6621	7783
185	1852	3884	5648	6594	7457	1943	4338	6136	7167	8023	2067	5123	7394	8541	9441
240	2392	5038	7388	8575	9752	2487	5550	7956	9200	10392	2628	6784	9371	10798	12012
300	2953	6285	9157	10605	12091	3087	6854	9779	11306	12806	3242	8229	11297	13024	15249
400	3779	7969	11632	13501	15435	3924	8635	12353	14263	16233	4181	10148	14780	16973	18966
500	4791	10159	14839	17198	19605	4949	10822	15571	18051	20467	5237	13249	18243	21047	24720
630	6118	12970	18984	21999	25099	6323	13725	19803	23040	26185	6654	16374	23991	27558	30763
800	7817	-				8018					8416				
1000	9691	-				9899					10517				

TABLE 5H- WEIGHTS - XLPE CABLES

APPROX NET WEIGHT OF ALUMIMIUM CONDUCTOR , XLPE INSULATED CABLES ACCORDING TO IS 7098-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Nett Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	77	219	239	-	277	-	-	-	-	-	-	472	505		578
6	91	265	292	-	341	-	-	-	-	-	-	555	594		678
10	106	311	347	-	409	-	-	-	-	-	-	625	672		789
16	132	264	332	-	408	-	-	503	-	617	211	583	732	-	858
25	168	377	481	566	595	-	568	692	821	850	259	808	943	1091	1137
35	204	453	587	675	733	-	664	818	950	1006	303	932	1113	1264	1337
50	254	561	737	858	927	-	815	1011	1173	1266	365	1103	1365	1567	1636
70	333	726	997	1155	1260	-	1045	1333	1531	1635	454	1370	1879	2162	2267
95	422	940	1265	1468	1609	505	1274	1641	1883	2048	600	1846	2271	2599	2773
120	510	1111	1512	1777	2009	601	1465	1908	2269	2461	707	2067	2600	3018	3273
150	631	1335	1903	2183	2478	707	1761	2358	2699	2986	824	2449	3142	3574	4264
185	765	1688	2355	2722	3066	856	2143	2843	3294	3631	980	2927	4100	4668	5050
240	945	2116	3005	3467	3908	1040	2628	3574	4093	4548	1181	3862	4989	5690	6168
300	1143	2630	3674	4242	4780	1277	3199	4296	4944	5495	1432	4573	5814	6662	7938
400	1461	3287	4609	5380	6071	1606	3953	5330	6142	6869	1863	5466	7756	8852	9602
500	1817	4152	5827	6726	7590	1975	4814	6560	7579	8452	2263	7241	9232	10575	12705
630	2269	5196	7324	8511	9552	2475	5951	8143	9552	10638	2806	8601	12331	14071	15216
800	2878					3079					3477				
1000	3592					3800					4418				

LT POWER CABLE - PVC

Power cables are used to transmit and distribute electrical energy. Power cables are commonly used in urban under-ground power grids, power station lead-out lines, power supply within industrial and mining enterprises, and over-the-river transmission lines. PVC insulated cables are manufactured up to 1000 sqmm(Single Core) and 630sqmm (Multi Core) conforming to IS, IEC & BS standards. PVC insulated cables are suitable for use on AC single phase or three phase (earthed or unearthed) systems for rated voltage upto and including 1100 volts. These cables can be used on DC systems for rated voltage up to and including 1500 volts to earth.

PVC INSULATED CABLE

- HIGH DIELECTRIC STRENGTH & RESISTANCE TO DC VOLTAGE EFFECTS
- HIGH MECHANICAL STRENGTH & RESISTANCE TO ABRASION, VIBRATION & AGEING
- RESISTANT TO MOST ACIDS, ALKALIES, TO TEMPORARY CONTACT WITH SOLVENTS, OILS AND LIQUID FLUIDS

The current ratings in Table - 6 & 7 based on the normal conditions of installation as described below:

1. Maximum condr. temperature	70° C	5. Thermal resistivity of soil	150° C cm/W
2. Ambient air temperature	40° C	6. Thermal resistivity of cable	650° C cm/W
3. Ground temperature	30° C	7. Max. short-circuit conductor temperature	160° C
4. Depth of laying (for cable laid directly in ground)	75 cm(1.1 kV)	8. Max. ambient air temperature	55° C
		9. Min. ambient air temperature	-15° C

Installation method and Rating factors are given in tables 6 to 11

Table 6

Rating for variations in ground temperature for cables laid directly in ground and in ducts

Ground temperature (°C)	15	20	25	30	35	40	45	50	55
Rating factor	1.17	1.12	1.06	1.0	0.94	0.87	0.79	0.70	0.60

Table 7

Rating factors for variation in ambient air temperature

Air temperature (°C)	25	30	35	40	45	50	55
Rating factor	1.25	1.16	1.09	1.0	0.90	0.80	0.69

Table 8

Rating factors of groups of twin and multicore cables laid directly in ground in horizontal formation

No. of cables	Rating factor for axial spacing				
	Touching	15 cm	30 cm	45 cm	60 cm
2 cables	0.78	0.81	0.85	0.88	0.90
3 cables	0.68	0.71	0.77	0.81	0.83
4 cables	0.61	0.65	0.72	0.76	0.79
6 cables	0.53	0.58	0.66	0.71	0.76
8 cables	0.48	0.54	0.62	0.67	0.72

Table 9

Rating Factors of groups of Twin and Multicore cables laid directly in Ground in Tier formation

No. of cables	Rating factor for axial spacing				
	Touching	15 cm	30 cm	45 cm	60 cm
4 cables	0.60	0.67	0.73	0.76	0.78
6 cables	0.51	0.57	0.63	0.67	0.69
8 cables	0.45	0.51	0.57	0.59	0.61

Table 10

Rating factors for variation in depth of laying in ground

Depth of laying (cms)	75	90	105	120	150	150 & above
Rating factor upto 25 sq. mm.	1.00	0.99	0.98	0.97	0.96	0.95

Table 11

Group rating factors for cables installed in Ground, separated by more than 7 cms.

No. of cables	1	2	3	4	5	6
Single core D.C. cables & multicore power cables	1.0	0.90	0.80	0.75	0.70	0.65
Single core A.C. cables	1.0	0.80	0.75	0.70	0.65	0.60

TABLE 12A- CURRENT RATINGS - PVC/HR PVC CABLES
SINGLE CORE (2 CABLES) UNARMOURED / ARMOURED CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Direct in Ground (30 °C) Amp.				In Duct (30 °C) Amp.				In Air (40 °C) Amp.			
	Copper		Aluminium		Copper		Aluminium		Copper		Aluminium	
sqmm	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC
1.50	25	29	21	24	23	27	19	22	24	29	18	22
2.50	35	41	28	32	31	36	25	29	32	38	25	30
4	46	53	36	42	42	49	33	38	43	52	32	38
6	57	66	44	51	54	63	42	49	54	65	41	49
10	75	87	59	68	72	84	56	65	72	86	56	67
16	94	109	75	87	92	107	71	82	92	110	72	86
25	125	145	97	113	120	139	93	108	125	150	99	119
35	150	174	120	139	140	162	110	128	155	186	120	144
50	180	209	145	168	165	191	130	151	190	228	150	180
70	220	255	170	197	200	232	155	180	235	282	185	222
95	265	307	205	238	230	267	180	209	275	330	215	258
120	300	348	230	267	255	296	200	232	310	372	240	288
150	340	394	265	307	280	325	220	255	345	414	270	324
185	380	441	300	348	305	354	240	278	390	468	305	366
240	420	487	335	389	340	394	270	313	445	534	350	420
300	465	539	370	429	370	429	295	342	500	600	395	474
400	500	580	410	476	405	470	335	389	570	684	455	546
500	540	626	435	505	430	499	355	412	610	732	490	588
630	590	684	485	563	465	539	395	458	680	816	560	672
800												
1000												

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

TABLE 12B- CURRENT RATINGS - PVC/HR PVC CABLES
SINGLE CORE (3 CABLES) UNARMOURED / ARMOURED CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Direct in Ground (30 °C) Amp.				In Duct (30 °C) Amp.				In Air (40 °C) Amp.			
	Copper		Aluminium		Copper		Aluminium		Copper		Aluminium	
sqmm	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC
1.50	22	26	17	20	21	24	17	20	20	24	15	18
2.50	30	35	24	28	29	34	24	28	27	32	21	25
4	39	45	31	36	38	44	30	35	35	42	27	32
6	49	57	39	45	48	56	37	43	44	53	35	42
10	65	75	51	59	64	74	51	59	60	72	47	56
16	85	99	66	77	83	96	65	75	82	98	64	77
25	110	128	86	100	110	128	84	97	110	132	84	101
35	130	151	100	116	125	145	100	116	130	156	105	126
50	155	180	120	139	150	174	115	133	165	198	130	156
70	190	220	140	162	175	203	135	157	205	246	155	186
95	220	255	175	203	200	232	155	180	245	294	190	228
120	250	290	195	226	220	255	170	197	280	336	220	264
150	280	325	220	255	245	284	190	220	320	384	250	300
185	305	354	240	278	260	302	210	244	370	444	290	348
240	345	400	270	313	285	331	225	261	425	510	335	402
300	375	435	295	342	310	360	245	284	475	570	380	456
400	400	464	325	377	335	389	275	319	550	660	435	522
500	425	493	345	400	355	412	295	342	590	708	480	576
630	470	545	390	452	375	435	320	371	660	792	550	660
800												
1000												

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

TABLE 12C- CURRENT RATINGS - PVC/HR PVC CABLES
TWO CORES UNARMOURED / ARMOURED CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Direct in Ground (30 °C) Amp.				In Duct (30 °C) Amp.				In Air (40 °C) Amp.			
	Copper		Aluminium		Copper		Aluminium		Copper		Aluminium	
sqmm	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC
1.50	23	27	18	21	20	23	16	19	20	24	16	19
2.50	32	37	25	29	27	31	21	24	27	32	21	25
4	41	48	32	37	35	41	27	31	35	42	27	32
6	50	58	40	46	44	51	34	39	45	54	35	42
10	70	81	55	64	58	67	45	52	60	72	47	56
16	90	104	70	81	75	87	58	67	78	94	59	71
25	115	133	90	104	97	113	76	88	105	126	78	94
35	140	162	110	128	120	139	92	107	125	150	99	119
50	165	191	135	157	145	168	115	133	155	186	125	150
70	205	238	160	186	180	209	140	162	195	234	150	180
95	240	278	190	220	215	249	170	197	230	276	185	222
120	275	319	210	244	235	273	190	220	265	318	210	252
150	310	360	240	278	270	313	210	244	305	366	240	288
185	350	406	275	319	300	348	240	278	350	420	275	330
240	405	470	320	371	345	400	275	319	410	492	325	390
300	450	522	355	412	385	447	305	354	465	558	365	438
400	490	568	385	447	425	493	345	400	530	636	420	504
500												
630												
800												
1000												

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

TABLE 12D- CURRENT RATINGS - PVC/HR PVC CABLES
3,3.5,4,5 CORES UNARMOURED / ARMOURED CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Direct in Ground (30 °C) Amp.				In Duct (30 °C) Amp.				In Air (40 °C) Amp.			
	Copper		Aluminium		Copper		Aluminium		Copper		Aluminium	
sqmm	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC	"A" PVC	"C" HR PVC
1.50	21	24	16	19	17	20	14	16	17	20	13	16
2.50	27	31	21	24	24	28	18	21	24	29	18	22
4	36	42	28	32	30	35	23	27	30	36	23	28
6	45	52	35	41	38	44	30	35	39	47	30	36
10	60	70	46	53	50	58	39	45	52	62	40	48
16	77	89	60	70	64	74	50	58	66	79	51	61
25	99	115	76	88	81	94	63	73	90	108	70	84
35	120	139	92	107	99	115	77	89	110	132	86	103
50	145	168	110	128	125	145	95	110	135	162	105	126
70	175	203	135	157	150	174	115	133	165	198	130	156
95	210	244	165	191	175	203	140	162	200	240	155	186
120	240	278	185	215	195	226	155	180	230	276	180	216
150	270	313	210	244	225	261	175	203	265	318	205	246
185	300	348	235	273	255	296	200	232	305	366	240	288
240	345	400	275	319	295	342	235	273	355	426	280	336
300	385	447	305	354	335	389	260	302	400	480	315	378
400	425	493	335	389	360	418	290	336	455	546	375	450
500												
630												
800												
1000												

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

TABLE 12E THICKNESSES - PVC/HR PVC CABLES

INSULATION, INNERSHEATH, OUTERSHEATH THICKNESSES OF PVC/HRPVC INSULATED CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Nominal Insulation Thickness		Minimum Innersheath Thickness				Minimum Outersheath Thickness (Flat strip armoured cable)					Minimum Outersheath Thickness (Round wire armoured cable)					Nominal Outersheath Thickness (Unarmoured cable)				
	Single Core Armoured	Multicore & Single Core Unarmoured	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core	1 Core	2 Core	3 Core	3.5 Core	4 Core
sqmm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.50	-	0.80	0.30	0.30	0.30	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
2.50	-	0.90	0.30	0.30	0.30	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
4	-	1.00	0.30	0.30	0.30	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
6	-	1.00	0.30	0.30	0.30	0.30	-	-	-	-	-	-	1.24	1.24	-	1.24	1.80	1.80	1.80	-	1.80
10	-	1.00	0.30	0.30	0.30	0.30	-	-	-	-	1.40	-	1.24	1.40	-	1.40	1.80	1.80	1.80	-	1.80
16	-	1.00	0.30	0.30	0.30	0.30	-	1.40	1.40	-	1.40	-	1.40	1.40	-	1.40	1.80	1.80	1.80	-	2.00
25	1.50	1.20	0.30	0.30	0.30	0.30	1.24	1.40	1.40	1.40	1.40	1.24	1.40	1.40	1.40	1.40	1.80	2.00	2.00	2.00	2.00
35	1.50	1.20	0.30	0.30	0.30	0.30	1.24	1.40	1.40	1.40	1.40	1.24	1.40	1.40	1.40	1.56	1.80	2.00	2.00	2.00	2.00
50	1.70	1.40	0.30	0.30	0.30	0.40	1.24	1.40	1.56	1.56	1.56	1.24	1.56	1.56	1.56	1.56	1.80	2.00	2.00	2.00	2.20
70	1.70	1.40	0.30	0.40	0.40	0.40	1.24	1.56	1.56	1.56	1.56	1.40	1.56	1.56	1.56	1.56	1.80	2.00	2.20	2.20	2.20
95	1.90	1.60	0.40	0.40	0.40	0.40	1.40	1.56	1.56	1.56	1.72	1.40	1.56	1.72	1.72	1.72	1.80	2.20	2.20	2.20	2.40
120	1.90	1.60	0.40	0.40	0.50	0.50	1.40	1.56	1.72	1.72	1.88	1.40	1.72	1.72	1.88	1.88	2.00	2.20	2.20	2.40	2.40
150	2.10	1.80	0.40	0.50	0.50	0.50	1.40	1.72	1.88	1.88	1.88	1.40	1.72	1.88	1.88	2.04	2.00	2.40	2.40	2.40	2.60
185	2.30	2.00	0.50	0.50	0.50	0.60	1.40	1.88	1.88	2.04	2.04	1.40	1.88	2.04	2.04	2.20	2.00	2.40	2.60	2.60	2.80
240	2.50	2.20	0.50	0.60	0.60	0.60	1.40	2.04	2.20	2.20	2.36	1.56	2.04	2.20	2.36	2.36	2.00	2.60	2.80	3.00	3.00
300	2.70	2.40	0.60	0.60	0.60	0.70	1.56	2.20	2.36	2.36	2.52	1.56	2.20	2.36	2.52	2.68	2.00	2.80	3.00	3.20	3.40
400	3.00	2.60	0.70	0.70	0.70	0.70	1.56	2.36	2.52	2.68	2.84	1.56	2.52	2.68	2.68	2.84	2.20	3.20	3.40	3.40	3.60
500	3.40	3.00	0.70	0.70	0.70	0.70	1.56	2.68	2.84	2.84	3.00	1.72	2.84	3.00	3.00	3.00	2.20	3.40	3.60	3.80	4.00
630	3.90	3.40	0.70	0.70	0.70	0.70	1.72	2.84	3.00	3.00	3.00	1.88	3.00	3.00	3.00	3.00	2.40	3.80	4.00	4.00	4.00
800	3.90	3.40	-	-	-	-	1.88	-	-	-	-	1.88	-	-	-	-	2.40	-	-	-	-
1000	3.90	3.40	-	-	-	-	2.04	-	-	-	-	2.04	-	-	-	-	2.60	-	-	-	-

TABLE 12F - OVERALL DIAMETER (OD) - PVC/HR PVC CABLES

OVERALL DIAMETER OF PVC/HR PVC INSULATED CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Approximate O.D. (+/-2 mm) - Unarmoured					Approximate O.D. (+/-2 mm) - Flat strip armoured					Approximate O.D. (+/-2 mm) - Round wire armoured					Nominal Diameter of Round wire armour				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.50	7.0	12	12	-	13	-	-	-	-	-	-	14	14	-	15	-	1.40	1.40	-	1.40
2.50	8.0	13	14	-	15	-	-	-	-	-	-	15	16	-	17	-	1.40	1.40	-	1.40
4	8.5	15	15	-	17	-	-	-	-	-	-	17	18	-	19	-	1.40	1.40	-	1.40
6	9.0	16	17	-	18	-	-	-	-	-	-	18	19	-	20	-	1.40	1.40	-	1.40
10	10	17	18	-	20	-	-	-	-	22	-	20	21	-	23	-	1.40	1.40	-	1.60
16	11	18	19	-	21	-	19	20	-	22	-	20	21	-	23	-	1.60	1.60	-	1.60
25	13	20	23	25	25	-	21	23	25	26	15	23	24	27	27	1.40	1.60	1.60	1.60	1.60
35	14	22	24	27	27	-	23	25	27	28	16	24	26	29	29	1.40	1.60	1.60	1.60	1.60
50	16	25	28	30	32	-	26	29	32	32	18	28	30	33	34	1.40	1.60	1.60	1.60	2.00
70	17	28	31	33	36	-	29	32	35	35	20	30	34	37	37	1.40	1.60	2.00	2.00	2.00
95	19	32	36	38	41	21	33	36	40	40	22	35	38	42	42	1.60	2.00	2.00	2.00	2.00
120	21	33	37	42	43	23	34	37	42	43	24	36	39	44	45	1.60	2.00	2.00	2.00	2.00
150	23	36	41	45	48	25	37	41	46	47	26	39	43	48	50	1.60	2.00	2.00	2.00	2.50
185	25	40	46	50	53	27	41	45	51	52	28	43	49	54	55	1.60	2.00	2.50	2.50	2.50
240	28	45	52	57	60	29	46	51	57	58	31	49	54	60	61	1.60	2.50	2.50	2.50	2.50
300	30	50	57	63	66	32	51	56	63	64	33	54	59	67	69	1.60	2.50	2.50	3.15	3.15
400	34	56	64	70	74	36	57	62	70	72	38	61	67	74	76	2.00	3.15	3.15	3.15	3.15
500	38	63	71	79	83	40	63	70	78	81	42	68	75	85	87	2.00	3.15	3.15	4.00	4.00
630	43	70	80	89	92	45	71	79	88	90	47	78	85	94	96	2.00	4.00	4.00	4.00	4.00
800	47	-	-	-	-	49	-	-	-	-	51	-	-	-	-	2.00	-	-	-	-
1000	51	-	-	-	-	54	-	-	-	-	56	-	-	-	-	2.50	-	-	-	-

TABLE 12G - WEIGHTS - PVC/HR PVC CABLES
APPROX NET WEIGHT OF PVC/HR PVC INSULATED COPPER CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	70	184	210	-	246	-	-	-	-	-	-	384	434	-	483
2.5	87	235	272	-	323	-	-	-	-	-	-	471	520	-	596
4	111	305	359	-	433	-	-	-	-	-	-	578	656	-	754
6	138	376	450	-	547	-	-	-	-	-	-	673	772	-	906
10	187	511	625	-	771	-	-	-	-	1055	-	857	1013	-	1263
16	256	507	689	-	901	-	698	902	-	1116	350	898	1112	-	1369
25	352	749	1030	1232	1324	-	965	1267	1513	1605	452	1201	1529	1793	1884
35	454	959	1337	1543	1729	-	1196	1595	1844	2029	564	1458	1882	2167	2377
50	601	1273	1793	2093	2360	-	1553	2141	2487	2722	728	1873	2457	2855	3298
70	801	1685	2428	2832	3163	-	2033	2791	3236	3566	958	2366	3341	3868	4225
95	1088	2311	3304	3854	4361	1299	2646	3707	4321	4846	1290	3273	4398	5100	5593
120	1347	2782	4004	4820	5334	1555	3164	4460	5302	5875	1547	3825	5149	6140	6678
150	1619	3383	4913	5665	6487	1855	3803	5433	6251	7050	1853	4492	6208	7110	8363
185	1998	4191	6095	7132	8097	2249	4685	6637	7781	8716	2250	5485	7890	9167	10166
240	2577	5436	7969	9313	10520	2855	5993	8611	9986	11265	2879	7271	9999	11617	12863
300	3189	6783	9881	11510	13113	3516	7400	10606	12258	13873	3516	8813	12146	14744	16405
400	4066	8640	12590	14545	16625	4417	9282	13306	15422	17538	4512	11493	15755	18153	20289
500	5169	10978	16030	18655	21260	5557	11747	16898	19574	22326	5699	14266	19761	23922	26552
630	6647	14133	20652	23855	27225	7098	14927	21695	25028	28445	7264	18877	25840	29768	33240
800	8347	-				8933					9016				
1000	10260	-				10899					11174				

TABLE 12H - WEIGHTS - PVC/HR PVC CABLES
APPROX NET WEIGHT OF PVC /HR PVC INSULATED ALUMINIUM CABLES ACCORDING TO IS 1554-1

Conductor cross sectional Area	Approximate Net Weight - Unarmoured					Approximate Net Weight - Flat strip armoured					Approximate Net Weight - Round wire armoured				
	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core	1Core	2Core	3Core	3.5Core	4Core
sqmm	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km	kg/km
1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	90	259	288	-	337	-	-	-	-	-	-	529	583	-	652
6	105	310	347	-	409	-	-	-	-	-	-	601	664	-	757
10	128	382	432	-	515	-	-	-	-	793	-	730	833	-	1001
16	157	320	408	-	527	-	511	622	-	742	250	711	831	-	994
25	204	451	583	691	728	-	667	820	973	1008	305	903	1082	1252	1288
35	245	536	702	814	882	-	773	959	1115	1182	354	1034	1247	1438	1530
50	309	683	908	1059	1180	-	963	1256	1452	1542	436	1283	1572	1820	2118
70	389	853	1179	1372	1498	-	1201	1543	1776	1901	546	1534	2092	2408	2560
95	503	1129	1531	1786	1997	647	1464	1934	2253	2482	705	2091	2625	3032	3229
120	615	1303	1785	2185	2375	751	1684	2241	2667	2916	815	2346	2929	3504	3719
150	730	1588	2220	2556	2897	889	2008	2740	3142	3460	964	2696	3515	4001	4772
185	889	1950	2734	3180	3615	1061	2444	3276	3829	4235	1141	3244	4529	5215	5685
240	1101	2454	3497	4101	4557	1289	3012	4139	4774	5302	1403	4289	5527	6405	6900
300	1342	3053	4286	5018	5653	1571	3670	5011	5765	6413	1669	5083	6551	8252	8945
400	1701	3862	5423	6258	7069	1943	4504	6139	7135	7983	2147	6715	8588	9866	10734
500	2134	4848	6835	7969	9000	2402	5617	7703	8888	10065	2664	8136	10566	13236	14292
630	2720	6201	8754	10091	11361	3037	6995	9797	11265	12580	3337	10945	13942	16005	17376
800	3307					3697					3976				
1000	4037					4462					4951				

TABLE 13A: TECHNICAL DATA FOR CLASS-2 CONDUCTOR AS PER IS: 8130 - 1984

Conductor cross sectional Area (Note 1)	Minimum No of wires				Maximum D.C. Resistance			Maximum A.C. Resistance			Maximum A.C. Resistance			Maximum A.C. Resistance		
	Non Compacted		Compacted		@ 20°C			@ 90°C (XLPE)			@ 70°C (PVC)			@ 85°C (HR PVC)		
	Circular		(Circular / Shaped)		Plain Copper	Tinned Copper	Aluminium	Plain Copper	Tinned Copper	Aluminium	Plain Copper	Tinned Copper	Aluminium	Plain Copper	Tinned Copper	Aluminium
sq.mm	CU	AL	CU	AL	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km
1.5	3	3	-	-	12.1	12.2	18.1	15.5	15.63	23.17	14.50	14.62	21.70	15.20	15.33	22.80
2.5	3	3	-	-	7.41	7.56	12.1	9.48	9.67	15.5	8.90	9.08	14.50	9.30	9.49	15.30
4	7	3	-	-	4.61	4.7	7.41	5.9	6.01	9.48	5.52	5.63	8.90	5.79	5.90	9.35
6	7	3	-	-	3.08	3.11	4.61	3.94	3.98	5.9	3.69	3.73	5.54	3.87	3.91	5.82
10	7	7	6	-	1.83	1.84	3.08	2.34	2.35	3.94	2.19	2.20	3.70	2.30	2.31	3.89
16	7	7	6	6	1.15	1.16	1.91	1.47	1.48	2.44	1.38	1.39	2.30	1.44	1.45	2.41
25	7	7	6	6	0.727	0.734	1.2	0.93	0.94	1.54	0.87	0.88	1.44	0.913	0.92	1.51
35	7	7	6	6	0.524	0.529	0.868	0.671	0.68	1.11	0.63	0.64	1.04	0.658	0.66	1.10
50	19	19	6	6	0.387	0.391	0.641	0.495	0.5	0.82	0.464	0.469	0.770	0.486	0.491	0.809
70	19	19	12	12	0.268	0.27	0.443	0.343	0.323	0.567	0.321	0.323	0.533	0.337	0.340	0.559
95	19	19	15	15	0.193	0.195	0.32	0.247	0.25	0.41	0.232	0.234	0.385	0.243	0.246	0.404
120	37	37	18	15	0.153	0.154	0.253	0.196	0.197	0.324	0.184	0.185	0.305	0.193	0.194	0.320
150	37	37	18	15	0.124	0.126	0.206	0.159	0.162	0.264	0.150	0.152	0.249	0.157	0.160	0.261
185	37	37	30	30	0.0991	0.1	0.164	0.127	0.128	0.21	0.121	0.122	0.198	0.126	0.127	0.208
240	61	37	34	30	0.0754	0.0762	0.125	0.0965	0.0975	0.16	0.0930	0.0940	0.1520	0.0972	0.0982	0.1590
300	61	61	34	30	0.0601	0.0607	0.1	0.0769	0.0777	0.128	0.0750	0.0757	0.1220	0.0787	0.0795	0.1280
400	61	61	53	53	0.047	0.0475	0.0778	0.0602	0.0608	0.1	0.0604	0.0610	0.0961	0.0630	0.0636	0.1010
500	61	61	53	53	0.0366	0.0369	0.0605	0.0468	0.0472	0.0774	0.0490	0.0494	0.0761	0.0509	0.0513	0.0796
630	91	91	53	53	0.0283	0.0286	0.0469	0.0362	0.0366	0.06	0.0401	0.0405	0.0606	0.0416	0.0420	0.0632
800	91	91	53	53	0.0221	0.0224	0.0367	0.0283	0.0287	0.047	0.0339	0.0343	0.0495	0.0351	0.0355	0.0515
1000	91	91	53	53	0.0176	0.0177	0.0291	0.0225	0.0226	0.0372	0.0297	0.0298	0.0416	0.0306	0.0307	0.0431

Note 1 : Conductors of 1.5sq.mm to 10sq.mm can be manufactured as per class-1 solid conductor as per IS 8130.

TABLE 1B: TECHNICAL DATA FOR CLASS-5 FLEXIBLE COPPER CONDUCTOR AS PER IS: 8130 - 1984

Conductor cross sectional Area	Maximum dia of individual strand in conductor	Maximum D.C. Resistance		Maximum A.C. Resistance		Maximum A.C. Resistance		Maximum A.C. Resistance	
		@ 20°C		@ 90°C (XLPE)		@ 70°C (PVC)		@ 85°C (HR PVC)	
		Plain Copper	Tinned Copper	Plain Copper	Tinned Copper	Plain Copper	Tinned Copper	Plain Copper	Tinned Copper
sq.mm	mm	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km	ohm/km
0.50	0.21	39.00	40.10	49.76	51.16	46.69	48.01	49.16	50.54
0.75	0.21	26.00	26.70	33.18	34.07	31.14	31.98	32.84	33.72
1.00	0.21	19.50	20.00	24.89	25.53	23.36	23.96	24.68	25.30
1.50	0.26	13.30	13.70	17.03	17.54	15.94	16.41	16.71	17.21
2.50	0.26	7.98	8.21	10.21	10.50	9.58	9.86	10.02	10.31
4	0.31	4.95	5.09	6.33	6.51	5.93	6.09	6.22	6.39
6	0.31	3.30	3.39	4.22	4.34	3.95	4.06	4.15	4.26
10	0.41	1.91	1.95	2.44	2.49	2.29	2.33	2.40	2.45
16	0.41	1.21	1.24	1.55	1.58	1.45	1.49	1.52	1.55
25	0.41	0.780	0.795	0.9976	1.0167	0.933	0.951	0.980	0.999
35	0.41	0.554	0.565	0.7093	0.7233	0.666	0.679	0.696	0.710
50	0.41	0.386	0.393	0.4937	0.5027	0.463	0.471	0.485	0.494
70	0.51	0.272	0.277	0.3252	0.3315	0.304	0.310	0.320	0.326
95	0.51	0.206	0.210	0.2636	0.2687	0.248	0.252	0.259	0.264
120	0.51	0.161	0.164	0.2062	0.2100	0.194	0.197	0.203	0.207
150	0.51	0.129	0.132	0.1654	0.1692	0.156	0.160	0.163	0.167
185	0.51	0.106	0.108	0.1358	0.1383	0.129	0.132	0.135	0.137
240	0.51	0.0801	0.0817	0.1025	0.1045	0.0986	0.1005	0.1031	0.1051
300	0.51	0.0641	0.0654	0.0820	0.0837	0.0798	0.0813	0.0837	0.0854
400	0.51	0.0486	0.0495	0.0622	0.0634	0.0623	0.0634	0.0650	0.0662
500	0.61	0.0384	0.0391	0.0491	0.0500	0.0512	0.0520	0.0532	0.0541
630	0.61	0.0287	0.0292	0.0367	0.0373	0.0406	0.0412	0.0421	0.0427

TABLE: 14- CAPACITANCE
1.1kV XLPE/PVC/HR PVC INSULATED CABLES - APPROXIMATE CAPACITANCE (microfarads/km)

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

TABLE 15 - REACTANCE
1.1kV XLPE/PVC/HR PVC INSULATED CABLES - APPROXIMATE REACTANCE (ohms/km)

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

TABLE 16 A- IMPEDANCE (Plain Copper Conductor) @ 70°C, 85°C & 90°C
1.1kV XLPE/PVC/HR PVC INSULATED CABLES - APPROXIMATE IMPEDANCE (ohms/km)

Conductor cross sectional Area	XLPE			PVC			HR PVC		
	Single Core @90°C		Multicore @ 90°C	Single Core @70°C		Multicore @ 70°C	Single Core @85°C		Multicore @ 85°C
sqmm	Unarmoured	Armoured		Unarmoured	Armoured		Unarmoured	Armoured	
1.50	15.5005	-	15.5004	14.5005	-	14.5004	15.2005	-	15.2004
2.50	9.4807	-	9.4805	8.9008	-	8.9007	9.3008	-	9.3006
4	5.9010	-	5.9008	5.5212	-	5.5210	5.7912	-	5.7909
6	3.9413	-	3.9410	3.6917	-	3.6913	3.8716	-	3.8712
10	2.3421	-	2.3416	2.1925	-	2.1919	2.3024	-	2.3018
16	1.4730	1.4735	1.4723	1.3836	1.3840	1.3827	1.4435	1.4439	1.4426
25	0.9348	0.9353	0.9336	0.8756	0.8762	0.8743	0.9183	0.9189	0.9171
35	0.6773	0.6780	0.6757	0.6373	0.6379	0.6355	0.6650	0.6656	0.6633
50	0.5035	0.5041	0.5013	0.4739	0.4746	0.4715	0.4955	0.4961	0.4932
70	0.3542	0.3549	0.3511	0.3336	0.3344	0.3303	0.3491	0.3498	0.3459
95	0.2617	0.2625	0.2577	0.2490	0.2499	0.2446	0.2593	0.2601	0.2551
120	0.2139	0.2148	0.2090	0.2042	0.2051	0.1989	0.2124	0.2132	0.2072
150	0.1809	0.1820	0.1750	0.1744	0.1755	0.1681	0.1804	0.1815	0.1743
185	0.1533	0.1542	0.1463	0.1497	0.1507	0.1424	0.1537	0.1547	0.1466
240	0.1286	0.1297	0.1204	0.1278	0.1288	0.1192	0.1308	0.1319	0.1225
300	0.1141	0.1151	0.1048	0.1149	0.1159	0.1054	0.1173	0.1184	0.1080
400	0.1031	0.1045	0.0927	0.1055	0.1067	0.0947	0.1070	0.1082	0.0964
500	0.0957	0.0971	0.0845	0.0992	0.1006	0.0881	0.1002	0.1016	0.0892
630	0.0904	0.0917	0.0785	0.0948	0.0963	0.0831	0.0954	0.0970	0.0838
800	0.0873	0.0888	-	0.0913	0.0927	-	0.0918	0.0932	-
1000	0.0853	0.0866	-	0.0889	0.0901	-	0.0892	0.0904	-

TABLE 16 B- IMPEDANCE (Aluminium Conductor) @ 70°C, 85°C & 90°C
1.1kV XLPE/PVC/HR PVC INSULATED CABLES - APPROXIMATE IMPEDANCE (ohms/km)

Conductor cross sectional Area	XLPE			PVC			HR PVC		
	Single Core @90°C		Multicore @ 90°C	Single Core @70°C		Multicore @ 70°C	Single Core @85°C		Multicore @ 85°C
sqmm	Unarmoured	Armoured		Unarmoured	Armoured		Unarmoured	Armoured	
1.50	23.1703	-	23.1702	21.7004	-	21.7003	22.8003	-	22.8003
2.50	15.5004	-	15.5003	14.5005	-	14.5004	15.3005	-	15.3004
4	9.4806	-	9.4805	8.9008	-	8.9006	9.3507	-	9.3506
6	5.9009	-	5.9007	5.5411	-	5.5409	5.8211	-	5.8208
10	3.9412	-	3.9409	3.7015	-	3.7011	3.8914	-	3.8911
16	2.4418	2.4421	2.4414	2.3022	2.3024	2.3016	2.4121	2.4123	2.4116
25	1.5429	1.5432	1.5422	1.4434	1.4437	1.4426	1.5132	1.5136	1.5125
35	1.1138	1.1142	1.1128	1.0444	1.0448	1.0433	1.0146	1.0150	1.0134
50	0.8252	0.8255	0.8238	0.7760	0.7764	0.7745	0.8147	0.8151	0.8133
70	0.5738	0.5743	0.5720	0.5407	0.5412	0.5387	0.5664	0.5668	0.5644
95	0.4190	0.4195	0.4165	0.3955	0.3960	0.3927	0.4140	0.4145	0.4114
120	0.3351	0.3357	0.3320	0.3176	0.3182	0.3142	0.3320	0.3326	0.3288
150	0.2777	0.2785	0.2740	0.2644	0.2651	0.2603	0.2757	0.2764	0.2718
185	0.2269	0.2275	0.2222	0.2167	0.2174	0.2117	0.2259	0.2266	0.2211
240	0.1812	0.1819	0.1754	0.1754	0.1762	0.1693	0.1815	0.1823	0.1756
300	0.1532	0.1540	0.1464	0.1498	0.1507	0.1427	0.1548	0.1556	0.1479
400	0.1304	0.1315	0.1224	0.1293	0.1303	0.1207	0.1330	0.1340	0.1246
500	0.1138	0.1150	0.1046	0.1151	0.1163	0.1056	0.1174	0.1186	0.1081
630	0.1023	0.1034	0.0920	0.1051	0.1065	0.0947	0.1066	0.1080	0.0964
800	0.0950	0.0964	-	0.0982	0.0995	-	0.0992	0.1005	-
1000	0.0903	0.0915	-	0.0936	0.0947	-	0.0942	0.0954	-

TABLE 17 A- VOLTAGE DROP (Plain Copper Conductor) @ 70°C, 85°C & 90°C
1.1kV XLPE/PVC/HR PVC INSULATED CABLES - APPROXIMATE VOLTAGE DROP (mV/A/m)

Conductor cross sectional Area	XLPE			PVC			HR PVC		
	Single Phase @ 90°C		3 Phase @ 90°C	Single Phase @70°C		3 Phase @ 70°C	Single Phase @ 85°C		3 Phase @ 85°C
sqmm	Unarmoured	Armoured		Unarmoured	Armoured		Unarmoured	Armoured	
1.50	31.0009	-	26.8156	29.0011	-	25.0857	30.4010	-	26.2967
2.50	18.9614	-	16.4013	17.8016	-	15.3981	18.6016	-	16.0901
4	11.8020	-	10.2083	11.0424	-	9.5513	11.5823	-	10.0183
6	7.8827	-	6.8180	7.3833	-	6.3860	7.7432	-	6.6972
10	4.6841	-	4.0509	4.3850	-	3.7920	4.6047	-	3.9822
16	2.9461	2.9469	2.5470	2.7672	2.7681	2.3922	2.8869	2.8878	2.4958
25	1.8696	1.8706	1.6151	1.7512	1.7523	1.5125	1.8367	1.8377	1.5865
35	1.3546	1.3559	1.1689	1.2746	1.2759	1.0994	1.3300	1.3312	1.1474
50	1.0070	1.0083	0.8673	0.9479	0.9492	0.8157	0.9910	0.9922	0.8532
70	0.7083	0.7097	0.6075	0.6673	0.6688	0.5715	0.6981	0.6996	0.5984
95	0.5234	0.5250	0.4458	0.4981	0.4997	0.4232	0.5186	0.5202	0.4413
120	0.4279	0.4296	0.3616	0.4084	0.4102	0.3441	0.4247	0.4264	0.3585
150	0.3618	0.3640	0.3028	0.3487	0.3510	0.2908	0.3608	0.3630	0.3016
185	0.3065	0.3085	0.2532	0.2994	0.3014	0.2463	0.3075	0.3095	0.2537
240	0.2573	0.2593	0.2082	0.2555	0.2576	0.2061	0.2617	0.2637	0.2119
300	0.2282	0.2302	0.1812	0.2297	0.2319	0.1823	0.2346	0.2367	0.1869
400	0.2061	0.2091	0.1604	0.2110	0.2135	0.1639	0.2140	0.2165	0.1668
500	0.1914	0.1942	0.1461	0.1985	0.2013	0.1524	0.2004	0.2031	0.1542
630	0.1808	0.1834	0.1359	0.1896	0.1927	0.1438	0.1909	0.1940	0.1451
800	0.1746	0.1775	-	0.1826	0.1854	-	0.1836	0.1863	-
1000	0.1706	0.1732	-	0.1778	0.1803	-	0.1784	0.1809	-

TABLE 17 B- VOLTAGE DROP (Aluminium Conductor) @ 70°C, 85°C & 90°C
1.1kV XLPE/PVC INSULATED CABLES - APPROXIMATE VOLTAGE DROP (mV/A/m)

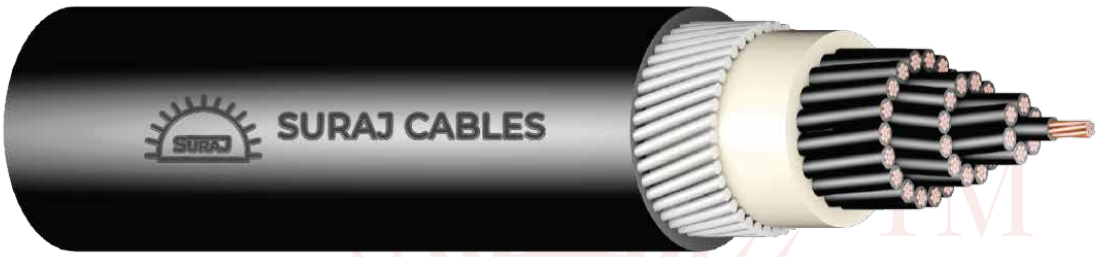
Conductor cross sectional Area	XLPE			PVC			HR PVC		
	Single Phase @90°C		3 Phase @ 90°C	Single Phase @70°C		3 Phase @ 70°C	Single Phase @85°C		3 Phase @ 85°C
sqmm	Unarmoured	Armoured		Unarmoured	Armoured		Unarmoured	Armoured	
1.50	46.3406	-	40.0845	43.4007	-	37.5415	45.6007	-	39.4445
2.50	31.0008	-	26.8156	29.0010	-	25.0857	30.6009	-	26.4697
4	18.9612	-	16.4012	17.8015	-	15.3980	18.7014	-	16.1765
6	11.8018	-	10.2082	11.0822	-	9.5857	11.6421	-	10.0700
10	7.8824	-	6.8178	7.4030	-	6.4030	7.7828	-	6.7316
16	4.8837	4.8842	4.2236	4.6043	4.6049	3.9819	4.8241	4.8246	4.1720
25	3.0858	3.0864	2.6679	2.8868	2.8875	2.4956	3.0265	3.0271	2.6165
35	2.2277	2.2284	1.9252	2.0889	2.0897	1.8050	2.0291	2.0300	1.7532
50	1.6503	1.6511	1.4252	1.5521	1.5529	1.3399	1.6295	1.6302	1.4070
70	1.1476	1.1485	0.9895	1.0814	1.0823	0.9319	1.1327	1.1336	0.9764
95	0.8380	0.8391	0.7206	0.7910	0.7921	0.6794	0.8280	0.8290	0.7117
120	0.6703	0.6714	0.5744	0.6352	0.6363	0.5436	0.6641	0.6652	0.5688
150	0.5555	0.5569	0.4740	0.5288	0.5303	0.4503	0.5514	0.5529	0.4702
185	0.4537	0.4550	0.3845	0.4334	0.4348	0.3663	0.4518	0.4531	0.3825
240	0.3624	0.3639	0.3035	0.3509	0.3524	0.2928	0.3631	0.3645	0.3038
300	0.3065	0.3080	0.2533	0.2997	0.3013	0.2469	0.3095	0.3111	0.2558
400	0.2608	0.2631	0.2117	0.2586	0.2606	0.2088	0.2660	0.2679	0.2156
500	0.2277	0.2300	0.1809	0.2301	0.2325	0.1827	0.2348	0.2372	0.1871
630	0.2046	0.2069	0.1591	0.2102	0.2130	0.1639	0.2133	0.2160	0.1668
800	0.1901	0.1928	-	0.1964	0.1990	-	0.1984	0.2010	-
1000	0.1805	0.1831	-	0.1871	0.1894	-	0.1885	0.1908	-

CONTROL CABLE - XLPE/PVC

Control cable are predominantly found within automation, process and control industries. They are used to inter-connect cable to measure, control and regulate computer programmed production machines. The flexible cables are most commonly used on production lines.

Control cables provide signal transmission among facilities at large industrial sites and commercial buildings. Such cables are shielded with PVC and XLPE insulators, ensuring superior construction. They are flame retardant, fireproof and eco-friendly according to the application. Furthermore, they are highly-shielded and thus applicable to precision equipment and are excellent at preventing intervention and external noise during signal transmission.

Cables are manufactured as per IS, BS & IEC standards as per the requirement of customers.



CONSTRUCTION:

Conductor Material:
Annealed bare / Tinned Solid / Stranded copper

Insulation Material:
XLPE / PVC Type A of IS : 5831/HR PVC (Type-C of IS : 5831)

Cores Identification:
Up to 5 core by color coding & more than 5 core either by color coding or Nos. printing on core.

Inner Sheath
Extruded PVC

Armouring
Single layer of galvanized steel round wire/Flat strip as applicable

Outer Sheath
PVC TYPE ST-1 of IS : 5831, PVC TYPE - ST-2 of IS : 5831 / FR / FRLS
Type Colour of outer sheath BLACK or any other color as per requirement

TABLE 18A - CONTROL CABLES - XLPE

1.5 sq.mm MULTICORE CONTROL XLPE INSULATED CABLES ACCORDING TO IS 7098-1

Number of Cores	Minimum Inner sheath Thickness	Minimum Outersheath Thickness		Nominal Outersheath Thickness	Round wire Diameter	Approximate Overall Diameter			Net Weight of Cable			Current Ratings			Standard Drum Length
		Round wire armoured	Flat strip armoured	Unarmoured		Round wire armoured	Flat strip armoured	Unarmoured	Round wire armoured	Flat strip armoured	Unarmoured	In Ground (30 °)	In Duct (30 °C)	In Air (40 °C)	
	mm	mm	mm	mm	mm	mm	mm	mm	kg/km	kg/km	kg/km	Amps	Amps	Amps	mtrs
2	0.30	1.24	-	1.80	1.40	13	-	12	357	-	163	33	29	29	1000
3	0.30	1.24	-	1.80	1.40	14	-	12	389	-	183	25	20	22	1000
4	0.30	1.24	-	1.80	1.40	15	-	13	431	-	213	25	20	22	1000
5	0.30	1.24	-	1.80	1.40	16	-	14	499	-	230	25	20	22	1000
6	0.30	1.24	-	1.80	1.40	16	-	15	564	-	266	22	19	19	1000
7	0.30	1.24	-	1.80	1.40	16	-	15	577	-	274	21	20	18	1000
8	0.30	1.24	-	1.80	1.40	17	-	16	636	-	309	20	17	18	1000
9	0.30	1.24	-	1.80	1.40	18	-	17	702	-	345	19	16	17	1000
10	0.30	1.24	-	1.80	1.40	20	-	18	759	-	368	18	15	16	1000
12	0.30	1.24	-	1.80	1.40	20	-	18	826	-	412	17	14	15	1000
14	0.30	1.40	-	1.80	1.40	21	-	19	931	-	462	16	13	14	1000
16	0.30	1.40	1.40	1.80	1.60	23	21	20	1083	833	515	16	13	14	1000
19	0.30	1.40	1.40	1.80	1.60	23	22	21	1179	911	577	15	12	13	1000
24	0.30	1.40	1.40	2.00	1.60	27	25	24	1436	1139	733	13	11	12	1000
27	0.30	1.40	1.40	2.00	1.60	27	26	25	1532	1218	797	13	11	11	1000
30	0.30	1.40	1.40	2.00	1.60	28	27	26	1634	1327	867	12	10	11	1000
33	0.30	1.40	1.40	2.00	1.60	29	27	27	1755	1413	940	12	9	10	1000
37	0.30	1.40	1.40	2.00	1.60	30	28	27	1891	1540	1023	11	9	10	1000
44	0.30	1.56	1.40	2.00	1.60	33	31	31	2209	1794	1197	11	8	9	1000
48	0.30	1.56	1.40	2.00	1.60	34	32	31	2330	1897	1280	11	8	9	1000
52	0.30	1.56	1.56	2.00	1.60	34	33	32	2457	2058	1367	10	8	9	1000
56	0.30	1.56	1.56	2.00	1.60	35	34	33	2603	2170	1461	10	8	9	1000
61	0.40	1.56	1.56	2.20	2.00	37	35	34	2983	2322	1596	9	8	8	1000

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

TABLE 18B - CONTROL CABLES - PVC/HR PVC
1.5 sq.mm MULTICORE CONTROL PVC/HR PVC INSULATED CABLES ACCORDING TO IS 1554-1

Number of Cores	Minimum Innersheath Thickness	Minimum Outer sheath Thickness		Nominal Outer sheath Thickness	Round wire Diameter	Approximate Overall Diameter			Net Weight of Cable			Current Ratings (TYPE "A" 70°C PVC)			Current Ratings (TYPE "C" HR 85 °C PVC)			Standard Drum Length
		Round wire armoured	Flat strip armoured	Unarmoured		Round wire armoured	Flat strip armoured	Unarmoured	Round wire armoured	Flat strip armoured	Unarmoured	In Ground (30 °C)	In Duct (30 °C)	In Air (40 °C)	In Ground (30 °C)	In Duct (30 °C)	In Air (40 °C)	
	mm	mm	mm	mm	mm	mm	mm	mm	kg/km	kg/km	kg/km	Amps	Amps	Amps	Amps	Amps	Amps	mtrs
2	0.30	1.24	-	1.80	1.40	14	-	12	384	-	184	23	20	20	27	23	24	1000
3	0.30	1.24	-	1.80	1.40	14	-	12	434	-	210	21	17	17	24	20	20	1000
4	0.30	1.24	-	1.80	1.40	15	-	13	483	-	246	21	17	17	24	20	20	1000
5	0.30	1.24	-	1.80	1.40	16	-	15	530	-	279	21	17	17	24	20	20	1000
6	0.30	1.24	-	1.80	1.40	17	-	16	597	-	323	15	13	13	17	16	16	1000
7	0.30	1.24	-	1.80	1.40	17	-	16	609	-	334	14	13	13	16	16	16	1000
8	0.30	1.24	-	1.80	1.40	18	-	17	672	-	373	14	12	12	16	14	14	1000
9	0.30	1.24	-	1.80	1.40	19	-	18	740	-	418	13	12	12	15	14	14	1000
10	0.30	1.40	-	1.80	1.40	21	-	19	827	-	451	13	11	11	15	13	13	1000
12	0.30	1.40	1.24	1.80	1.60	22	20	19	953	690	507	12	10	10	14	12	12	1000
14	0.30	1.40	1.40	1.80	1.60	23	21	20	1048	793	570	11	10	10	13	12	12	1000
16	0.30	1.40	1.40	1.80	1.60	24	22	21	1147	882	636	11	9	9	13	11	11	1000
18	0.30	1.40	1.40	1.80	1.60	24	22	21	1197	931	685	10	9	9	12	11	11	1000
19	0.30	1.40	1.40	2.00	1.60	25	23	23	1243	960	740	10	9	9	12	11	11	1000
20	0.30	1.40	1.40	2.00	1.60	26	24	24	1315	1021	780	10	8	8	11	10	10	1000
24	0.30	1.40	1.40	2.00	1.60	28	27	26	1507	1194	910	9	8	8	11	10	10	1000
25	0.30	1.40	1.40	2.00	1.60	28	27	26	1532	1219	935	9	8	8	10	9	9	1000
27	0.30	1.40	1.40	2.00	1.60	28	27	26	1605	1274	991	9	8	8	10	9	9	1000
29	0.30	1.40	1.40	2.00	1.60	29	28	27	1697	1332	1052	9	7	7	10	8	8	1000
30	0.30	1.40	1.40	2.00	1.60	29	28	27	1725	1359	1080	9	7	7	10	8	8	1000
32	0.30	1.40	1.40	2.00	1.60	30	29	28	1802	1444	1142	9	7	7	10	8	8	1000
33	0.30	1.40	1.40	2.00	1.60	30	29	28	1832	1473	1172	8	7	7	9	8	8	1000
34	0.30	1.40	1.40	2.00	1.60	31	30	29	1902	1533	1210	8	7	7	9	8	8	1000
35	0.30	1.40	1.40	2.00	1.60	31	30	29	1927	1558	1235	8	7	7	9	8	8	1000
36	0.30	1.40	1.40	2.00	1.60	31	30	29	1951	1583	1260	8	7	7	9	8	8	1000
37	0.30	1.40	1.40	2.00	1.60	31	30	29	1969	1601	1278	8	7	7	9	8	8	1000
40	0.30	1.56	1.40	2.00	1.60	33	31	30	2118	1712	1367	8	7	7	9	8	8	1000
42	0.30	1.56	1.56	2.00	1.60	31	30	29	2120	1750	1401	8	6	6	8	8	8	1000
44	0.30	1.56	1.56	2.00	1.60	35	34	33	2313	1888	1497	8	6	6	8	8	8	1000
48	0.30	1.56	1.56	2.00	1.60	35	34	33	2435	1993	1603	7	6	6	8	7	7	1000
52	0.40	1.56	1.56	2.20	2.00	37	35	34	2803	2129	1753	7	6	6	8	7	7	1000
54	0.40	1.56	1.56	2.20	2.00	37	35	34	2853	2179	1803	7	6	6	8	7	7	1000
56	0.40	1.56	1.56	2.20	2.00	38	36	35	2971	2269	1871	7	6	6	8	7	7	1000
61	0.40	1.56	1.56	2.20	2.00	39	37	36	3127	2397	2003	7	6	6	8	7	7	1000

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

TABLE 19A - CONTROL CABLES - XLPE CABLES
2.5 sq.mm MULTICORE CONTROL XLPE INSULATED CABLES ACCORDING TO IS 7098-1

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

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

TABLE 19B - CONTROL CABLES - PVC/HR PVC CABLES
2.5 sq.mm MULTICORE CONTROL PVC /HR PVC INSULATED CABLES ACCORDING TO IS 1554-1

Number of Cores	Minimum Innersheath Thickness	Minimum Outer sheath Thickness		Nominal Outer sheath Thickness	Round wire Diameter	Approximate Overall Diameter			Net Weight of Cable			Current Ratings (TYPE "A" 70°C PVC)			Current Ratings (TYPE "C" HR 85 °C PVC)			Standard Drum Length
		Round wire armoured	Flat strip armoured	Unarmoured		Round wire armoured	Flat strip armoured	Unarmoured	Round wire armoured	Flat strip armoured	Un-rmoured	In Ground (30 °C)	In Duct (30 °C)	In Air (40 °C)	In Ground (30 °C)	In Duct (30 °C)	In Air (40 °C)	
	mm	mm	mm	mm	mm	mm	mm	mm	kg/km	kg/km	kg/km	Amps	Amps	Amps	Amps	Amps	Amps	mtrs
2	0.30	1.24	-	1.80	1.40	15	-	13	471	-	235	32	27	27	37	31	32	1000
3	0.30	1.24	-	1.80	1.40	16	-	14	520	-	272	27	24	24	31	28	29	1000
4	0.30	1.24	-	1.80	1.40	17	-	15	596	-	323	27	24	24	31	28	29	1000
5	0.30	1.24	-	1.80	1.40	18	-	16	662	-	363	27	24	24	31	28	29	1000
6	0.30	1.24	-	1.80	1.40	19	-	17	748	-	425	21	18	18	24	22	22	1000
7	0.30	1.24	-	1.80	1.40	19	-	17	765	-	443	20	17	17	23	20	20	1000
8	0.30	1.40	-	1.80	1.40	21	-	19	873	-	497	19	16	16	22	19	19	1000
9	0.30	1.40	1.40	1.80	1.60	22	21	20	1021	783	559	18	15	15	21	18	18	1000
10	0.30	1.40	1.40	1.80	1.60	24	23	21	1115	849	603	18	15	15	21	18	18	1000
12	0.30	1.40	1.40	2.00	1.60	24	23	22	1213	929	709	17	14	14	20	17	17	1000
14	0.30	1.40	1.40	2.00	1.60	25	24	24	1335	1042	800	16	14	14	19	17	17	1000
16	0.30	1.40	1.40	2.00	1.60	26	25	25	1462	1159	895	15	13	13	18	16	16	1000
18	0.30	1.40	1.40	2.00	1.60	26	25	25	1535	1232	969	14	12	12	16	14	14	1000
19	0.30	1.40	1.40	2.00	1.60	28	26	26	1610	1272	1013	14	12	12	16	14	14	1000
20	0.30	1.40	1.40	2.00	1.60	29	28	27	1696	1348	1067	13	11	11	15	13	13	1000
24	0.30	1.56	1.40	2.00	1.60	32	30	30	1986	1573	1251	13	11	11	15	13	13	1000
25	0.30	1.56	1.40	2.00	1.60	32	30	30	2023	1610	1288	13	11	11	15	13	13	1000
27	0.30	1.56	1.40	2.00	1.60	33	31	30	2122	1715	1371	12	10	10	14	12	12	1000
29	0.30	1.56	1.56	2.00	1.60	33	32	31	2241	1827	1458	12	10	10	14	12	12	1000
30	0.30	1.56	1.56	2.00	1.60	34	32	31	2282	1868	1499	12	10	10	14	12	12	1000
32	0.30	1.56	1.56	2.00	1.60	35	33	32	2403	1979	1587	12	10	10	14	12	12	1000
33	0.30	1.56	1.56	2.00	1.60	35	33	32	2446	2022	1630	11	9	9	13	11	11	1000
34	0.40	1.56	1.56	2.20	2.00	37	35	34	2770	2097	1720	11	9	9	13	11	11	1000
35	0.40	1.56	1.56	2.20	2.00	37	35	34	2807	2134	1757	11	9	9	13	11	11	1000
36	0.40	1.56	1.56	2.20	2.00	37	35	34	2844	2171	1794	11	9	9	13	11	11	1000
37	0.40	1.56	1.56	2.20	2.00	37	35	34	2871	2198	1821	11	9	9	13	11	11	1000
40	0.40	1.56	1.56	2.20	2.00	38	36	35	3051	2349	1951	11	9	9	13	11	11	1000
42	0.40	1.56	1.56	2.20	2.00	37	35	34	3055	2382	2005	10	9	9	12	11	11	1000
44	0.40	1.56	1.56	2.20	2.00	41	39	38	3312	2551	2138	10	9	9	12	11	11	1000
48	0.40	1.56	1.56	2.20	2.00	41	39	39	3493	2730	2294	10	9	9	12	11	11	1000
52	0.40	1.56	1.56	2.20	2.00	42	40	40	3710	2918	2460	10	8	8	11	10	10	1000
54	0.40	1.72	1.56	2.20	2.00	43	40	40	3820	2992	2534	10	8	8	11	10	10	1000
56	0.40	1.72	1.56	2.20	2.00	44	41	41	3942	3084	2630	9	8	8	11	10	10	1000
61	0.40	1.72	1.56	2.20	2.00	45	42	42	4186	3298	2823	9	8	8	11	10	10	1000

Note : Normal current ratings are given in standard conditions, if site conditions are different, current rating should be multiplied by rating factor as given in page no. 25-27

AERIAL BUNCH CABLES

Aerial Bunch Cable (ABC) is designed for residential and rural areas for reducing the bushfire hazards. Aerial Bunch Cable is a very novel concept for Over Head Power distribution when compared to the conventional bare conductor over- head distribution system. ABC provides higher safety and reliability, lower power losses and ultimate system economy by reducing installation, maintenance and operative cost. This system is ideal for rural distribution and especially attractive for installation in difficult terrains such as hilly areas, forest areas, coastal areas etc.
Aerial Bunch Cables is also considered to be the best choice for power distribution in congested urban areas with narrow lanes and by – lanes. In developing urban complex, Aerial Bunched Cables is the better choice because of flexibility for re-routing as demanded by changes in urban development plan.

Construction of cable

The phase conductor can be of single phase or three phases. A lighting conductor can be also incorporated for street lighting. A messenger conductor supports the weight of the cable and keeps the assembly strung under tension. Phase conductors are made of concentrically stranded Aluminium Wires having 7 or 19 wires. Messenger conductors are made of Aluminium Alloy having 7 or 19 wires.

Phase and lighting conductors may be insulated with XLPE compound using Sioplas Technology. Messenger conductors are kept either bare or insulated. Phase and lighting conductors are twisted around the messenger conductor. In special cases a neutral conductor and a street light cable may also be provided separately. Generally, the messenger acts as earth and neutral.

CONFIGURATION:

Single Phase or Three Phase systems with or without Neutral Conductor and Street Light line.

Conductor:

- Phase or lighting conductor: electrical grade aluminium of H2 or H4 grade as per IS:8130
- Messenger conductor: aluminium silica and magnesium alloy, confirming IS:398 (Part-4)

Insulation

XLPE with sioplas technique

Identification of phase.

Ridges provided on the insulation of phase conductors: 1 ridge for the 1st phase , 2 ridges for the 2nd phase and 3 ridges for The 3rd phase. The neutral phase may have 4 ridges, if required.

Colour of insulation

As the cable remains exposed to environmental elements such as uv rays from sunlight, the insulation is mixed with A small amount of carbon black to prevent the deterioration of polythene.

This construction has additional advantages

- Cables are lighter in weight
- Easy to install
- Can be installed on poles, on walls etc.
- Easy to make terminations and branch off joints on live wire as well
- Protection against power theft

SURAJ 1.1 kV Aerial Bunched Cable - Aluminium Phase Conductor & Bare / Insulated Messenger Conductor Without Lighting Conductor Confirming To IS: 14255 - 1995

Sl. No.	Description & Type of Cable	No. of wires		Thickness of XLPE Insulation		Approx overall Diameter	Approx weight of Cable	Breaking Load of messenger	Maximum D.C Resistance Ohms/Km		AC Current Rating Amps
		Phase	Messenger	Phase	Messenger						
				mm	mm	mm	kg/KM	KN(min)	Phase	Messenger	In air at 40°C
	With Insulated messenger conductor										
1	1 C x 16 mm² + 25 mm² (insulated)	7	7	1.20	1.20	20.0	165	7.0	1.910	1.380	72
2	3 C x 16 mm² + 25 mm² (insulated)	7	7	1.20	1.20	22.0	301	7.0	1.910	1.380	64
3	1 C x 25 mm² + 25 mm² (insulated)	7	7	1.20	1.20	22.4	195	7.0	1.200	1.380	99
4	3 C x 25 mm² + 25 mm² (insulated)	7	7	1.20	1.20	25.0	390	7.0	1.200	1.380	84
5	1 C x 35 mm² + 25 mm² (insulated)	7	7	1.20	1.20	27.3	227	7.0	0.868	1.380	120
6	3 C x 35 mm² + 25 mm² (insulated)	7	7	1.20	1.20	27.4	486	7.0	0.868	1.380	105
7	1 C x 35 mm² + 35 mm² (insulated)	7	7	1.20	1.20	28.0	259	10.1	0.868	0.986	120
8	3 C x 35 mm² + 35 mm² (insulated)	7	7	1.20	1.20	28.4	518	10.1	0.868	0.986	105
9	1 C x 50 mm² + 35 mm² (insulated)	7	7	1.50	1.20	29.0	317	10.1	0.641	0.986	150
10	3 C x 50 mm² + 35 mm² (insulated)	7	7	1.50	1.20	32.3	692	10.1	0.641	0.986	130
11	3 C x 70 mm² + 50 mm² (insulated)	7	7	1.50	1.50	37.5	939	14.0	0.443	0.689	155
12	3 C x 70 mm² + 70 mm² (insulated)	7	7	1.50	1.50	39.0	1002	19.7	0.443	0.492	155
13	3 C x 95 mm² + 70 mm² (insulated)	19	7	1.50	1.50	42.7	1237	19.7	0.32	0.492	190
14	3 C x 120 mm² + 70 mm² (insulated)	19	7	1.60	1.50	46.0	1482	19.7	0.253	0.492	220
15	3 C x 150 mm² + 70 mm² (insulated)	19	7	1.80	1.50	50.0	1791	19.7	0.206	0.492	250
	With bare messenger conductor										
1	1 C x 16 mm² + 25 mm² (bare)	7	7	1.20	---	18.5	137	7.0	1.910	1.380	72
2	3 C x 16 mm² + 25 mm² (bare)	7	7	1.20	---	19.3	272	7.0	1.910	1.380	64
3	1 C x 25 mm² + 25 mm² (bare)	7	7	1.20	---	19.5	167	7.0	1.200	1.380	99
4	3 C x 25 mm² + 25 mm² (bare)	7	7	1.20	---	20.5	362	7.0	1.200	1.380	84
5	1 C x 35 mm² + 25 mm² (bare)	7	7	1.20	---	22.0	199	7.0	0.868	1.380	120
6	3 C x 35 mm² + 25 mm² (bare)	7	7	1.20	---	23.5	458	7.0	0.868	1.380	105
7	1 C x 35 mm² + 35 mm² (bare)	7	7	1.20	---	24.6	226	10.1	0.868	0.986	120
8	3 C x 35 mm² + 35 mm² (bare)	7	7	1.20	---	25.0	485	10.1	0.868	0.986	105
9	1 C x 50 mm² + 35 mm² (bare)	7	7	1.50	---	26.6	284	10.1	0.641	0.986	150
10	3 C x 50 mm² + 35 mm² (bare)	7	7	1.50	---	26.8	659	10.1	0.641	0.986	130
11	3 C x 70 mm² + 50 mm² (bare)	7	7	1.50	---	31.2	890	14.0	0.443	0.689	155
12	3 C x 70 mm² + 70 mm² (bare)	7	7	1.50	---	34.4	946	19.7	0.443	0.492	155
13	3 C x 95 mm² + 70 mm² (bare)	19	7	1.50	---	36.0	1179	19.7	0.32	0.492	190
14	3 C x 120 mm² + 70 mm² (bare)	19	7	1.60	---	38.0	1425	19.7	0.253	0.492	220
15	3 C x 150 mm² + 70 mm² (bare)	19	7	1.80	---	40.0	1735	19.7	0.206	0.492	250

Note: Higher cable sizes are also available.

SURAJ CABLES

SURAJ 1.1 kV Aerial Bunched Cable - Aluminium Phase Conductor & Bare / Insulated Messenger Conductor With Lighting Conductor Confirming To IS: 14255 - 1995

Sl. No.	Description & Type of Cable	No. of wires		Thickness of XLPE Insulation		Approx overall Diameter	Approx weight of Cable	Breaking Load of messenger	Maximum D.C Resistance Ohms/Km		AC Current Rating Amps
		Phase	Messenger	Phase	Messenger						
				mm	mm	mm	kg/KM	KN(min)	Phase	Messenger	In air at 40°C
	With Insulated messenger conductor										
1	3 C x 16 mm² + 25 mm²(insulated) + 16 mm²	7	7	1.20	1.20	23.5	369	7.0	1.910	1.380	62
2	3 C x 25 mm² + 25 mm²(insulated) + 16 mm²	7	7	1.20	1.20	25.0	457	7.0	1.200	1.380	82
3	3 C x 35 mm² + 25 mm²(insulated) + 16 mm²	7	7	1.20	1.20	27.5	554	7.0	0.868	1.380	103
4	3 C x 35 mm² + 35 mm²(insulated) + 16 mm²	7	7	1.20	1.20	28.4	586	10.1	0.868	0.986	103
5	3 C x 50 mm² + 35 mm²(insulated) + 16 mm²	7	7	1.50	1.20	32.5	760	10.1	0.641	0.986	127
6	3 C x 70 mm² + 50 mm²(insulated) + 16 mm²	7	7	1.50	1.50	37.4	1007	14.0	0.443	0.689	154
7	3 C x 70 mm² + 70 mm²(insulated) + 16 mm²	7	7	1.50	1.50	39.5	1070	19.7	0.443	0.492	154
8	3 C x 95 mm² + 70 mm²(insulated) + 16 mm²	19	7	1.50	1.50	42.5	1304	19.7	0.320	0.492	188
9	3 C x 120 mm² + 70 mm²(insulated) + 16 mm²	19	7	1.60	1.50	46.8	1550	19.7	0.253	0.492	218
10	3 C x 150 mm² + 70 mm²(insulated) + 16 mm²	19	7	1.80	1.50	50.8	1860	19.7	0.206	0.492	248
	With bare messenger conductor										
1	3 C x 16 mm² + 25 mm² (bare) + 16 mm²	7	7	1.20	---	19.5	340	7.0	1.910	1.380	62
2	3 C x 25 mm² + 25 mm² (bare) + 16 mm²	7	7	1.20	---	20.5	429	7.0	1.200	1.380	82
3	3 C x 35 mm² + 25 mm² (bare) + 16 mm²	7	7	1.20	---	23.5	526	7.0	0.868	1.380	103
4	3 C x 35 mm² + 35 mm² (bare) + 16 mm²	7	7	1.20	---	25.0	553	10.1	0.868	0.986	103
5	3 C x 50 mm² + 35 mm² (bare) + 16 mm²	7	7	1.50	---	26.8	727	10.1	0.641	0.986	127
6	3 C x 70 mm² + 50 mm² (bare) + 16 mm²	7	7	1.50	---	31.5	958	14.0	0.443	0.689	154
7	3 C x 70 mm² + 70 mm² (bare) + 16 mm²	7	7	1.50	---	34.5	1013	19.7	0.443	0.492	154
8	3 C x 95 mm² + 70 mm² (bare) + 16 mm²	19	7	1.50	---	37.0	1248	197	0.320	0.492	188
9	3 C x 120 mm² + 70 mm² (bare) + 16 mm²	19	7	1.60	---	39.0	1493	19.7	0.253	0.492	218
10	3 C x 150 mm² + 70 mm² (bare) + 16 mm²	19	7	1.80	---	40.0	1803	19.7	0.206	0.492	248

Insulation thickness of 16 mm² for lighting conductor	1.20 mm
Current rating of 16 mm² lighting conductor	62 Amps.
Conductor operating temperature	90° C
Short circuit temperature for one sec	250° C

Ambient Air temperature is 40 °C

Rating factor for variation in air temperature:

Air Temperature °C	20	25	30	35	40	45	50
Rating Factor	1.32	1.25	1.16	1.09	1	0.9	0.81

Note: Higher cable size and special cable construction as per client's requirement is also available

SINGLE CORE FLEXIBLE CABLES

Single Core Insulated Copper Conductor (Unsheathed) Flexible Cable, 1100 Voltage Grade For Industrial Application

- Higher safety factors
- Compact construction
- Choice of superior insulation system for meeting IEC classification, temperature rise, protection etc.

Construction:

Conductor : Plain annealed copper conductor as per IS:8130
Insulation : Primary - Natural Type A PVC
Color : As per IS:694 or customer's requirement
Standard : IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05

TECHNICAL SPECIFICATIONS

	FR	FRLS	ZHFR
Type of insulation	70°C/105°C Heat Resistant PVC	Flame Retardant Low Smoke (FRLS)	Halogen Free (HFFR) From 1.0 to 4.0 sq.mm.
Typical applications	Wiring of panels for use in high ambient temperature	Wiring in high density critical installations in public places and fire prone areas	Wiring in high density critical installations in public places and in vicinity of electronic systems
Applicable standards	IS-694, BS 6004, IEC 60227, DIN VDE-0281-3	IEC 60332-1, BS 4066-1, EIC-60754-1, ASTMD-2843, ASTMD-2863	IEC 60332-1&3, BS 4066-1&3, IEC 60754-1&2, ASTMD-2863, BS 7211, DIN VDE-0282-9

SINGLE CORE INSULATED COPPER CONDUCTOR(UNSHEATHED) FLEXIBLE CABLES, 1100 VOLTAGE GRADE FOR INDUSTRIAL APPLICATION

NOMINAL CROSS SECTIONAL AREA OF CONDUCTOR	NUMBER/ NOM. DIA. OF COND. STRANDS	THICKNESS OF INSULATION (NOM)	APPROX. OVERALL DIAMETER	MAX. CURRENT CARRYING CAPACITY	MAX CONDUCTOR RESISTANCE PER KM AT 20° C
sq. mm.	mm	mm	mm	Amps	Ohms
10	80/0.4	1.0	6.30	55	1.91
16	126/0.4	1.0	7.40	75	1.21
25	196/0.4	1.2	9.10	100	0.780
35	276/0.4	1.2	10.30	125	0.554
50	396/0.4	1.4	12.20	165	0.386
70	354/0.5	1.4	14.10	240	0.272
95	484/0.5	1.6	16.40	300	0.206
120	608/0.5	1.6	18.00	325	0.161
150	750/0.5	1.8	20.10	352	0.129
185	925/0.5	2.0	22.30	415	0.106
240	1210/0.5	2.2	25.20	500	0.0801
300	1520/0.5	2.4	28.50	585	0.0641

NOTE: Conductor as per class V. 100 metre packing lengths as per IS:694 and in bigger packing on request. Higher sizes of nominal cross sectional area of conductor area are also available on request. *The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.

SURAJ™ SURAJ CABLES

MULTI CORE FLEXIBLE CABLES

Owing to our consistent efforts for quality and providing the best, we have developed exhaustive range of domestic wires and cables suitable to Indian homes and varied conditions. Manufactured with best quality of Conductor (electrolytic grade copper) and finest grade of indigenously developed PVC compound, SURAJ Multicore Flexible Core give maximum safety at no extra cost.

Construction

Conductor : Bare annealed copper as per IS : 8130 / BS : 6360 / IEC : 60228

Insulation : Primary-Natural PVC with FR property
Secondary - Skin Colour with FR property coated PVC

Standard : IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05

Sizes : Two, three, four & five core from 0.5 sq.mm to 400 sq. mm

Salient Features

- Electrolytic Grade copper having pure and maximum conductivity to ensure maximum safety.
- Bunching of copper in uniform lay & diameter, that makes stripping & crimping of wires easier & minimizes losses.
- Indigenously developed PVC compound formulated from finest ingredients and produced in-house.
- Double insulation, with primary insulation from virgin PVC, coated with ultra thin colour layer.

Multi-core Flexible Cables Conforming to IS: 694/2010

SURAJ 1100V Grade Multi Strand Flexible Annealed Copper Conductor, PVC Insulated, PVC Sheathed Multi-core Flexible Cables Conforming to IS: 694/2010

Conductor Area	No. & Size of Each Strand	Max. DC Resistance at 20°C	Insulation Thickness Nominal	Sheath Thickness Nominal				Overall Diameter Approx				#Current Rating
				2 Core	3 Core	4 Core	5 Core	2 Core	3 Core	4 Core	5 Core	
Sq. mm.	mm.	Ohm/km	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	Amp.
0.5	16/0.20	39.0	0.6	0.9	0.9	0.9	0.9	6.2	6.6	7.0	7.5	5
0.75	24/0.20	26.0	0.6	0.9	0.9	0.9	0.9	6.6	6.90	7.4	8.0	8
1	32/0.20	19.5	0.6	0.9	0.9	0.9	1.0	7.1	7.3	8.0	8.9	13
1.5	30/0.25	13.3	0.6	0.9	0.9	1.0	1.0	7.5	8.0	9.0	9.7	17
2.5	50/0.25	7.98	0.7	1.0	1.0	1.0	1.0	9.0	9.4	10.4	11.3	24
4	56/0.30	4.95	0.8	1.0	1.0	1.0	1.1	10.0	10.6	11.8	13.0	30
6	84/0.30	3.30	0.80	1.1	1.2	1.2		11.2	12.3	13.6		38
10	80/0.40	1.91	1.00	1.3	1.4	1.4		14.8	16.0	17.6		52
16	126/0.40	1.21	1.00	1.4	1.4	1.4		17.0	18.2	20.0		70
25	196/0.40	0.78	1.20	1.4	1.5	1.6		20.3	21.9	24.5		88
35	276/0.40	0.554	1.20	1.6	1.6	1.7		23.1	24.8	27.5		110
50	396/0.40	0.386	1.40	2.0	2.0	2.0		27.8	29.7	32.8		145
70	556/0.40	0.272	1.40	2.2	2.2	2.2		32.0	34.2	37.8		215
95	756/0.40	0.206	1.60	2.4	2.4	2.4		35.8	38.3	42.2		260
120	954/0.40	0.161	1.60	2.5	2.5	2.5		39.6	42.4	46.9		305

Note: Conductor as per class V. Supplied in 100 metre lengths with black outer sheath and in bigger packing on request. Any colour on specific request can be supplied, in economical run. Higher sizes of nominal cross sectional area of conductor area are also available on request.
*The number and diameter of conductor strands are for reference only. Conductor resistance as per IS:8130 is the governing criteria.
The above data is indicative and may be revised without prior intimation.

SUBMERSIBLE CABLES

SURAJ 3 Core Flat Cables are manufactured keeping in mind the severe and difficult conditions in which they are required to perform, The individual conductors are made from bright electrolytic grade copper. The wires are drawn, annealed and bunched properlyto ensure flexibility and uniform resistance. Each of the three copper conductors are insulated with a special formulated PVC compound. The cores are laid up in flat parallel formation. The outer sheath of the cable is extruded with a special grade of abrasion resistant PVC compound in black colour which is impervious to water, grease, oil, etc.

Construction

Conductor : Stranded Flexible bare annealed electrolytic grade copper.

Insulation : Specially formulated PVC (Type - A,C & D)

Outer Sheath : Specially formulated PVC (St-1 & ST-3)

Size : 2 Core and 3 Core - 1.5 to 120 sq. mm.

Standard : IS:694, BS:6004, BS:6500, BS: 7211, IEC: 60227-1, 2,5 CSA-22.2 No. 38-05

Application

PVC insulated multistrand annealed bare copper conductor, three core flat PVC sheathed cable are used for giving electrical connection to the submersible pump motors.

Conductor	Insulation	Sheath	Overall Dimensions (Approx) 'W' 'H' mm	Conductor Resistance @20°C (max) ohms/km	Current Carrying Capacity @40°C Amps
Area Sq. mm.	Thickness (Nom) mm	Thickness (Nom) mm			
1.5 *	0.6	0.9	10.0 x 4.80	12.10	14
2.5 *	0.7	1.0	12.50 x 5.70	7.41	18
4.0 **	0.8	1.0	14.20 x 6.40	4.95	26
6.0 **	0.8	1.10	16.15 x 7.10	3.30	31
10.0 **	1.0	1.40	20.90 x 9.15	1.91	42
16.0 **	1.0	1.40	24.25 x 10.50	1.21	57
25.0 **	1.2	2.00	30.60 x 13.75	0.780	72
35.0 **	1.2	2.00	34.40 x 14.80	0.554	90
50.0 **	1.4	2.20	40.45 x 18.20	0.386	115
70.0 **	1.4	2.20	46.00 x 20.10	0.272	143
95.0 **	1.6	2.40	52.25 x 22.75	0.206	165

Note: The strand diameter is nominal. However, Construction of conductor is designed to satify the requirements of conductor resistance as per IS 8130 : 2013

* As per conductor class 2 of IS 8130 : 2013 ** As per conductor class 5 of IS 8130 : 2013

Note: The number of wires and strand diameter will be such as to satisfy the requirements of conductor resistance as per IS 8130 : 2013

SELECTION GUIDE FOR 3 CORE FLAT PVC CABLES

1) HP vs Current : The full load current for submersible pump motors, 3 phase, 50 cycles, 415-425 V.

HP	5.0	7.5	10.0	12.5	15.5	17.5	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0
Amp	7.5	11.0	14.9	18.9	22.5	25.2	28.4	35.6	42.3	50.4	58.1	62.1	67.5	73.8	81.0	87.3	93.6	100.8	108.0

2) Derating factors : Multiply the current carrying capacity of the cable by factors given below for various ambient temperatures

Ambient Temperature °C	30	35	40	45	50
Rating Factor	1.09	1.04	1.00	0.95	0.77

FLAME RETARDANT PVC INSULATED SINGLE CORE UNSHEATHED COPPER CABLES (UP TO 1100 VOLTS AC)

Conductor : The conductors are drawn from bright electrolytic grade annealed copper and bunched together.

Insulation : The bunched conductors are insulated with specially formulated FR PVC compound with a high insulation resistance value. The insulation process is carried out on modern high speed extrusion lines, which ensures high accuracy and consistency in performance. Flame retardent properties enable the cable to withstand overloads. The insulation is resistant to boiling water, steam and vapors. This prevents ageing and cracking in kitchens, bathrooms, damp walls and chemical industries.

Marking : The cables are printed with generic marking "SURAJ-FR"

Colors : Red, Yellow, Blue, Black, Green and Grey or as per client's reqt.

Packing : 90 Meters(approx. 100 yards) pack in protective cartons.

Suraj-FR is a multi-strand flexible wire with flame retardent properties. It has specially formulated insulation with a high oxygen and temperature index, enabling the wire to withstand overloads preventing electric mishaps.

TEST	SPECIFICATION	SPECIFIED VALUES
Critical Oxygen Index	ASTM-D 2863	Minimum 29%
Temperature Index	ASTM-D 2863	Minimum 250°C

SIZE DIMENSIONS AND RATINGS

Nominal Cross Sectional Area of Conductor	Number/Nominal Dia of wires* [Nom.]	Thickness of insulation [Nom.]	Overall Diameter Max.	Current Rating		D.C Resistance [Max.] at 20°C
				Casing	Concealed	
Sq. mm	Number/mm	Mm	Mm	amps	amps	Ohm/km
0.75	24/0.2	0.6	2.8	7.50	7.00	26.0
1.00	32/0.2	0.6	3.0	12.00	11.00	19.5
1.50	30/0.25	0.6	3.4	16.00	14.00	13.3
2.50	50/0.25	0.7	4.1	22.00	19.00	7.98
4.00	56/0.3	0.8	4.8	29.00	26.00	4.95
6.00	84/0.3	0.8	5.3	37.00	31.00	3.30

*The number & diameter of conductor strands are for reference only and governed by conductor resistance.

*The above data is indicative only and may be revised without prior information.

Suraj Cables will not be responsible for any damages arising out incorrect application of its product.

FLAME RETARDANT LOW SMOKE PVC INSULATED SINGLE CORE UNSHEATHED COPPER CABLES (UP TO 1100 VOLTS AC)

Conductor : The conductors, drawn from bright electrolytic grade annealed copper and bunched together.

Insulation : The bunched conductors are insulated with specially formulated Flame Retardent Low Smoke Compound. During a fire situation, the FR-LSH Compound restricts the spread of flame. The smoke emission is also minimal.

Marking : The cables are printed with generic marking "SURAJ-FRLS"

Colors : Red, Yellow, Blue, Black, Green and Grey.

Packing : 90 Meters(approx. 100 yards) pack in protective cartons.

Suraj's FRLS house wire is ideal for wiring solutions in multistoried buildings, hotels, hospitals, commercial establishments and residential complexes. It is shielded by a specially formulated flame retardent PVC compound. During fire, ordinary PVC emits black smoke and toxic fumes which are acidic in nature. This impairs visibility and hampers rescue operations. Suraj-FRLS insulation retards spread of fire and emits minimum smoke and toxic gases. Thereby reducing the risk of injury. So, give yourself the promise of security and supreme quality by getting Suraj Cables House Wires.

TEST	SPECIFICATION	SPECIFIED VALUES
Critical Oxygen Index	ASTM-D 2863	Minimum 29%
Temperature Index	ASTM-D 2863	Minimum 250°C
Acid Gas Generation	IEC 60754-1	Maximum 20%
Smoke Density Rating	ASTM-D 2843	Maximum 60%

SIZE DIMENSIONS AND RATINGS

Nominal Cross Sectional Area of Conductor	Number/Nominal Dia of wires* [Nom.]	Thickness of insulation [Nom.]	Overall Diameter Max.	Current Rating		D.C Resistance [Max.] at 20°C
				Casing	Concealed	
Sq. mm	Number/mm	Mm	Mm	amps	amps	Ohm/km
0.75	24/0.2	0.6	2.8	7.50	7.00	26.0
1.00	32/0.2	0.6	3.0	12.00	11.00	19.5
1.50	30/0.25	0.6	3.4	16.00	14.00	13.3
2.50	50/0.25	0.7	4.1	22.00	19.00	7.98
4.00	56/0.3	0.8	4.8	29.00	26.00	4.95
6.00	84/0.3	0.8	5.3	37.00	31.00	3.30

*The number & diameter of conductor strands are for reference only and governed by conductor resistance.

*The above data is indicative only and may be revised without prior information.

Suraj Cables will not be responsible for any damages arising out incorrect application of its product.

ZERO HALOGEN FLAME RETARDENT INSULATED SINGLE CORE UNSHEATHED COPPER CABLES (UP TO 1100 VOLTS AC)

Conductor : The conductors, drawn from bright electrolytic grade annealed copper and bunched together.

Insulation : The bunched conductors are insulated with specially formulated grade of Halogen Free Flame Retardent(HFFR) compound is used. The insulation does not melt or drop in case of fire. The smoke emitted is transparent, non-toxic and minimal. The victims trapped in the fire do not suffocate and evacuation is convinient.

Marking : The cables are printed with generic marking "SURAJ-ZHFR"

Colors : Red, Yellow, Blue, Black, Green and Grey or as per client's reqt.

Packing : 90 Meters(approx. 100 yards) pack in protective cartons.

Suraj-ZHFR is processes using a zero halogen flame retardent compound (ZHFR). The insulation is of superior quality, 100% Lead free and eco-friendly. In case of a fire situation, Suraj-ZHFR does not emit toxic or poisonous fumes, which enables safe evacuation. These wires are best suited for wiring in hospitals, hotels, business establishments and high rise buildings where fire can be determined.

	SPECIFICATION	SPECIFIED VALUES
Critical Oxygen Index	ASTM-D 2863	Minimum 29%
Temperature Index	ASTM-D 2863	Minimum 250°C
Acid Gas Generation	IEC 60754-1	Maximum 0.5%
Smoke Density Rating	ASTM-D 2843	Maximum 20%

SIZE DIMENSIONS AND RATINGS

Nominal Cross Sectional Area of Conductor	Number/Nominal Dia of wires* [Nom.]	Thickness of insulation [Nom.]	Overall Diameter Max.	Current Rating		D.C Resistance [Max.] at 20°C
				Casing	Concealed	
Sq. mm	Number/mm	Mm	Mm	amps	amps	Ohm/km
0.75	24/0.2	0.6	2.8	7.50	7.00	26.0
1.00	32/0.2	0.6	3.0	12.00	11.00	19.5
1.50	30/0.25	0.6	3.4	16.00	14.00	13.3
2.50	50/0.25	0.7	4.1	22.00	19.00	7.98
4.00	56/0.3	0.8	4.8	29.00	26.00	4.95
6.00	84/0.3	0.8	5.3	37.00	31.00	3.30

*The number & diameter of conductor strands are for reference only and governed by conductor resistance.

*The above data is indicative only and may be revised without prior information.

Suraj Cables will not be responsible for any damages arising out incorrect application of its product.

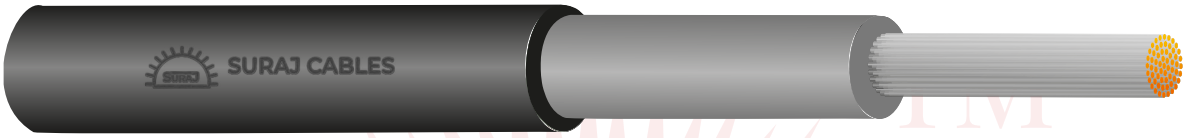
General Description

Flexible Single core cable with flexible electroplated tinned copper conductor insulated with special cross linked halogen free Elastomer, low smoke zero halogen sheathed, UV and Ozone resistant. The cable is able to satisfy the latest requirement for PV systems as per EN 50618, IEC-60227/60502, IS-694 & TUV Spec No. 2 Pfg-1169/08.2007.

Applications

Flexible cables suitable for :

- Mobile & fixed installations
- Connection between photovoltaic panels to junction Box/Inverter.
- Indoor & outdoor use in dry, damp and wet situations.
- On trays and in ducts open and closed.



Construction

Conductor : Electrolytic annealed electroplated tinned copper conductor, class - 5 IEC 60228/ IS 8130.

Insulation : Halogen free fire retardant thermosetting Elastomer (cross linked) type IE 3 to IS 6380 and EI 3 to EN 50363-1, according to table 1 of EN - 50618 : 2014.

Outer Sheath : Halogen free fire retardant thermosetting Elastomer (cross linked) outer sheath type SE4 to IS : 6380 and EM 50363 - 1, according to table 1 of EN-50618 : 2014. Standard Colours are Red or black. Both Profibus DP and Profibus PA work on RS 485.

SIZE (In Sq.mm)	No. of Cond./ Size of each wire (In Nos./ mm)	Cond. Dia (mm)	XL-LSOH Insulation Thickness Nominal (mm)	XL-LSOH Sheath Thickness Nominal (mm)	Overall Diameter Nominal (mm)
4.00	56/0.3	2.6	0.70	0.80	5.60 ± 0.20
6.00	84/0.3	3.2	0.70	0.80	6.50 ± 0.20
10.00	80/0.4	4.3	0.70	0.80	7.45 ± 0.20
16.00	126/0.4	5.4	0.70	0.90	8.6 ± 0.40

$1x10^{14}$ Ohm cm @ 20°C

$1x10^{11}$ Ohm cm @ 90°C

(Specific volume resistance to IEC: 50395-8.2)

SURAJ CABLES

TECHNICAL DATA SHEET FOR SOLAR CABLE

Photovoltaic Cable (Solar Cable)

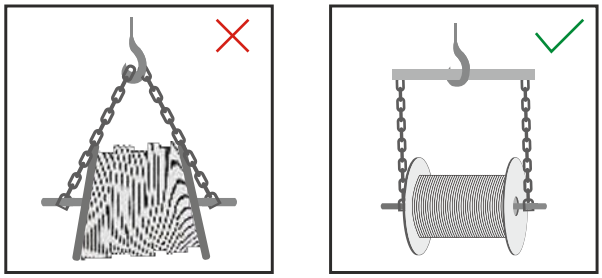
TYPE-1									
Dimensions of Solar D.C. Cables From PV Module to Array Junction Box & MIB to Inverter as per EN - 50618T : 2014									
Single Core Size (sqmm)	Maxi-mum Wire size	No of wire	XL-LSOH Insulation Thickness Nominal (mm)	XL-LSOH Sheath Thickness Nominal (mm)	Overall Diameter Nominal (mm)	Maximum Conductor Resistance at 20°C ohm/km (Tinned Copper)	Current Carrying capacity of DC solar cable with XL-LSOH insulation & XL-LSOH sheathing at 60°C		
							Single cable in Air (Amp.)	Single cable on surface (Amp.)	Two adjacent cable on surface (Amp.)
1.50	0.26	30	0.70	0.80	4.60 ± 0.20	13.70	30	29	24
2.50	0.26	50	0.70	0.80	5.00 ± 0.20	8.21	41	39	33
4.00	0.31	56	0.70	0.80	5.50 ± 0.20	5.09	55	52	44
6.00	0.31	84	0.70	0.80	6.50 ± 0.20	3.39	70	67	57
Array Junction Box to main Junction Box & MIB to Inverter as per EN - 50618 : 2014									
10.00	0.41	80	0.70	0.80	7.45 ± 0.40	1.95	98	93	79
16.00	0.41	126	0.70	0.90	8.45 ± 0.40	1.24	132	125	107
25.00	0.41	196	0.90	1.00	10.30±0.40	0.795	176	167	142
35.00	0.41	276	0.90	1.10	11.70±0.50	0.565	218	207	176
50.00	0.41	396	1.0	1.20	13.60±0.50	0.393	274	260	219
70.00	0.41	556	1.1	1.20	15.20±0.50	0.277	406	386	325
95.00	0.41	756	1.1	1.30	17.40±0.70	0.210	491	467	393
120.00	0.41	954	1.2	1.30	19.30±0.80	0.164	576	547	461
150.00	0.41	1192	1.4	1.40	21.75±0.80	0.132	670	637	536
185.00	0.41	1472	1.60	1.60	23.90±1.0	0.108	784	745	627
240.00	0.41	1910	1.70	1.70	27.10±1.0	0.0817	944	897	755

TYPE-2									
Dimensions of Solar D.C. Cables From PV Module to Array Junction Box (As per IS : 694 & IS:1554 Part-1 Guideline)									
Single Core Size (sqmm)	Maxi-mum Wire size	No of wire	HR 105°C Insulation Thickness Nominal (mm)	UV-HR 105°C Sheath Thickness Nominal (mm)	Overall Diameter Nominal (mm)	Maximum Conductor Resistance at 20°C ohm/ km (Bare Copper)	Current Carrying capacity of DC solar cable with HR 105°C Insulation & UV stabilised HR 105°C sheathing at 40°C		
							Single cable in Air (Amp.)	Single cable on surface (Amp.)	Two adjacent cable on surface (Amp.)
1.50	0.26	30	0.60	0.90	4.90 ± 0.40	13.30	28	26	22
2.50	0.26	50	0.70	0.90	5.40 ± 0.40	7.98	39	37	31
4.00	0.31	56	0.80	0.90	6.40 ± 0.50	4.95	50	48	40
6.00	0.31	84	0.80	0.90	6.90 ± 0.60	3.30	64	61	51
Array Junction Box to main Junction Box & MIB to Inverter (As per IS : 694 & IS:1554 Part-1 Guideline)									
10.00	0.41	80	1.00	0.90	8.20 ± 0.5	1.91	89	84	71
16.00	0.41	126	1.00	0.90	9.30 ± 0.5	1.21	119	113	95
25.00	0.41	196	1.20	1.00	10.70 ± 0.6	0.780	150	143	120
35.00	0.41	276	1.20	1.10	12.40 ± 0.6	0.554	191	182	153
50.00	0.41	396	1.40	1.30	14.75 ± 0.6	0.386	253	240	202
70.00	0.41	556	1.40	1.40	16.80 ± 0.8	0.272	374	350	299
95.00	0.41	756	1.60	1.50	19.30 ± 0.8	0.206	451	429	361
120.00	0.41	954	1.60	1.60	20.75 ± 0.8	0.161	530	504	424
150.00	0.41	1192	1.80	1.80	23.20 ± 1.0	0.129	618	587	494
185.00	0.41	1472	2.00	1.90	25.30 ± 1.0	0.106	721	685	577
240.00	0.41	1910	2.20	2.20	29.20 ± 1.0	0.0801	869	825	695

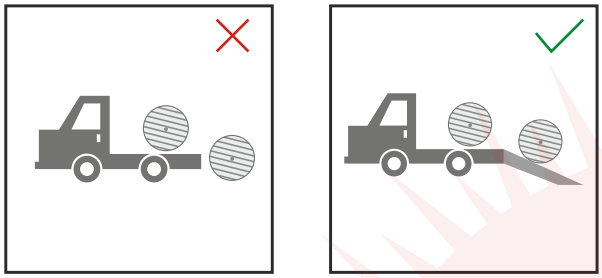
TYPE-3									
Dimensions of Solar D.C. Cables From PV Module to Array Junction Box (As per IS : 7098 Part-1 Guideline)									
Single Core Size (sqmm)	Maxi-mum Wire size	No of wire	XLPE Insulation Thickness Nominal (mm)	UV ST-2 Sheath Thickness Nominal (mm)	Overall Diameter Nominal (mm)	Maximum Conductor Resistance at 20°C ohm/ km (Bare Copper)	Current Carrying capacity of DC solar cable with XLPE Insulation & UV stabilised PVC ST-2 sheathing at 40°C		
							Single cable in Air (Amp.)	Single cable on surface (Amp.)	Two adjacent cable on surface (Amp.)
1.50	0.26	30	0.70	0.90	4.90 ± 0.40	13.30	25	24	20
2.50	0.26	50	0.70	0.90	5.40 ± 0.40	7.98	35	33	28
4.00	0.31	56	0.70	0.90	5.90 ± 0.50	4.95	45	43	36
6.00	0.31	84	0.70	0.90	6.40 ± 0.60	3.30	58	55	46
Array Junction Box to main Junction Box & MIB to Inverter (As per IS : 7098 Part-1 Guideline)									
10.00	0.41	80	0.70	0.90	7.40 ± 0.5	1.91	80	76	64
16.00	0.41	126	0.70	0.90	8.40 ± 0.5	1.21	106	101	85
25.00	0.41	196	0.90	1.00	10.40 ± 0.6	0.780	135	128	108
35.00	0.41	276	0.90	1.10	11.85 ± 0.6	0.554	173	164	138
50.00	0.41	396	1.00	1.20	13.90 ± 0.6	0.386	226	215	181
70.00	0.41	556	1.10	1.30	15.85 ± 0.8	0.272	336	319	269
95.00	0.41	756	1.10	1.50	18.20 ± 0.8	0.206	406	386	325
120.00	0.41	954	1.20	1.60	20.75 ± 0.8	0.161	476	452	381
150.00	0.41	1192	1.40	1.70	23.20 ± 1.0	0.129	555	527	444
185.00	0.41	1472	1.60	1.90	25.40 ± 1.0	0.106	649	616	519
240.00	0.41	1910	1.70	2.10	29.30 ± 1.0	0.0801	781	742	625

HANDLING

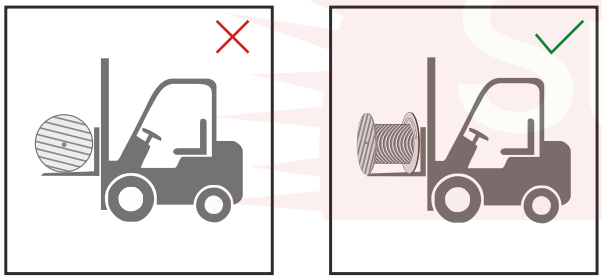
Handling at site: While unloading the cable drums certain precautions are to be taken for ensuring the safety of cable.



When using a lift or crane use a spreader bar longer than the overall drum width just above the drum flanges. Without a spreader bar this will lead to bending of drum flanges crushing & damaging the cable.



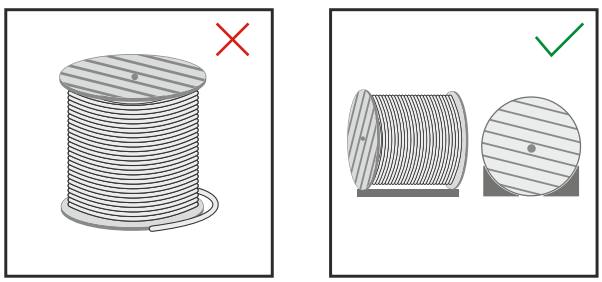
When unloading from the truck, inclined ramp should be used to lower the drum. Do not drop the drum directly from the truck, which may lead to damage of the drum & subsequently the cable.



While using forklift for handling or shifting the drum, the drum should be perpendicular to the forks rather than parallel. Do not allow the forks to be in contact with the cable.

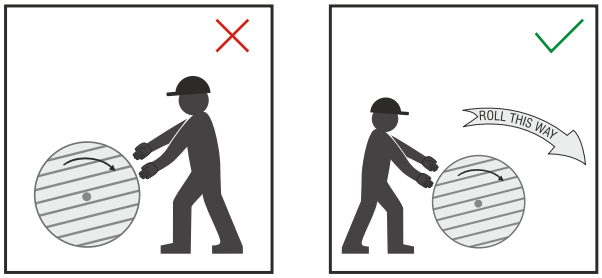
STORAGE

Cable drums should be stored on plain ground without any hard stones projecting above the surface and dry place away from direct sunlight and rain. All cable drums should be stored with battens intact, with sufficient space in between the drums. Ensure stoppers for every drum to avoid the drum movement after storage. Cable drums should not be stored one above the other.

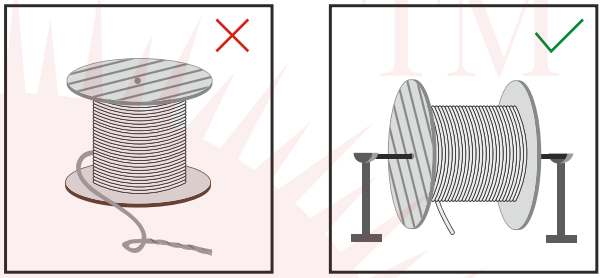


INSTALLATION AND LAYING

While laying of cables special care to be taken. The cable and should be pulled with pulling eye only after mounting the drum on the jacks. Do not keep the drum on its flange while pulling the cable. This will result in Cird Caging (Twists and deformation of cable) and armour swelling.



Roll the drum in only one direction as indicated by arrow marked on the drum.



MINIMUM BENDING RADIUS

Cable type	Single Core	Multi Core
HT Cable	20xD	15xD
LT Cable	15xD	12xD

TESTING AT SITE

After the cable is installed before commissioning, it should be tested for DC High Voltage. The recommended voltage and duration will be as per IS:1255. Megger, continuity and cross continuity to be checked on each core before and after laying.

PRODUCT CODE

CONSTITUENT	CODE
ALUMINIUM CONDUCTOR	A
XLPE INSULATION	2X
ROUND STEEL WIRE	W
FLAT STEEL STRIP ARMOUR	F
DOUBLE ROUND STEEL WIRE ARMOUR	WW
DOUBLE FLAT STEEL STRIP ARMOUR	FF
NON MAGNETIC (AI) ROUND WIRE ARMOUR	Wa
NON MAGNETIC (AI) STRIP ARMOUR	Fa
PVC OUTER SHEATH	Y

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SURAJ™

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