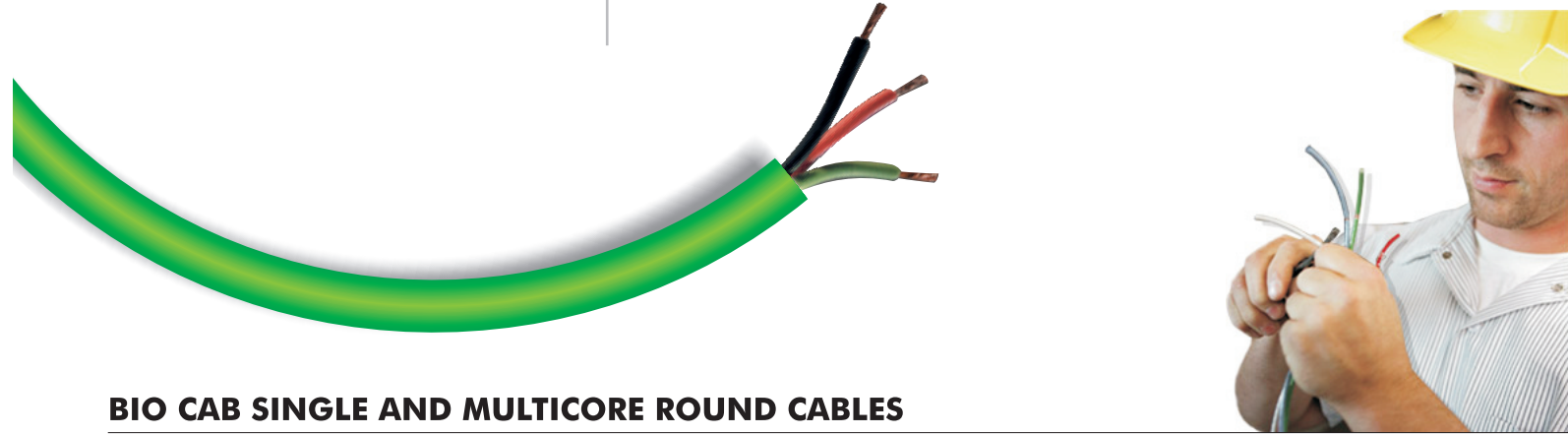


## SINGLE AND MULTICORE ROUND CABLES

**MULTICORE ROUND** FR PVC insulated copper conductor sheathed black cables in voltage grade up to and including 1100V with bright annealed bare copper based on IS 694 : 1990



### BIO CAB SINGLE AND MULTICORE ROUND CABLES

**Features**  
Manufactured from bright annealed 99.97% pure bare copper conductors these cables offer low conductor resistance. These wires are insulated with in house manufactured specially formulated PVC Compound. The tough robust outer PVC jacket protects it from the oils, greases, various chemicals and abrasions giving long life and electrical safety.

**Applications:**  
Multicore Cables are very versatile and can be used in control panels for heavy industries, heavy machineries, air-condition, Motors etc.

#### Construction

**Conductor** : Electrolytic Grade Copper Conductor as per IS: 8130-1984 Flexibility Class 2 and 5.  
**Insulation** : PVC Type A of IS: 5831-1984 for maximum conductor temperature 70°C  
PVC Type C of IS: 5831-1984 for maximum conductor temperature 85°C  
**Thickness of Insulation** : Nominal thickness as per relevant specification is tabulated.

**Tolerance on Thickness of Insulation** : The smallest of the measured values of thickness of insulation shell not fall below the nominal value specified in the relevant tables by more than (0.1 mm + 0.1 t). Where t = Nominal Thickness of Insulation in mm.

#### • Colour of Insulation

Two Core Cable	Three Core Cable	Four Core Cable	Five Core Cable	Six Core and above
Red & Black	Red, Black & Green	Red, Yellow, Blue & Green	Red, Yellow, Blue, Black & Gray	two adjacent Cores in each layer Blue and Yellow, remaining Cores Gray

- Laying - up** : The cores are laid up with a suitable right hand lay.
- Outer Sheath** : PVC Type A of IS: 5831-1984 for maximum conductor temperature 70°C.  
PVC Type C of IS: 5831-1984 for maximum conductor temperature 85°C.
- Application** : The laid up cores shall be provided with outer sheath applied by Extrusion.
- Thickness of Outer Sheath** : The average thickness of outer sheath of Unarmoured cables shall not be less than the nominal value specified. The smallest of the measured values shall not be less than 0.2 mm + 0.2 t. (t is nominal thickness of sheath)
- Colour of Outer Sheath** : Colour of outer sheath shall be black, colour other than black may be used as agreed to between the purchaser and the supplier.

## FLAME RETARDANT



### BIO CAB FLAME RETARDANT

Does not catch flame | Does not propagate fire | Non-Toxic and Non-Corrosive.

**Applications** : Wiring in all installations where fire safety is more important. Schools, theaters, commercial complexes, air conditioned apartments, high rise buildings, fire alarms and emergency lighting circuits.  
**Specifications** : Generally conforms to, IEC 60332-1 & 3, IEEE 383, IEC 60754-1 & 2, IS-8130, IS-694, IS-5831.  
**Conductor** : Thin strands of Electrolytic Copper are multi-drawn simultaneously for uniformity of Resistance, Dimension, and Flexibility. The drawn strands are bunched in high precision machines. A circular conductor is thus formed. The conductor is bunched in such a way that it reduces in overall diameter for space saving in high density wiring.  
**Insulation** : Specially formulated grade of Flame Retardant (FR) compound is used. The performance of the cable in a fire situation is exceptionally good. The insulation does not burn readily. It does not melt and drip. The smoke is negligible, transparent, non toxic. The victims trapped in fire do not suffocate and this facilitates fire fighting operations. Unlike general purpose PVC, the smoke emitted is non-corrosive. Thus, the electronic printed circuit boards, hard disks and other sensitive electronic equipments are unaffected.  
**Marking** : The cables are marked " BIO CAB - FR (Size) 1100 IS:694  
**Colours** : Red, Yellow, Blue, Black, Green.

#### Size, Construction and Current rating

Conductor Area Sq. mm	Insulation Thickness mm	Number of strands/ Nominal Dia. of Strands	Max. Overall Diameter mm	Conductor Resistance Ohm/km at 20°C(Max)	Current Rating Amps. Casting	Concealed
1.00	0.7	14/0.3	2.8	18.10	14	13
1.50	0.7	22/0.3	3.1	12.10	18	16
2.50	0.8	36/0.3	3.8	7.41	24	20
4.00	0.8	56/0.3	4.4	4.95	32	26

## SINGLE AND MULTICORE ROUND CABLES



### BIO CAB SINGLE AND MULTICORE ROUND CABLES

## FLAME RETARDANT







**BIO CAB SUBMERSIBLE 3 CORE FLAT CABLES**

Powering the world  
For trouble free working, this connecting cable is used for submersible pump motors. BIO CAB 3 Core Flat Cable are manufactured keeping in mind the severe and difficult conditions in which they are required to perform. The individual conductors are made of bright electrolytic grade copper. These wires are drawn, annealed and bunched properly to ensure flexibility and uniform resistance. Each of the 3 copper conductors is insulated with special PVC Compound. The cores are laid up in flat parallel position. The outer sheath of the cable is made from a special grade of abrasion resistance PVC Compound impervious to water, grease, oil etc.

Selection guide for 3 core flat cables

1. HP Vs Current: the full load current for submersible pump motors, 3 phases, 50 cycles, 415-425v.

HP	5.0	7.5	10.0	12.5	15.0	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. Operating Factors: Multiply the current carrying capacity of the factors given below for various ambient

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

3. Core Flat Cables as per IS 694:1990 with mark

Size, Construction & Current Rating

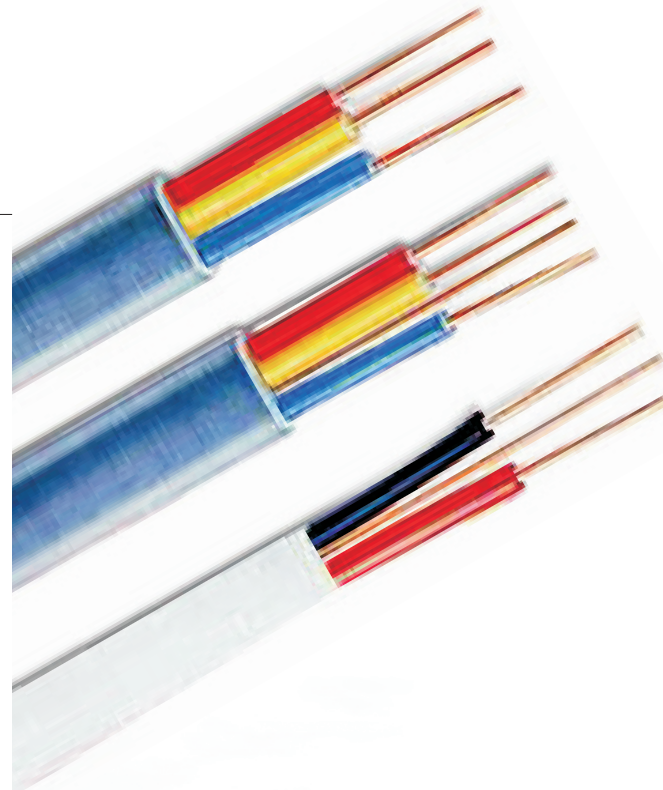
No. of Cores/ Area sq.mm	Conductor No/Dia of strands mm	Insulation Thickness (Nom)mm	Sheath Thickness (Nom)mm	Overall Dimensions		Conductor Resistance @20°C (max) ohms/km	Current carrying capacity
				Width (approx) 'W' mm	Height (approx) 'H' mm		
3 x 1.5	22/0.30	0.6	0.9	10.3	4.9	12.10	14
3 x 2.5	36/0.30	0.7	1.0	12.6	5.8	7.41	18
3 x 4.0	56/0.30	0.8	1.0	14.8	6.6	4.95	26

Three core flat flexible industrial cable for **submersible** pump motors 1100 voltage grade

Product Code	Number / Dia of Wire in mm	Length in mtrs.	Nominal Area of cond. sq. mm
06 209	22 / 0.3	(100 mtr.)	1.5
06 210	36 / 0.3	(100 mtr.)	2.5
06 211	56 / 0.3	(100 mtr.)	4.0
06 212	84 / 0.3	(100 mtr.)	6.0
06 213	140 / 0.3	(100 mtr.)	10.0
Available 100 mtrs. in Polythene pack			
06 219	22 / 0.3	(500 mtr.)	1.5
06 220	36 / 0.3	(500 mtr.)	2.5
06 221	56 / 0.3	(500 mtr.)	4.0
06 222	84 / 0.3	(500 mtr.)	6.0
Available 300 & 500 mtrs. in wooden drum.			

Submersible 3 Core Flat

BIO CAB flat cables provide energy + submersible pump motors. The individual conductors are made of bright electrolytic grade copper. The cores are insulated with a high dielectric grade PVC compound. The outer sheath is made of a special grade of abrasion-resistant PVC compound impervious to water, grease, oil, etc.



JELLY FLOODED  
CO-AXIAL  
CABLES



**JELLY FLOODED COAXIAL CABLE**

BIO CAB co-axial cables are used for transmission of audio and video signals in cable TV network. The cables offer higher bandwidth for your customers to receive the maximum number of channels with a high level of picture and sound quality. The center conductor is made of electrolytic grade copper and ensures better signal transmission. It is insulated with nitrogen gas injected foam polyethylene which is superior and more environment-friendly than chemical foam.

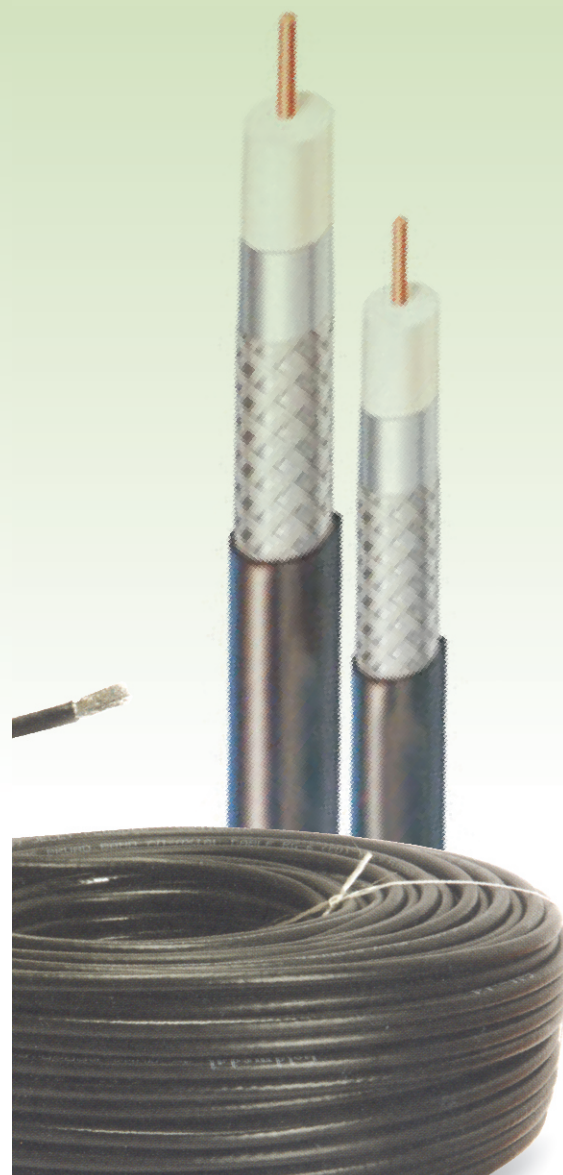
- High quality Co-axial for Cable TV network.
- Notch free attenuation values over wide band of frequencies
- The special jacketing offers increased life even in rugged conditions.

- Conductor** : The central conductor is made of 99.97% pure solid electrolytic grade conductor, which has distinct advantages over traditional copper conductor
- Insulation** : The insulation provided over the conductor is of foam PE which acts as a dielectric.
- Screen** : Aluminum Mylar tape is provided over the insulated conductor to shield the conductor and ensure disturbance free transmission of signals
- Braiding** : The braiding provided is >60% coverage of ATC (Annealed tinned copper) / Aluminium braiding.

Attenuation db/100 mtrs. (20°C) @ Mhz	RG 59 F	RG 6 F	RG 11 F
211	12.47	9.50	6.23
250	13.45	10.50	6.72
300	14.60	11.50	7.38
350	15.75	12.45	7.94
400	16.73	13.30	8.53
450	17.72	14.35	9.02

Construction and electrical parameters

C Parameters	Cable type		E Parameters	Cable type	
	RG 11 F	RG 6 F		RG 11 F	RG 6 F
Inner Conductor	ABC	ABC	Inner Conductor	0.80	2.10
Nom. Dia. (mm) of Inner Conductor	1.63	1.02	Nom. Capacitance (pF/mtr.)	53	53
Insulating material	Foam PE	Foam PE	Characteristic Impedance (Ohms)	75	75
Nom. Dia (mm) of Insulation	7.00	4.50	Velocity of Propagation (%)	85	85
Outer Conductor			Minimum Bending Radius(mm)	75	65
			Maximum Attenuation at 20°C (dB/100m)at Mhz	Max.	Max.
First	Bonded AL tape	Bonded AL tape	5	1.25	1.95
Second	Tinned Cu / Al braid	Tinned Cu / Al braid	50	3.10	5.30
			100	4.20	7.00
Nom. Coverage %	> 60%	> 60%	200	6.00	9.90
Outer Sheath	PVC	PVC	300	7.38	11.50
Nom. Dia (mm) Outer Sheath	10.00	7.00	400	8.53	13.30
			500	9.51	14.95



**JELLY FLOODED COAXIAL CABLE**



**FRLS (FIRE RETARDANT LOW SMOKE) MULTI STRAND** single core



**BIO CAB FRLS**

- Special Heat Resistant and Flame Retardant Low Smoke (FRLS) INSULATION. Higher Current Rating Higher Temperature Rating
- Applications : Suitable for use in conduit and for fixed protected insulation. Particularly suitable for wiring in fire and explosion prone areas, chemical factories, densely wired areas, public buildings, schools, hospitals, commercial complexes, theatres etc.
- Specifications : Generally conforms to, IS: 694, IEC: 60754-1 IS: 8130 & IS: 5831.
- Conductor : Many thin strands of Electrolytic Copper are fine-drawn simultaneously for uniformity of Resistance, Dimension and Flexibility. The Drawn strands are twisted in high precision machines and compacted. This not only imparts circularity to the cable is bent during but also prevents the tendency of the strands to separate and exert internal pressure on the insulation when the cable is bent during installation and usage.
- Insulation : Specially formulated high temperature grade of Flame Retardant Low Smoke compound restricts the spread of flames in a fire situation. FRLS Cables produce very less smoke during burning as compared to general purpose cables. This ensures improved visibility for evacuation of trapped victims and facilitates fire-fighting operations.
- Marking : The cables are printed with generic marking 'BIO CAB - FRLS (size) 1100 IS 694
- Colours : Double strips of Silver Gray or bright orange on base colour Red, Yellow, Blue, Black and Green running along the length of the cable.

Sizes, Construction and Current Ratings

Conductor Area Sq. mm	Insulation Thickness mm	Number of strands/ Nominal Dia, of Strands	Max. Overall Diameter mm	Conductor Resistance Ohm/km at 20°C(Max)	Current Rating Amps. Casting	Concealed
1.00	0.7	14/0.3	2.8	18.10	14	13
1.50	0.7	22/0.3	3.1	12.10	18	16
2.50	0.8	36/0.3	3.8	7.41	24	20
4.00	0.8	56/0.3	4.4	4.95	32	26

Electrical safety depends on five characteristics

- Smoke
- Hazardous gas generation
- Rate of heat release
- Flame spread
- Rate of burning

FR Properties

Properties	Test method	Value
Limited Oxygen Index	ASTM - D 2863	>29%
Temperature Index	ASTM - D 2863	>250°C
Smoke Density (Light absorption)	ASTM - D 2843	>60%

In case of fire in a closed space, trapped people are unable to find the exit due to emission of thick black smoke and lose consciousness due to the inhalation of toxic fumes before they can be evacuated to safety.

The advantages of low smoke and low acid gas generation are additional and critical features available with BIO CAB FRLS wires in comparison with FR (Flame Retardant) wires which do not provide these properties.



**BIO CAB ZERO HALOGEN LOW SMOKE**

- Zero Halogen | Does not catch flame | Does not propagate fire | Non-Toxic and Non-Corrosive

- Applications : Wiring in all installations where fire safety is more important. Schools, theaters, commercial complexes, air conditioned apartments, high rise buildings, fire alarms and emergency lighting circuits.
- Specifications : Generally conforms to, IEC 60332-1 & 3, IEEE 383, IEC 60754-1 & 2, IS-8130, IS-694, IS-5831.
- Conductor : Thin strands of Electrolytic Copper are multi-drawn simultaneously for uniformity of Resistance, Dimension, and Flexibility. The drawn strands are bunched in high precision machines. A circular conductor is thus formed. The conductor is bunched in such a way that it reduces in overall diameter for space saving in high density wiring.
- Insulation : Specially formulated grade of Halogen free Flame Retardant (ZHFR) compound is used. The performance of the cable in a fire situation is exceptionally good. The insulation does not burn readily. It does not melt and drip. The smoke is negligible, transparent, non-toxic. The victims trapped in fire do not suffocate and this facilitates fire fighting operations. Unlike PVC, the smoke emitted is non-corrosive. Thus, the electronic printed circuit boards, hard disks and other sensitive electronic equipments are unaffected.
- Marking : The cables are marked "BIO CAB - ZHLS (Size) 1100 IS:694
- Colours : Red, Yellow, Blue, Black, Green.

Size, Construction and Current rating

Conductor Area Sq. mm	Insulation Thickness mm	Number of strands/ Nominal Dia, of Strands	Max. Overall Diameter mm	Conductor Resistance Ohm/km at 20°C(Max)	Current Rating Amps. Casting	Concealed
1.00	0.7	14/0.3	2.8	18.10	14	13
1.50	0.7	22/0.3	3.1	12.10	18	16
2.50	0.8	36/0.3	3.8	7.41	24	20
4.00	0.8	56/0.3	4.4	4.95	32	26

FR Properties

Properties	Test method	Value
Limited Oxygen Index	ASTM - D 2863	31%
Temperature Index	ASTM - D 2863	>250°C
Smoke Density (Light absorption)	ASTM - D 2843	<60%
Acid Gas Generation	IEC - 60754-1	<5%



**FRLS (FIRE RETARDANT LOW SMOKE) MULTI STRAND** single core unsheathed flexible cables in voltage grade upto and including 1100 V.



**ZHLS (ZERO HALOGEN LOW SMOKE) MULTISTRAND** single core unsheathed flexible cables in voltage grade upto and including 1100 V.



# POWER CABLE

TYPICAL EXAMPLES OF DESIGN & CONSTRUCTION AS PER IS:1554

Power Cable  
Steel strip, armoured



### IS Specification

**Conductor :** **8130**  
EC Grade Aluminium

**Insulation :** **5831**  
PVC type A or C

**Inner Sheath :** **5831**  
PVC type ST1 or ST2

**Armour :** **3975**  
Galvanised Steel strip

**Outer Sheath :** **5831**  
PVC type ST1 or ST2

Control Cable  
Steel strip, armoured



**Conductor :**  
High conductivity, Electrolytic Grade Copper

**Insulation :**  
PVC type A or C

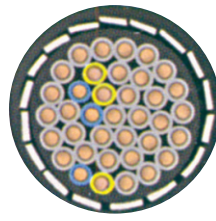
**Inner Sheath :**  
PVC type ST1 or ST2

**Armour :**  
Galvanised Steel strip

**Outer Sheath :**  
PVC type ST1 or ST2

### CLASSIFICATION OF PVC COMPOUND

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



### CORE IDENTIFICATION

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

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

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

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

### PRODUCT CODE

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

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

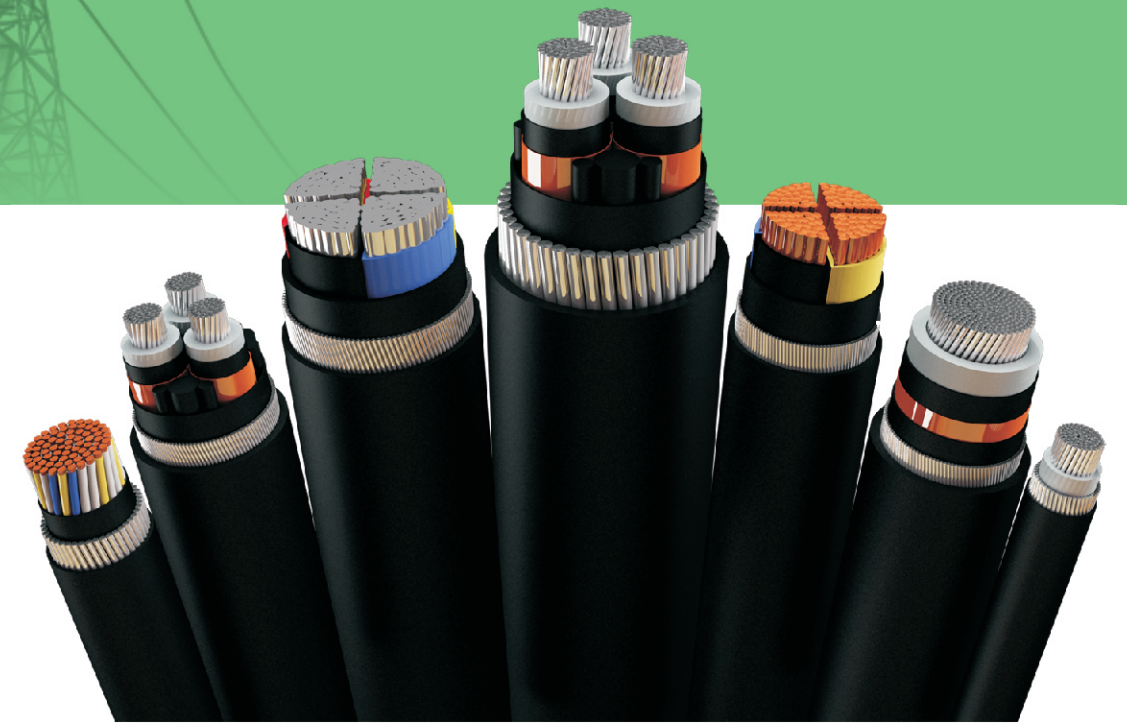
This product code is stenciled on the surface of the drum flange.  
Note : Conductor construction classified as :

$r_s$  : single strand  $r_m$  : multi strand circular  $s_m$  : sector shaped

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



POWER CABLE



# TELEPHONE AND SWITCHBOARD

## BIO CAB ZERO TELEPHONE AND SWITCHBOARD

- Low attenuation
- No cross talk
- Flame retardant jacket
- True sound

Applications : Recommended for switchboard and internal telephone wiring in high rise buildings, offices, factories, hotels, residential complexes, transmission of analog and digital signals, internal wiring in faxes, modems, computers, alarm enunciators, data recording / acquisition systems and various communication devices.

Specifications : ITD-S/WS 113C & 114C, DOT GR / WIR 06/02 MAY 94, ITI D 3005 & D2712.

Conductor : The central conductor is made of 99.97% pure solid electrolytic grade copper.

Insulation : Premium quality grade polyethylene used for insulation with several online testing equipments.

Twisted Pairs : The cores are carefully twisted with suitable lays and laid up together to form cable. Special attention given to this stage for minimising cross talk.

RipCord : A nylon rip cord is provided in order to safely peel off the jacket without damaging the cores.

Sheath : The laid up pairs are jacketed with special Flame Retardant (FR) compound to resist flame.

### ELECTRICAL PARAMETERS

Conductor Resistance : 92.20 ohm / km at 20°C max.  
Mutual Capacitance : 50 nF / km max.  
Insulation Resistance in Air : 10000 M-ohm / km  
Capacitance Unbalance-pair to pair : 230 pF / 100m max.  
Capacitance Unbalance-pair to ground : 330 pF / 100m max.  
Resistance Unbalance : 2.5% max.

Conductor Parameters	1 pair	2 pair	3 pair	4 pair	5 pair	10 pair
Conductor (solid annealed bare copper)	0.4 mm diameter (non.) & 0.5 mm diameter (non)					
Insulation Material (0.4 & 0.5 mm dia)	High density polyethylene (HDPE)					
Insulation Thickness (Average) 0.4 mm dia, 0.5 mm dia	0.17 mm, 0.20 mm					
Diameter of insulated Conductor 0.4 mm dia, 0.5 mm dia	0.74 mm, 0.92 mm					
Rip cord	Nylon					
Colour Combination	For 0.4 mm dia & 0.5 mm dia					

Part 1	White-Blue	White-Blue	White-Blue	White-Blue	White-Blue	White-Blue
Part 1		White-Orange	White-Orange	White-Orange	White-Orange	White-Orange
Part 1			White-Green	White-Green	White-Green	White-Green
Part 1				White-Brown	White-Brown	White-Brown
Part 1					White-Grey	White-Grey
Part 1						White-Blue
Part 1						White-Orange
Part 1						White-Green
Part 1						White-Brown
Part 1						White-Grey



## ZERO TELEPHONE AND SWITCHBOARD