



# UNIWIRE CABLES

## AERIAL BUNCHED CABLES



14255 CM/  
L NO. 8400008912





## INTRODUCTION

Aerial Bunched Cable (ABC) is a good concept for over head power distribution. When compared to the conventional bare conductor over head distribution system ABC provides reliability and higher safety. Lowers power losses and ultimate system economy by reducing installation, maintenance and operative cost. This system is ideal for rural distribution and specially attractive for installation in difficult places such as hilly areas, forest areas, coastal areas etc.

## CONSTRUCTION OF ABC

XLPE/HDPE insulated power conductors of aluminium (neutral conductor and street lighting conductors if and when necessary) are laid together (twisted) around a high tensile stranded and aluminum alloy with insulated or bare messenger wire to form the aerial bunched cable. This assembly is directly strung on to distribution pole/towers by mean of standard hardwares available in the market but care shall be taken to render the messenger wire completely insulated from earthing at any point of distribution in case of HT ABC. The XLPE (cross-linked polyethelene) insulation is black in colour and its stabilizer against deterioration caused by exposure to direct sunlight and ultraviolet radiation, XLPE is cross-linkable low density polythylene which is made thermoset by special formation from base polymer of thgermoplastic low density polyethylene, XLPE combines the best electrical properties of LDPE and superior thermo mechanical properties.

## MATERIALS

- Aluminum conductors conform to IS: 8130 (class-2)
- Stranded high tensile Al Alloy messenger wire conforms to IS:398 (Part-4). Alternatively Galvanized steel wire conforms to IS:398 (Part-2)
- XLPE and HDPE insulation of power conductors conforms to IS:7098 (part-I & II) and IS:6474 respectively. Since, the tension-form the current carrying conductor is totally removed by introduction of messenger. Wire the operating temperature of the conductor is 900C as against 750C of the bare conductor of the same size.

## STRINGING

No difficulty is envisaged during stringing of ABC in the conventional method but care shall be taken that insulated conductors do not get damaged during installation.

Dragging the ABC on the ground is to be avoided. Tension to be applied during stringing shall be 25% of the breaking load of the messenger wires. This will allow line to have sag within specified limit of 1.5% of the span at the lowest ambient temperature.

## JOINTING

While mid-span jointing permissible for LT ABC system by conventional technique, our recommendation will be to draw the line in such a way as to bring the joints at the supports. Mid-span jointing is not at all recommended in the case of HT lines our recommendation is for outdoor type HY terminations only. Under unavoidable circumstances, line tapping at the support points may be allowed through suitably designed clamp connectors/PG clamp, semi-conducting screen continuity shall be maintained at all joints as far as possible to avoid fluctuations during system disturbances. The 3 phase screens may be shorted and earthed through suitable non-linear surge arrestor.

## RELIABILITY, SAFETY AND FLEXIBILITY:

ABC Cables are highly reliable and insulation has been developed to with stand heat, cold and intense sunlight. Disturbance and faults occur five to ten times more often in open wire lines than in ABC lines. There is no risk in touching the live cable and the insulation reduces the number of short circuits and over-voltages in overhead cables during thunder-storms. Few hardware accessories are needed as each one can be used with many different size of cable. This makes installation and storage easier. Streets can easily be get it at little extra cost by using the ABC cables that have an extra conductor for lighting. The cable can be supplied with one or two insulated conductors for street lighting.

The hardware and accessories for AB cables are made by various reputed manufacturer and is easily available in India. They are similar to the standard hardware available for Bare conductor overhead distribution lines.

## SCOPE

This specification covers design, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of XLPE. Insulated Aluminum cables twisted over central bare/insulate aluminum messenger wire.

## STANDARDS

The materials shall conform in all respects to the relevant Indian Standard Specifications with latest amendments thereto, IS-14255/95 Indian Title International & Standard Internationally recognized standard.

IS-8130/1484 Aluminum conductors for Insulated electric cables

IS-6474/1984 Polyethylene Insulation for IS 7098 Part-I XLPE Insulation

Cables for voltage upto and including 1000 V

IS-398/Part-IV/All Aluminum Alloy IEC - 228/1978

1994 Conductors (AAAC) for Overhead Transmission purposes Conductors of Insulated Cables

IS 10418/1982 Drums for electric cables

IS-6568/1988 Specification for logs for BS148/ASTMD plywood 1275, D1533, D 1934, IEC

PUB 296-1969

SI. NO.	DESCRIPTION
1	Aluminum conductor (power)
2	XLPE Insulation
3	Aluminum Conductor (lighting)
4	Bare 'Al-alloy' conductor (messenger)



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**1.1KV grade stranded & compacted aluminium phase conductor and stranded messenger conductor with all aluminium alloy, phase conductor is insulated with XLPE compound, messenger is either insulated or bare with lighting conductor of 16mm<sup>2</sup> referred specification IS: 14255-1995 up to the latest amendment.**

Description & type of cable	No. of wires		Thickness of XLPE insulation		App. Overall dia. mm	App. Weight of cable kg/km	Breaking load of messenger kn(min)	Max. D.C. resistance		A.C. current rating Amps. in air at 40°C
	Phase	Messenger	Phase	Messenger				ohms/km		
			mm	mm				Phase	Messenger	
<b>With insulated messenger conductor</b>										
3C x 16 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.2	1.2	23.5	369	7	1.91	1.38	62
3C x 25 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.2	1.2	25	457	7	1.2	1.38	82
3C x 35 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.2	1.2	27.5	554	7	0.868	1.38	103
3C x 35 mm <sup>2</sup> + 35 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.2	1.2	28.4	586	10.1	0.868	0.986	103
3C x 50 mm <sup>2</sup> + 35 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.5	1.2	32.5	760	10.1	0.641	0.986	127
3C x 70 mm <sup>2</sup> + 50 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.5	1.5	37.5	1007	14	0.443	0.689	154
3C x 70 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	7	7	1.5	1.5	39.5	1070	19.7	0.443	0.492	154
3C x 95 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	19	7	1.5	1.5	42.5	1304	19.7	0.32	0.492	188
3C x 120 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	19	7	1.6	1.5	46.8	1550	19.7	0.253	0.492	218
3C x 150 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated) + 16 mm <sup>2</sup>	19	7	1.8	1.5	50.8	1860	19.7	0.206	0.492	248
<b>With bare messenger conductor</b>										
3C x 16 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.2	N.A*	19.5	340	7	1.91	1.38	62
3C x 25 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.2	N.A*	20.5	429	7	1200	1.38	82
3C x 35 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.2	N.A*	23.5	526	7	0.868	1.38	103
3C x 35 mm <sup>2</sup> + 35 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.2	N.A*	25	553	10.1	0.868	0.986	103
3C x 50 mm <sup>2</sup> + 35 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.5	N.A*	26.8	727	10.1	0.641	0.986	127
3C x 70 mm <sup>2</sup> + 50 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.5	N.A*	31.5	958	14	0.443	0.689	154
3C x 70 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	7	7	1.5	N.A*	34.5	1013	19.7	0.443	0.492	154
3C x 95 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	19	7	1.5	N.A*	37	1248	19.7	0.32	0.492	188
3C x 120 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	19	7	1.6	N.A*	39	1493	19.7	0.253	0.492	218
3C x 150 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare) + 16 mm <sup>2</sup>	19	7	1.8	N.A*	40	1803	19.7	0.206	0.492	248

**Note:** Insulation thickness of 16 mm<sup>2</sup> for lighting conductor operating temperature  
 Current rating of 16 mm<sup>2</sup> lighting conductor  
 Conductor operating temperature  
 Short circuit temperature for one sec.

1.20 mm  
 62 Amps.  
 90°C  
 250°C

Ambient Air Temperature is 40°C

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1.1 KV grade stranded & compacted aluminium alloy, phase conductor and stranded messenger conductor with all aluminium alloy, phase conductor is insulated with XLPE compound, messenger is either insulated or bare with lighting conductor of 16 mm<sup>2</sup> referred specification IS:14255-1995 up to latest amendment.

Description & type of cable	No. of wires		Thickness of XLPE insulation		App. Overall dia.	App. Weight of cable	Breaking load of messenger	Max. D.C. resistance		A.C. current rating Amps. in air at 40°C
	phase	messenger	phase	messenger				ohms/km		
			mm	mm	mm	kg/km	kn(min)	phase	messenger	
<b>With insulated messenger conductor</b>										
1C x 16 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	20	165	7	1.91	1.38	72
3C x 16 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	22	301	7	1.91	1.38	64
1C x 25 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	22.4	195	7	1.2	1.38	99
3C x 25 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	25	390	7	1.2	1.38	84
1C x 35 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	27.3	227	7	0.868	1.38	120
3C x 35 mm <sup>2</sup> + 35 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	27.4	486	7	0.868	1.38	105
1C x 35 mm <sup>2</sup> + 35 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	28	259	10.1	0.868	0.986	120
3C x 35 mm <sup>2</sup> + 25 mm <sup>2</sup> (insulated)	7	7	1.2	1.2	28.4	518	10.1	0.868	0.986	105
1C x 50 mm <sup>2</sup> + 35 mm <sup>2</sup> (insulated)	7	7	1.5	1.2	29	317	10.1	0.641	0.986	150
3C x 50 mm <sup>2</sup> + 35 mm <sup>2</sup> (insulated)	7	7	1.5	1.2	32.3	692	10.1	0.641	0.986	130
3C x 70 mm <sup>2</sup> + 50 mm <sup>2</sup> (insulated)	7	7	1.5	1.5	37.5	939	14	0.443	0.689	155
3C x 70 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated)	7	7	1.5	1.5	39	1002	19.7	0.443	0.492	155
3C x 95 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated)	19	7	1.5	1.5	42.7	1237	19.7	0.32	0.492	190
3C x 120 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated)	19	7	1.6	1.5	46	1482	19.7	0.253	0.492	220
3C x 150 mm <sup>2</sup> + 70 mm <sup>2</sup> (insulated)	19	7	1.8	1.5	50	1791	19.7	0.206	0.492	250
<b>With bare messenger conductor</b>										
Description & type of cable	No. of wires		Thickness of XLPE insulation		App. Overall dia.	App. Weight of cable	Breaking load of messenger	Max. D.C. resistance		A.C. current rating Amps. in air at 40°C
	phase	messenger	phase	messenger				ohms/km		
			mm	mm	mm	kg/km	kn(min)	Phase	Messenger	
1C x 16 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	18.5	137	7	1.91	1.38	72
3C x 16 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	19.3	272	7	1.91	1.38	64
1C x 25 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	19.5	167	7	1.2	1.38	99
3C x 25 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	20.5	362	7	1.2	1.38	84
1C x 35 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	22	199	7	0.868	1.38	120
3C x 35 mm <sup>2</sup> + 35 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	23.5	458	7	0.868	1.38	105
1C x 35 mm <sup>2</sup> + 35 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	24.6	226	10.1	0.868	0.986	120
3C x 35 mm <sup>2</sup> + 25 mm <sup>2</sup> (bare)	7	7	1.2	N.A*	25	485	10.1	0.868	0.986	105
1C x 50 mm <sup>2</sup> + 35 mm <sup>2</sup> (bare)	7	7	1.5	N.A*	26.6	284	10.1	0.641	0.986	150
3C x 50 mm <sup>2</sup> + 35 mm <sup>2</sup> (bare)	7	7	1.5	N.A*	26.8	659	10.1	0.641	0.986	130
3C x 70 mm <sup>2</sup> + 50 mm <sup>2</sup> (bare)	7	7	1.5	N.A*	31.2	890	14	0.443	0.689	155
3C x 70 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare)	19	7	1.5	N.A*	34.4	946	19.7	0.443	0.492	155
3C x 95 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare)	19	7	1.5	N.A*	36	1179	19.7	0.32	0.492	190
3C x 120 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare)	19	7	1.6	N.A*	38	1425	19.7	0.253	0.492	220
3C x 150 mm <sup>2</sup> + 70 mm <sup>2</sup> (bare)	19	7	1.8	N.A*	40	1735	19.7	0.206	0.492	250

**Rating factor for variation in air temperature:**

Air Temperature °C	20	25	30	35	40	49	50
Rating Factor	1.32	1.25	1.16	1.09	1	0.9	0.81

\*Not Applicable