

TECHNICAL SPECIFICATIONS FOR AERIAL BUNCHED CABLE HAVING XLPE INSULATED L.T. CABLE FOR WORKING VOLTAGE UPTO 1100 VOLT

1.	SCOPE :
	The specification covers design, manufacture, testing before despatch, transportation, supply and delivery of ISI marked 1100V Aerial Bunched Cable having XLPE insulated Cable (three Power Core) with stranded compact circular aluminium conductors twisted over an insulated aluminium alloy messenger wire for use as overhead distribution feeders, with/without one street lighting core with stranded compacted circular aluminium conductor XLPE insulated suitable for use on 3-Phase AC System conforming to IS-14255/1985 with up to date amendments.
2.	LOCATION :
	Aerial bunched Cables for use in L.T. overhead lines are preferred than conventional L.T. overhead lines with bare conductors as those are not subjected to frequent faults as happens with the bare conductors and also to minimise problem of tree clearance etc. ABC System is safer and eliminates use of insulators and associated hardwares required for bare conductors.
3.	APPLICABLE STANDARDS :
	Unless otherwise stipulated in this specification, the following standard with up to date amendment shall be applicable.
	IS 14255-1995
	IS : 8130
	IS : 398 (Part-IV)
	Specification for AERIAL Bunched Cables for working Voltage Up to & including 1100 Volts.
	Specification for Conductors for Insulated Cables.
	Specification for Aluminium Alloy Conductor.
4.	RATED VOLTAGE :
	The rated Voltage of LT AB Cables shall be 1100 Volts.
5.	CONDUCTORS :
	The Aluminium Conductors for phase/street lightning conductor shall be H2 of H4 grade Aluminium complying with the requirements of IS-8130-1984 with up to date amendments. For messenger wire stranded All Aluminium Conductor shall be of heat treated Aluminium Magnesium-Silicon Alloy Wires containing approximate 0.5% magnesium and 0.5% silicon conforming to IS-398 (Part-IV)/1984 with up to date amendments. The stranded conductor shall be clean & reasonably uniform in size and shape and its surface shall be free from sharp edges. Not more than two joints shall be allowed in any of the wires forming every complete length of conductor and no joint shall be within 300 mm. of any other joint in the same layer. The joint shall be brazed, silver soldered or electric or gas welded. No joint shall be made in the conductor, once it has been stranded.
6.	INSULATION :
	The Conductor (with protective barrier, wherever applied) shall be provided with cross linked polyethylene applied by extrusion conforming to the standard Specification as per IS 14255/95.
	The average thickness of insulation when measured in accordance with relevant clause of the specification, shall not be less than standard value specified. Upper surface of Cable insulation should be Ultra Violet Ray resistant Colour of insulation shall be black.
7.	CORE IDENTIFICATION :
	The Phase Conductors shall be insulated with black weather resistant, XLPE suitable for 1100 Volt insulation. The Phase Conductor shall be provided with one, two and three ridges for quick identification. The individual cores thus formed shall then be laid up around insulated messenger wire. The insulated messenger wire shall have four ridges as per IS 14255:1995. The insulated street lighting conductor shall not have any identification mark.

8.	MESSENGER-CUM-NEUTRAL WIRE :
	The insulated messenger wire shall be of aluminium alloy, generally conforming to IS 398 (Part-IV)/1994 and suitably compacted to have smooth round surface to avoid damage to the other insulating sheath of phase conductor twisted around the messenger.
9.	LAYING UP :
	Three Power Cores having Ridges one, two and three and one street lighting without any ridge, if any should be twisted over insulated messenger wire with right hand direction of lay. This will from the Aerial Bunched Cable. Lay ratio shall be as specified in IS:14255/1995.
10.	TESTS FOR CABLES :
10.1	Type test reports not older than 5 years of at least two sizes of Aerial Bunched Cables with & without street lighting core being procured and as specified in relevant IS & IEE and detailed in Clause 5:1 got conducted from independent recognised Test House shall be furnished by the bidders along with the bid. The bid not accompanied with test reports may not be considered for evaluation. TYPE TEST REPORTS SHALL CONTAIN DETAILS OF FOLLOWING TYPE TESTS AS PER IS 8130-1984 & IS 10810
1.	Tests on Phase/Street Light Conductor :
	i) Tensile Test
	ii) Wrapping Test.
	iii) Resistance Test.
2.	Test on Messenger Conductor ;
	i) Breaking Load.
	ii) Elongation Test.
	iii) Resistance Test.
3.	Physical Test for XLPE insulation :
	i) Tensile Strength and elongation at break.
	ii) Ageing in oven.
	iii) Hot Set Test.
	iv) Shrinkage Test.
	v) Water Absorption (Gavimetric)
4.	Test for thickness insulation.
5.	Insulation performance (Volume resistivity) Test.
6.	High Voltage Test. Report of above and any other type test provided in the relevant Indian Standards shall also be supplied.
10.2	ROUTINE TEST ;
	These shall be carried out on all sizes of all drums of unarmoured Cables by the supplier as given in Clause 5.1 and shall be got approved before despatch. The Cable shall be inspected and tested at the manufacturer's works before despatch as per ISS mentioned in schedule of requirement. The manufacturer shall arrange all the necessary machinery, apparatus and labour required for the testing purpose. The routine tests embodied in the respective ISS are as per list given below : 1. Conductor Resistance Test. 2. High Voltage Test at room temperature. 3. Cold Bend Test (optional) Any other routine test provided in the relevant Indian Standards shall also got conducted by the supplier.

10.3	ACCEPTANCE TEST :
	These tests as per relevant IS & IEC shall be carried out in the presence of the purchaser's representative if so desired by the purchaser. The following shall constitute the acceptance tests.
(a)	Tensile Test (for phase/street light conductor)
(b)	Wrapping Test (for phase/street light conductor)
(c)	Breaking Load Test for messenger Conductor.
(d)	Elongation test for messenger conductor.
(e)	Conductor resistance test.
(f)	Test for thickness of insulation.
(g)	Tensile Strength and Elongation at Break Test.
(h)	Hot Set Test for XLPE insulation.
(i)	Insulation resistance test and
(j)	High Voltage Test.
11.	SEQUENTIAL MARKING :
	Due to technical difficulty Marking of the Sequential Length is not required. Instead the Weight of Cable for all sizes shall have to be mentioned for Per K.M. Length.
12.	PACKING & MARKING :
	The Cable shall be supplied on suitable sized wooden non-returnable drum of robust construction for each length of Cables as per I.S. 10418. A layer of water proof paper shall be applied to the surface of the drums and over the outer cable layer. A clear space at least 40 mm. shall be left between the Cable and Logging. Wood preservative shall be applied to the entire drum. Each metre length shall be embossed with the Trade Name of Manufacturer and the work 'ELECTRIC WBSEDCL'. Packing shall be sturdy to protect the Cable from any injury during transportation handling and storage. Both Cable ends shall be sealed with PVC/Rubber Caps to eliminate ingress of moisture. Each Cable Drum shall have following information stenciled on it.
a)	Manufacturer's Name, Brand Name of Trade Mark.
b)	Year of Manufacture.
c)	Nominal Cross-Sectional area of the Cable Conductor.
d)	Type of Cable and Voltage Grade.
e)	Length of the Cable.
f)	Number of the Cores.
g)	ISI Certification Mark, IS reference.
h)	Colour of outer sheath.
i)	No. of lengths in Drum (if more than one)
j)	Cable Code.
k)	Direction of rotation of drum (by means of an arrow)
l)	Approximate gross weight in Kg./Km.
	The standard Drum Length will be 500 mtrs. in each Drum for all sizes subject to a tolerance of $\pm 5\%$.
13.	INSPECTION :
	The Cable shall be inspected at manufacturer's works before despatch as per IS-7098 (Part-I)/1988 (with upto date amendments) & IS 14255/1995. All the acceptance tests embodied in the above shall be performed by the Inspecting Officer. The Manufacturer shall arrange without making any extra charges with all the necessary machinery, apparatus and labour requirement for the testing purpose. The Cable requirement for testing shall be to Firm's Account.
14.	LITERATURE AND MANUAL :
	To be submitted as per General Terms & Conditions of Contract.
15.	GUARANTEED TECHNICAL PARTICULARS :
	To be submitted along with Tender documents.

A. DESCRIPTION OF 1.1 KV AERIAL BUNCHED CABLES :

Description	Size
	Ph.Wire + St.Light Wire + Messenger-Cum-Neutral Wire
1100V Grade L.T. Aerial Bunched Cable having three Power Core & One Neutral-Cum-Messenger Core of stranded compacted circular Aluminium Black coloured XLPE insulated & Core identification by ridges, one, two and three & four respectively. One Street Lighting Core of stranded, compacted Circular Aluminium Conductor, Black coloured XLPE insulated without any identification mark. Messenger-Cum-Neutral Wire should be of stranded compacted Circular Aluminium Alloy Conductor conforming to IS 8130/1984, IS-398(Part-IV)/1979 and IS-14255/1995 with upto date amendments, if any.	1) 3x25 + 1x16 + 1x25 sq.mm. 2) 3x35 + 1x16 + 1x25 sq.mm. 3) 3x50 + 1x16 + 1x35 sq.mm. 4) 3x70 + 1x16 + 1x50 sq.mm. (Provision for street light conductor is optional and as per requirement)
[Sizes of Power Conductor & Messenger Wire may vary as per requirement]	

B. ACCESSORIES REQUIRED FOR DRAWAL OF L.T. OVERHEAD LINE WITH 1100V GRADE AERIAL BUNCHED CABLES ON PCE POLE SUPPORT

Sl. No.	Description
1.	Anchor Clamp (3-Bolt and 2 Bolt Type)
2.	Eye hook with Suspension Clamp Assembly.
3.	PCC Pole Clamp.
4.	Insulation Piercing Connectors with cover or P.G.Connectors with insulation cover.
5.	Water Proof pre-insulated Hexagonal Compression Connectors & Lugs.

NOTE : Offer for L.T. Aerial Bunched Cables should cover required accessories with details of dimensions, materials and provisional quantity per K.M. of L.T. O/H Line.

DIMENSIONAL AND ELECTRICAL PARAMETERS :

LTABC : The standard sizes and technical characteristics for Single Core Cable.

Parameters	Nominal Sectional Area of Conductors (sq.mm.)				
	16	25	35	50	70
No. of Strands	4	7	7	7	7
Dia. of Compacted Conductor (MM)	4.4	5.5	6.8	7.9	9.4
Approx. Mass (Kg./Km.)	42	65	95	127	170
Max. DC resistance at 20°C (ohm/km.)	1.91	1.20	0.868	0.641	0.443
Insulation Thickness (mm.)	1.2	1.2	1.2	1.5	1.5
Current rating at 40°C in air.	60	85	100	120	155

Note : The resistance values given in the Table are the max. permissible one.

TECHNICAL CHARACTERISTIC OF INSULATED MESSENGER-CUM-NEUTRAL WIRE FOR LT ABC :

Nominal Sectional Area (mm.)	Dia. of Compacted Conductor(mm.)	Approx. mass (Kg./Km.)	Max. D.C. resistance At 20C (Ohm./Km.)	Minimum Tensile Strength (KN)
25	5.9	65	1.38	7.4
35	6.9	95	0.986	10.3
50	7.9	127	0.689	14.0

SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR L.T. ABC CABLES

Sl. No.	Description	Size-1	Size-2	Size-3
1.	Manufacturer's Name & Address			
2.	Lists of Standard applicable.			
3.	Power/Neutral-Cum-Messenger Core Conductors.			
3.1	Nominal cross sectional area, no. of standards and strand dia.			
	i) Power Cross(mm.)n/mm.			
	ii) Neutral-Cum-Messenger Core(mm)/n/mm.			
	iii) Street Lighting Core(mm.)/n/mm.			
	B. Max. DC resistance of conductor at 20°C			
	i) Power Cross (Ohm/Km.)			
	ii) Neutral-Cum-Messenger Core (Ohm/Km.)			
	iii) Street Lighting Core (Ohm/Km.)			
	C. Approximate diameter of Conductor.			
	i) Power Cross (mm.)			
	ii) Neutral-Cum-Messenger Core (mm.)			
	iii) Street Lighting Core (mm.)			
	D. Approximate dia over insulation.			
	i) Power Cores.			
	ii) Neutral-Cum-Messenger Core.			
	iii) Street Lighting Core.			
3.2	Insulation Minimum Thickness			
	i) Power Cross (mm.)			
	ii) Neutral-Cum-Messenger Core (mm.)			
	iii) Street Lighting Core (mm.)			
4.	Messenger Wire (Insulated)			
	i) Nom. Cross Sectional area (sq.mm.)			
	ii) Approx. breaking load (KN)			
5.	Current ratings			
	Continuous current carrying capacity of Cable in Air at Ambient Temp. 40°C (Amp.)			
	i) Power Cores			
	ii) Neutral-Cum-Messenger Core			
	iii) Street Lighting Core			
6.	Approx. Weight (Kg./Km.)			
7.	No. of Cores			
	i) Power Core (No.)			
	ii) Street Lighting Core (No.)			
	iii) Insulated Messenger (No.)			
8.	Derating factor			
	Derating factors for variation in Air Temp.			
	Air Temp. °C			
9.	Rating Factor.			
9.1	Identification of Power Cores, Neutral-Cum- Messenger Core & Street Lighting Core.			
9.2	Laying.			
10.	Details of Power/Neutral-Cum-Messenger Core			
10.1	Conductor :			
	a) Material			
	b) Flexibility Class as per IS : 8130/84			
	c) Form of Conductor.			
10.2	Insulation			
	a) Material.			
	b) Form of Conductor			
11.	Voltage Grade of Cable.			
	a) Service Voltage.			
	b) Neutral Earthing.			
12.	Maximum Conductor Temperature.			
	a) Continuous (in Deg.C)			
	b) Short time (in Deg.C)			
13.	Type of curing of XLPE Insulation Completed Cable.			