SPECIFICATION OF LT AERIAL BUNCHED (AB) CABLES (Size: 3C x 35mm² +1C x16 + 25mm² & 3Cx50mm²+1Cx25 + 35mm²) FOR LT LINES
(APPLICABLE FOR LT AB CABLE WITH XLPE INSULATION ONLY)

1. **SCOPE:**
This specification covers XLPE insulated Aluminum cable twisted over a central bare Aluminum Alloy messenger wire for use of L.T. Over-Head lines in Rural Electrification System. The Aerial Bunched cable and messenger wire should be confirming to IS.

2. **RATED VOLTAGE:**
The rated voltage of the AB cables shall be 1100 volts

3. **APPLICABLE STANDARDS:**
Unless otherwise stipulated in this specification the following Standards shall be applicable.
(i) IS – 14255/1995 : ABC cables 1100 volts.
(ii) IS – 8130/1984 : Conductors for insulated cables.
(iii) IS – 398/Pt.IV/1994: Aluminium alloy conductor.
(iv) IS – 10418/1982 : Drums for electric cables

4. **GENERAL:**
The AB cable covered under this specification should be suitable for use on three phase, 4 wire earthed system for working voltage up to 1100 V. It should confirm the relevant standards stated above and others if applicable.
The phase conductor should be 50 mm² and 35 mm² XLPE insulated and the neutral conductor should be 25 mm² and 16 mm² **XLPE insulated** whereas messenger conductor should be Bare heat treated aluminium silicon containing 0.5% magnesium and approximately 0.5% silicon confirming to IS: 398 (Part-IV):1979 and its latest amendment, if any.

5. **PHASE & NEUTRAL CONDUCTORS:**
5.1 The phase & neutral conductor shall be provided cross linked poly ethylene insulation applied by extrusion. The thickness of insulation shall not be less than **1.2 mm** up to 35mm² and shall not be less than **1.5 mm** for above 35mm² at any point and insulation shall be so applied that it fits closely on the conductor and it shall be possible to remove it without damaging the conductor. The insulated conductors

shall generally conform to the standards IS-14255:1995. (Please refer G.T.P Clause no. 13)

5.2 The phase conductors shall be provided with one, two & three 'ridges' for easy identification.

5.3 The tensile strength of the aluminum wire used in the conductor shall not be less 90 N/mn^2.

5.4 The standard size and technical characteristics of the phase conductors shall be as shown in the Table-1.

TABLE-I

Nominal sectional area in mm^2	No. of Strands	Diameter of compacted conductor in mm	Approx. mass Kg/KMs.	Max. DC Résistance at 20°c (Ohm/km)	Insulation Thickness in mm
1	**2**	**3**	**4**	**5**	**6**
16	7	4.4	42	1.91	1.2
25	7	5.5	65	1.20	1.2
35	7	6.8	95	0.868	1.2
50	7	7.9	127	0.641	1.5

NOTE: 1) The resistance values given in col.5 are the max. permissible
2) Tolerance of + 5% is allowable on dimension.

6. MESSENGER WIRE:

6.1 The bare messenger wire shall be of aluminium alloy generally confirming to IS–398/Pt.IV/94 composed of 7 strands and shall be suitable compacted to have smooth round surface to avoid damages to the overall insulation of phase & neutral conductor twisted around the messenger.

6.2 There shall be no joint in any wire of the stranded messenger Conductor except these made in the base rod or wires before final drawing.

6.3 The sizes and other technical characteristics of the messenger wire shall be as given in the Table No.2.

TABLE –2

Nominal sectional area in mm^2.	No. of strands	Diameter of compacted conductor in mm	Approx. mass Kgs/KMs	Max .DC Resistance
1	**2**	**3**	**4**	**5**
25	7	5.8	65	1.380
35	7	6.8	95	0.986

NOTE: while limiting values in col. 3 is to be guaranteed a Tolerance of + 5% will be permissible.

7. XLPE INSULATION:

The insulation shall generally confirm to IS-7098(Part-II):85

Sr. No.	Property	Requirement
1.	Tensile Strength	12.5 N / mm^2 Minimum
2.	Elongation at break	200 % Min.
3.	Ageing in air over	
a.	Treatment: Temperature & duration	 135 ± 3°C & 7 days
b.	Tensile strength variation	± 25% Max.
c.	Elongation variation	± 25% Max.
4.	Hot Set	
a)	Treatment temperature, Time under load, mechanical stresses	200 ± 3°C, 15 minutes 20 N /cm^2.
b)	Elongation under load	175 % max.
c)	Permanent elongation (set) after cooling	15 % Max
5	Shrinkage	
a)	Treatment temperature duration	130 ± 3°C For 1 hour
b)	Shrinkage	4% Max
6	Water absorption (Gravimetric)	
a)	Treatment– Temp. Duration	85 ± 2°C 14 days
b)	Water absorbed	1 mg. / cm^2 max.

8. TYPE TEST:

(A) Test for Phase/Street Light Conductors

a) Tensile Test (IS-8130)
b) Wrapping Test (IS-8130)
c) Conductor Resistance Test (IS-8130)

(B) Test for Messenger:

a) Breaking load test (to be made on finished conductor) –(IS-398 / Pt.IV / 1994 with latest revision)

b) Elongation test (IS - 398 / Pt.IV/1994)
c) Resistance test (IS - 398 / Pt. IV /1994)
d) If insulated , the test of insulation as per relevant IS will be applicable

(C) Physical test for XLPE insulation

i) Tensile strength and Elongation at break
ii) Ageing in air oven
iii) Hot set test
iv) Shrinkage test
v) Water absorption (Gravimetric)
vi) Carbon black
1. Content & 2. Dispersion

(D) Test for thickness of insulation

(E) Insulation Resistance (Volume Resistivity) Test

(F) High Voltage Test

Note: The tenderer should submit the entire above type test of any Govt. approved Laboratory along with their offer.

Optional Test:

Bending test on the completed cable:

Bending test shall be performed on a sample of complete cable. The sample shall be bent around a test mandrel at room temperature for at least one complete turn. It shall then be unwound and the process shall be repeated after turning the sample around its axis 180^0. The cycle of this operation shall be then repeated twice.

The diameter of mandrel shall be 10 (D+d).

Where D = Actual diameter of cable
(i.e. the min. circumscribing diameter in mm)
d = Actual diameter of the phase conductor in mm
No cracks visible to the naked eye are allowed.

9. ACCEPTANCE TESTS:

Tests for Phase / Street Light Conductors :

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
j. High voltage test

10. PACKING MARKING:

10.1 The LT AB cable shall be wound in non returnable drums conforming to IS-10418/1982 "Specification for Reels and Drums for bare wire" of the latest version thereof. The drums shall be marked with the following:

a) Manufacturers name
b) Trade mark if any
c) Drum number
d) Size of Conductor
e) Size of Messenger
f) Voltage grade
g) Number of lengths of pieces of Cable in each drum
h) Gross mass of the packing
i) Net mass of Cable
j) ISI mark

10.2 The drums shall be of such a construction as to assure delivery of conductor in field free from displacement and damage and should be able to withstand all stresses due to handling and the stringing operation so that cable surface not dented, scratched or damaged in any way during transport and erection. The cable shall be properly lugged on the drums

10.3 The cable drums should be suitable for wheel mounting.

11. STANDARD LENGTH:

The standard length of drum will be 500 metre with ± 5%

Non-standard Length:

Non standard length not less than 50% of the standard length shall be accepted to the extent of 10% of the ordered quantity.

12. INSPECTION:

All tests and inspections shall be made at the place of manufacturer unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with this specification.

13. EXPERIENCE:

The tenderer must have some experience of manufacturer and supply of this cable to any Electricity Board. Copy of order executed and performance report may be submitted along with the offer.

14. TYPE TEST CERTIFICATES:

The duly attested copy of Type Test Certificate of the offered sizes of AB cable, as per IS: 14255/1995 with latest amendment/revision be submitted from **any Govt. approved laboratory** along with the offer. In absence of type test certificate, offer will be liable to be ignored/rejected without any further correspondence (at DGVCL discretion). Type Test Certificate shall Not be More Than Seven Years Old from Date of Opening of Tender.

15. SUBMISSION OF ISI LICENSE FOR IS14255:1995

The tenderer/s are required to submit duly attested photo copy of the valid ISI License up to the date of delivery for supply of these AB cables/wires along with tender and they should submit GTP along with the tender failing which, the offer would be ignored.

16. IMPORTANT:

In absence of valid ISI License/GTP duly filled in/and copy of type test certificate of Govt. approved Laboratory, duly attested by authorized person, offer will be liable to be ignored without any further correspondence.

17. ISI Marking:

The material supplied shall be confirming to Indian Standard Specification and also with ISI marking as applicable and even after inspection of the lot, if the materials received at site is found without ISI marking, the lot shall be rejected and no further correspondence shall be entertained in this regard.

GUARANTEED TECHNICAL PARTICULARS (G.T.P.)

Technical information and Guaranteed Technical Particulars (G.T.P.) for LT Aerial Bunched Cable (XLPE insulated only) of sizes 3C x 35 + 1C X16 +25 mm² & 3C x 50 + 1C X25 +35 mm² messenger wire

PART – A

Bidders have to confirm following important requirements:

Sr. No.	Particulars	confirmation
1.	AB Cable shall be manufactured and supplied Confirming to IS: 14255/1995 with latest Amendment if any and DGVCL's specification	Yes
2.	Cable drums/label shall bear ISI Mark	Yes
3.	ISI License shall remain valid till order is Completed	Yes
4.	Colour of XLPE Insulation – Black	Yes
5.	Shape – compacted	Yes
6.	Standard length in case of drum of 500 metres ± 5 %	Yes
7.	Non-Standard length 50% of Std. length up to 10% of ordered quantity	Yes
8.	Packing shall contain only one Length.	Yes
9.	Packing material: wooden drums as per IS: 10418/1982 duly painted.	Yes
10.	Following shall be embossed on AB cable	
	a. DGVCL	Yes
	b. 1100 Volts	Yes
	c. IS: 14255/1995	Yes
	d. Year of manufactures	Yes
	e. Trade Mark	
	f. Marking on drum shall be as per IS: 14255/1995	Yes

11. Conductor –

a) For Phase 35mm² & 50 mm² Aluminium as per IS 8130/1984 Yes

b) For Messenger wire 25mm^2 & 35mm^2 Aluminium Alloy as per IS 398/Pt.IV/1994 Yes

12. Maximum phase Conductor resistance at 20ºC
    35 mm^2 Conductor - 0. 868 Ohm/KM Yes
    50 mm^2 Conductor - 0. 641 Ohm/KM

    Maximum Messenger Conductor resistance at 20ºC
    25 mm^2 Conductor - 1.380 Ohm/KM Yes
    35 mm^2 Conductor - 0.986 Ohm/KM Yes

13. Thickness of insulation :

LT Aerial Bunched Cable size	XLPE Insulation thickness in mm (Nominal)	Confirmation
3x35+1Cx16+25mm^2	1.20	Yes
3x50+1Cx25+35mm^2	1.50	Yes

14. Volume resistivity of insulation
    a. At 27ºC – 1 x 10^13 Ohm-cm. Min Yes
    b. At 70°C – 1 x 10^11 Ohm-cm. Min Yes

15. Tensile strength of Insulation and sheath - 12.5 N/mm^2 Min. Yes

16. Elongation at break of Insulation and Sheath – 200 % Min. Yes

17. Overall Tolerance in supply of ordered total quantity shall be **± 2** % (Plus and minus 2%) Yes

PART-B

Bidders have to furnish below details about material for information:

Sr. No.	Particulars	Confirmation
1.	ISI License for IS:14255/1955	
	a. Number	
	b. Date of expiry	
2.	Approximate weight of 1000 metres length of LT 3 C X AB Cable (weight in Kgs.)	

LT AB Cable of Size	Alum.	Alu. Alloy	XLPE	**Total**
3Cx35+1Cx16+25 mm^2				
3Cx50+1Cx25+35mm^2				

3. Cable Conductor, Circular Compacted?

Date: Signature & Seal of the Tenderer

PART – C (ENCLOSURES)

Bidders have to enclose following documents and has to confirm for the same

Sr. No.	Particulars	Confirmation
1.	ISI License	Yes
2.	Proof if applied for renewal of ISI License	Yes/No
3.	TYPE TEST CERTIFICATE:	
3.1	Type test certificate from any Govt. approved Laboratory	Yes
	a. Name of Lab.	
	b. T.R. No.	
	c. Date	
4.	List of plant and machinery	Yes
5.	List of testing facility available	Yes
6.	List of orders of new cable supply pending/executed	
	a. with MGVCL/DGVCL/UGVCL/PGVCL	Yes
	b. with agencies other than 6.(a)	Yes

PART – D

Bidder has to mention below deviation if any, quoting relevant clause of specification.

Date: Signature & Seal of the Tenderer