

TECHNICAL SPECIFICATION

A.B. CABLE

1.0 NATURE OF WORK

The work covered by this Specification is for L.T lines in A.B cable as specified herein and in the attached Schedules. The overhead distribution lines will form part of the SOUTHCO's distribution System.

1.1 GENERAL PARTICULARS OF THE SYSTEM

The following are the general particulars governing the design and working of the complete system of which the Works will form a part.

The system will be in continuous operation during the varying atmospheric and climatic conditions occurring at all seasons.

1.2 SCOPE-

AB Cabling works.

The contractor will provide different size conductors and different size AB Cables only. Also other items required for construction of New lines, up gradation or replacement of conductors, AB cabling works with inter posing of poles, repair of old damaged poles, replacement of damaged X-arms, Post insulators with GI pin, replacement of tension fittings with Insulators(70KN), Mid-span joint, Al. tape, H/W fittings armoured rods concreting materials etc, along with suspension clamp , 'Eye' hook with shackle insulators, insulation piercing connector and dead end clamps reqd. for AB Cables etc are to be supplied by contractor.

DISCLAIMER

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Though adequate care has been take while issuing the Bid document, the Bid document, the Bidder should satisfy itself that documents are complete in all respects. Intimation for any discrepancy shall be given to this office immediately.

Stringing of Aerial Bunched Cable (ABC)

Fixing of Suspension & Tension/ Dead end fittings to the Poles.

The suspension clamp is to be hung on eye hook/ suspension hook, which is fixed to the pole at a minimum distance of 0.15 mt. from top end of the pole. The messenger wire of bunched cable resting on a pulley is separated from the cable by separating wedges and inserted in the conductor groove of the suspension clamp.

The bolt is tightened to a torque of 20 N after which the pulley and wedges are to be removed. The cable is tied to the messenger wire with nylon tie on both sides of clamps. Pole clamps 50 x 8 mm flat shall be used. Eye hook of 20mm dia MS rod to be used as per the drawing. The pole clamp shall be made to suite the pole width. This shall be installed as per Fig. No. 2 (a) of REC Construction Standard.

Fittings & Accessories

The following hardware fittings and accessories shall be used to install, erect & join the aerial bunched cable.

a) Suspension Clamp with Eye-Hook – The Contractor shall install the suspension clamp with eye hook. This hook shall be used to attach the AB cable on the pole by means of a dead end clamp in terminal poles and for attaching a suspension clamp suitable for holding AB cables of size 35mm² to 95mm² in straight lines and angle up to 90 Deg.-

b) Suspension fittings & the corresponding eye hook shall be as per REC Construction Standard No. e – 34. The eye hooks shall be made from minimum 20mm dia MS rods with eye on one end and the other end being suitably flattened with two holes for M16 bolt & nut to fix with the back clamps made from minimum 50x8mm flats as per drawing. The eye hook, back clamp and bolts & nuts are to be hot dip galvanized.

c) Dead End fittings shall be bolted type as per REC Construction Standard No. E-35 & the corresponding eye hook shall be as specified above. The dead clamps are to be anchored with the pole with similar arrangement of eye hook & back clamp. In this case, the back clamp shall have two nos. of holes on both sides for M16 bolts. One side of the clamp shall be used for holding the eye hook with dead end clamp and the other side shall be used for anchoring the Stay.

d) Nylon Tie- The contractor shall supply nylon ties. These ties shall be used for tying the conductors with the messenger wire to prevent the phase conductors from chatting against suspension clamp. The nylon tie is made of weather resistant black nylon.

e) Connectors- The contractor shall supply connector. These shall be used as non-tension aluminum to aluminum connections for conductor joints.

f) Plastic Covers for Connectors- The contractor shall install Plastic Covers for Connectors. These covers shall be used with aluminum/aluminum connectors to protect connectors against corrosion caused by climatic conditions.

Installation of Cable

The contractor shall be fully responsible for all activities related to installation of AB cable. His responsibilities consists of handling, pulling, stringing & jointing of the cable and effecting service connection to consumers as per direction of the Engineer-in-charge. The total no. of consumers per KM in urban area and rural area is approximately 200 & 50 nos. respectively. But payment shall be made as per actual use of piercing connectors to effect service connection to the consumers.

Handling of AB Cable

The contractor shall observe following precautions while handling the AB Cable:

The cable drums must be stored and transported in an upright position.

While loading/unloading, the drums shall not be thrown from transport vehicles.

Cable contact with sharp articles shall be avoided.

In order to prevent damage to the insulation, the cable shall not be dragged on the ground.

Pulleys shall be used for this purpose.

In order to prevent strands from spreading, always cut the cable with a cutter.

Use nylon ties or electrical tape to prevent the cable from spreading away from messenger wire after the cutting. Staple the end of the cable on to the drum in order to prevent loosening.

Do not remove the protective boards from the cable drum before the cable is pulled off the drum.

While moving the drum by rolling it on ground, always roll the drum in the direction indicated by the arrow on the flange. When pulling the cable, the spinning direction must be opposite.

Do not store the drums on wet soil, sandy or humid places.

Store the accessories in good order for quick easy and correct handling.

Pulling the Cable

The principle is to pull the cable under mechanical tension so that contact with the ground or any other obstacles is avoided. The cable drum should be perfectly in alignment with line to be strung and fixed about 15-20 mts.

From the holding the first pulley. Open the cover of the drum to check and ensure that the insulation is not damaged.

The pulling which is sent up upto the cable drum is about 15-20 mts from the pole holding to the last pulley. The pulleys are directly hung to such hook on the poles. The pulley tandem is to be used on angle poles if the line is deviating more than 60° Pull the guiding rope through all the pulleys.

Normal care shall be taken to assume a smooth passage of whole cable through the pulleys, especially in the first pole and on angle poles. One worker should act s brakeman at the cable drum so that the cable is not loosened during the pulling. One worker should follow the cable going through the pulleys and stop the pulling if anything goes wrong.

Stringing Operations.

The contractor shall follow one of the following methods for stringing.

1. Sag Method

Fix a dead end clamp on the neutral messenger wire at the pole. The messenger shall be bent behind the clamp to ensure sufficient friction between the messenger and the clamp in the initial stays during stringing.

Bind the conductor together beside the dead end clamp using a nylon tie.

Hand the clamp on the hook at the end pole Rewind simultaneously the slack cable length on the cable drum.

Attach the 'come along' on the neutral messenger wire at the first pole of the line.

Tighten the cable by the shackle or the winch when required sag is obtained.

Hand the dead end clamp on the hook and install it on the neutral messenger.

Remove the come along

Bind the conductors together on the messenger wire using a nylon tie

Check the length of the cable needed and cut it at an appropriate point.

2. Dynamometer Methods

Start the operation as above up to the stage.

Install the dynamo meter on the come-along

Tighten the cable at the required value by reading the Dynamo meter

Finish the stringing as in the sag method operation.

Jointing of Cables

Jointing of cable shall be in accordance with clause 12.3.3 of IS 1255:1993 and manufacturers special instructions given hereunder. This joining is to be done by skilled personnel.

Cable Damage and Repairs: If the cable is damaged for whatever reasons, it shall be brought to the notice of the engineer and shall not be used without his approval.

No joint or splice shall be made in spans crossings over main roads, small rivers or in tension spans.

Not more than one joint in the cable shall be allowed in one span.

The stringing rate include rates for paving, stringing, clamping, jointing, tensioning and fitting of all necessary accessories.

Insulated piercing connectors suitable for AB cable size from 16mm² to 95mm² and service connection cable of size 2.5mm² to 35mm² shall be used for effecting service connections to the consumers.

Final Checking, Testing and Commissioning

After stringing have been done as approved by the engineer, to ensure that everything is complete in all respects, the works shall be thoroughly inspected keeping in view the following main points.

All the bolts and nuts should be of hot dip galvanized materials as per relevant IS.

The stringing of the cable has been done as per the approved sag and desired clearances are achieved.

No damage, minor or major to the cable, messenger wire and accessories

The contractor shall submit a report to the above effect to the Engineer in Charge, who shall inspect and verify the correctness of the report. In case it is noticed that some or any of the above is not fulfilled, the engineer shall get such items rectified by the contractor no extra cost to the purchaser.

After final checking, the line shall be tested for insulation resistance in accordance with IS 1255:1983.

All arrangements for such testing or any other test desired by the Engineer-in-charge shall be done by the contractor and necessary labour, transport and equipment shall be provided by him. Any defect found out as a result of such tests shall be rectified by the contractor, forthwith at no extra cost to the purchaser.

In addition to the above, the contractor shall be responsible for testing and ensuring that the total and relative sags of the cable as within the specified tolerance. Such tests shall be carried out at selected points along the route as required by the Engineer-in-charge and the contractor shall provide all necessary equipment and labour to enable the tests to be carried out. After satisfactory test on the line and approval by the Engineer in Charge, the line shall be energized at full operating voltage before handing over. The cable shall be megger tested before and after jointing. The AB cable shall be tested for.

- i) Continuity of messenger wire and conductors
- ii) Absence of cross phasing
- iii) Insulation resistance to earth
- iv) Insulation resistance between conductors
- v) DC Resistance
- vi) Capacitance

As per IS 1255:1983 of the latest issue and as per manufacturers instructions.

Sufficient backfilled earth covers each foundation pit and is adequately compacted.

All poles are used strictly according to final approved drawing and are free of any defect or damage whatsoever.

The stringing of the conductors and earth wire has been done as per the approved sag and tension charts and desired clearances as clearly available.

All conductor and messenger wire accessories are properly installed.

All other requirements for completion of works such as fixing of danger plate and anti-climbing device have been fulfilled.

The insulation of the line as a whole is tested by the Contractor through provision of his own equipment, labour etc., to the satisfaction of the owner. Proper earthing of the poles.

HT/LT/Road Crossing Guarding

The contractor shall provide & install protective guarding as per REC construction standard for the line, The guarding shall be provided at all the crossing i.e. road, telecommunication & power lines, railway line, nallaha etc.

The contractor is required to follow local statutory regulations stipulated in Electricity (Supply) Act 1948, Indian

Electricity Rules 1956 as amended and other local rules and regulations referred in these specifications.

Reference Standards

The codes and/or standards referred to in the specifications shall govern, in all cases wherever such references are made. In case of a conflict between such codes and/or standards and the specifications, latter shall govern. Such codes and/or standards, referred to shall mean the latest revisions, amendments/changes adopted and published by the

relevant agencies unless otherwise indicated. Other internationally accepted standards which ensure equal or better performance than those specified shall also be accepted, subject to prior approval by the owner. In case no reference is given for any item in these specifications, latest REC specification & Construction Standards shall be referred to.

**GUARANTEED TECHNICAL PARTICULARS FOR LT XLPE AB Cable (Size :
3X95 +1X70+1X16mm2)**

SI No	Description	3X 95 + 1X70 + 1X16mm2
		Requirement
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)
3	Material of Neutral Catenary	Aluminium alloy as per IS 398 Pt - IV
4	Voltage Class	0.65/1.1 KV
5	No. of Strands of Phase Conductor	19
5(a)	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	19/2.54
6	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	12.7
7	No. Of Strands / Average Strand Dia. In mm. (Neutral Catenary.)	7/3.6
8	Minimum Overall Dia. Of compacted Bare Neutral Catenary .(in mm.)	10.8
9	No. Of Strands / Average strand dia. / Nominal cross sectional area of conducting part In No / mm2. (St. Light Conductor)	7 /1.75 / 16mm2
10	Minimum average thickness of insulation of phase Cond. (mm)	1.5
11	Minimum thickness of insulation of Phase Cond. (mm)	1.25
12	Minimum thickness of insulation at any point in street light conductor (mm)	0.98
13	Maximum DC resistance of Phase conductor at 20 ° C Ohm/ KM	0.32
14	Maximum DC resistance of street light conductor Ω / Km	1.91
15	Maximum DC resistance of neutral cond. Ω / Km	0.492
16	Ultimate tensile strength of neutral conductor (KN)	19.7
17	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral
18	Embossing on insulation at each one meter interval	As per Technical Specification
19	Cable drum length	250 / 500 / 1000m
20	Volume Resistivity of insulation at 27°C	$1 \times 10^{13} \Omega$ - cm min.
21	Volume Resistivity of insulation at 70°C	$1 \times 10^{11} \Omega$ - cm min.

GUARANTEED TECHNICAL PARTICULARS FOR LT XLPE AB Cable (Size : 3X70+1X50+1X16mm2)

SI No	Description	3X 70 + 1X50 + 1X16mm2
		Requirement
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation (IS 14255/95)
3	Material of Neutral Catenary	Aluminium alloy as per IS 398 Pt - IV
4	Voltage Class	0.65/1.1 KV
5	No. of Strands of Phase Conductor	19
5(a)	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	19/2.18
6	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	10.8
7	No. Of Strands / Average Strand Dia. In mm. (Neutral Catenary.)	7/3.05
8	Minimum Overall Dia. Of compacted Bare Neutral Catenary .(in mm.)	9.15
9	No. Of Strands / Average strand dia. / Nominal cross sectional area of conducting part In No / mm2. (St. Light Conductor)	7 /1.75 / 16mm2
10	Minimum average thickness of insulation of phase Cond. (mm)	1.5
11	Minimum thickness of insulation of Phase Cond. (mm)	1.25
12	Minimum thickness of insulation at any point in street light conductor (mm)	0.98
13	Maximum DC resistance of Phase conductor at 20 ° C Ohm/ KM	0.443
14	Maximum DC resistance of street light conductor Ω / Km	1.91
15	Maximum DC resistance of neutral cond. Ω / Km	0.689
16	Ultimate tensile strength of neutral conductor (KN)	14
17	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral
18	Embossing on insulation at each one meter interval	As per Clause 9 of this P.O
19	Cable drum length	250 / 500 / 1000m
20	Volume Resistivity of insulation at 27°C	$1 \times 10^{13} \Omega$ - cm min.
21	Volume Resistivity of insulation at 70°C	$1 \times 10^{11} \Omega$ - cm min.

N.B: 1) For values not available in relevant ISS, values indicated in our GTP / Tender Specification shall be valid.

2) In case of discrepancies between values of ISS & GTP, better will prevail.

3) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.

