



उत्तर दक्षिण हरियाणा बिजली वितरण निगम  
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Specification No. CSC- 67/DH/UH/P&D/2011-2012

TECHNICAL SPECIFICATIONS

FOR

33 kV AERIAL BUNCHED CABLE

*Issue Month:*

(CSC approval date Feb. 2012)

*Common Specifications Committee*

UHVN & DHBVN



## TECHNICAL SPECIFICATION FOR 33 KV AERIAL BUNCHED CABLE

### 1. SCOPE:

This specification covers design, manufacture, shop testing, supply and delivery of XLPE Insulated Three and Single Core 33 KV Aerial Bunched Cable (ABC) having Aluminium Conductor twisted around an XLPE Insulated all aluminium alloy (AAA) messenger wire suitable for installation of these self supporting overhead power cables in either the existing or new 33 KV Overhead system of the rural / urban electrification schemes.

The designation of the 33 KV Aerial Bunched Cable is

3 Core x 120 +70 mm <sup>2</sup>	1 Core x 120 +70 mm <sup>2</sup>
3 Core x 150 +150 mm <sup>2</sup>	1 Core x 150 +150 mm <sup>2</sup>
3 Core x 185 +185 mm <sup>2</sup>	1 Core x 185 +185 mm <sup>2</sup>
3 Core x 240 +240 mm <sup>2</sup>	1 Core x 240 +240 mm <sup>2</sup>
3 Core x 300 +300 mm <sup>2</sup>	1 Core x 300 +300 mm <sup>2</sup>
3 Core x 400 +400 mm <sup>2</sup>	1 Core x 400 +400 mm <sup>2</sup>

### 2. STANDARDS:

In addition to the technical specification hereunder, the following IS as amended from time to time shall also be applicable generally for the Aerial Bunched Cables.

i)	IS:7098(Pt-II)/85	For XLPE insulated PVC Sheathed cables for working voltages from 3.3 KV upto and including 33 KV.
ii)	IS:7098(Pt-I)/88	For XLPE insulated PVC Sheathed cables for working voltages upto and including 1100 Volts.
iii)	IS:8130/84	For Aluminium Conductor for insulated electric cables.
iv)	IS:398(Pt-IV)/79	For all aluminium alloy conductors (AAAC) for overhead transmission purposes.

### 3. PRINCIPAL PARAMETERS:

#### i) CONDUCTOR :

Round, Stranded and compacted aluminium conductor as per IS:8130/84 or latest version. The stranded conductor shall be clean and uniform size and shape and its surface shall be free from sharp edges.

#### ii) CONDUCTOR SCREEN:

Extruded semi-conducting compound generally as per IS:7098(Pt-2)/85. Conductor screening shall be non-metallic and shall consist of either semi-conducting compound Tape or a layer of extruded semi-conducting compound of thickness not less than 0.3mm.

#### iii) CONDUCTOR INSULATION:

Extruded cross-linked Polyethylene generally as per IS:7098 (Pt-2)/85 – nominal insulation thickness 8.8 mm & minimum thickness 3.14 mm.



iv) **CONDUCTOR INSULATION SCREEN :**

Layer of Extruded semi-conducting compound of thickness not less than 0.3mm generally to IS:7098(Pt-2)/85.

v) **CONDUCTOR INSULATION METALLIC SCREEN:**

Aluminium tape generally to IS: 7098(Pt-2)/85.

vi) **CONDUCTOR OUTER SHEATH:**

Extruded black polyethylene compound type ST-3 to IEC-502 for 3 Core Aerial Bunched Cable. The colour of the outer sheath shall be black and shall UV rays resistant. The average thickness of the sheath shall not be fall below the standard value (ts) specified by more than  $0.2+0.2(ts)$  m.

vii) **MESSENGER:**

Stranded and compacted all aluminium alloy (AAA) conductor to IS:398(Pt-IV)/79 to serve the purpose of neutral in the network and also to carry the weight of the entire Aerial Bunched Cable under suspension on overhead lines. There shall not be joints in any wire of the stranded messenger conductor except those made in the base rod or wire before final drawing.

viii) **MESSENGER INSULATON :**

Extruded weather resistant black cross-polyethylene  
rated voltage of insulation : 1.1 KV

ix) **AB CABLE LAYING UP :**

Three or Single Sheathed core twisted around the bare messenger. Three power cores having ridges one two and three shall be twisted over bare messenger wire with right hand direction of lay. This will form the Aerial Bunched Cable.

**4.0 CLIMATIC CONDITIONS:**

The cable shall work satisfactorily under the following climatic conditions:-

i)	Location	At various locations in the state of Haryana
ii)	Maximum ambient temperature (°C)	60
iii)	Minimum ambient air temperature (°C)	-5
iv)	Maximum average daily ambient temperature (°C)	40
v)	Maximum yearly weighed average ambient temperature (°C)	32



vi)	Maximum altitude above mean sea level (m)	1000
vii)	Minimum Relative Humidity (%)	26
viii)	Maximum Relative Humidity (%)	95
ix)	Average no of Rainy days/ year	120
x)	Average annual rainfall	900 mm
xi)	Maximum wind pressure	195 kg/m sq.

The equipment shall be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth

#### 5.0 DIMENSIONAL DATA AND ELECTRICAL PHASE CONDUCTOR:

The Conductor shall be for the use in 33 KV system with maximum operating voltage 36 KV the dimensions and electrical values of the conductor shall be as per IS: 8130/84. The maximum permissible load currents shall refer to an air temperature of 50°C, an operational temperature of 90°C in the conductor and 75°C in the neutral messenger conductor. The metallic screens connected to each other at both ends of the cable are earthed at one or both ends of the cable. Minimum wind speed 0.6m/sec. and Maximum solar radiation 1400 W/mm<sup>2</sup>.

5.1 The maximum permissible short circuit current for 1 Second shall refer to a Short Circuit occurring while the cable is at its full load.

#### 5.2 MINIMUM BENDING RADIUS

Number and area of Conductor	Bending of Core	Radius of Cable
3 Core x 120 +70 mm <sup>2</sup>	20 D	15 D
3 Core x 150 +150 mm <sup>2</sup>	20 D	15 D
3 Core x 185 +185 mm <sup>2</sup>	20 D	15 D
3 Core x 240 +240 mm <sup>2</sup>	20 D	15 D
3 Core x 300 +300 mm <sup>2</sup>	20 D	15 D
3 Core x 400 +400 mm <sup>2</sup>	20 D	15 D

#### 5.3 LENGTHS :

The cable shall be supplied in standard drum lengths with tolerance for 33 KV HT Aerial Bunched cable of sizes as under:

#### 5.4

Number and area of Conductor	Standard Length (Mtrs.)	Tolerance
3 Core x 120 +70 mm <sup>2</sup>	250/500	±5%
3 Core x 150 +150 mm <sup>2</sup>	250/500	±5%
3 Core x 185 +185 mm <sup>2</sup>	250/500	±5%
3 Core x 240 +240 mm <sup>2</sup>	250/500	±5%
3 Core x 300 +300 mm <sup>2</sup>	250/500	±5%
3 Core x 400 +400 mm <sup>2</sup>	250/500	±5%



#### 5.5 IDENTIFICATION :

The manufacturer shall be identified on one of the three outer sheaths throughout the length of the Aerial Bunched Cable by manufacturer's name or trade mark, voltage grade and year of production which may be coded at regular intervals of not more than 1 Metre. A specific designation " " also may be clearly marked. These markings shall be indented or printed or embossed on the insulation of the phase conductor alone. In order to distinguish the three phases, each single core shall bear suitable identification mark on the respective outer sheath. In case of Three Core Cables only. For Single Core Cable, it is not required.

#### 5.6 PACKING :

The Aerial Bunched Cable shall be wound on and packed in wooden drum (design and detailed dimensional drawing of which shall be furnished by the bidder along with Bid) conforming to IS: 10418/82 in order to protect it fully against damage in handling and transport. The ends of the cable shall be sealed by means of non-hygroscopic sealing material.

#### 5.7 NON-STANDARD LENGTH :

Non-Standard length shall be  $\pm 5\%$  of order quantity and no length shall be less than 100 Metres. In case, the order quantity is not the multiple of standard length, then 1 length shall be supplied as a patch length for completing the order quantity.

#### 5.8 ORDER QUANTITY TOLERANCE:

Order Quantity tolerance shall be  $\pm 5\%$  for order quantity more than 5 Kms and  $\pm 10\%$  for order quantity less than 5 Kms.

#### 5.9 MARKING:

The following information either stenciled on the reel or drum or contained in a label attached to it shall be carried by the cable.

- a) Manufacturers Name, Brand Name or Trade Mark
- b) Voltage Grade.
- c) Number Of Cores
- d) Nominal cross-sectional area of conductor
- e) Length of Cable on the reel or drum
- f) Direction of rotation of drum (by means of arrow)
- g) Approximate Gross weight.



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- h) Year of Manufacture
- i) The reel, drum, or label may be marked with IS Certification Mark.
6. **LIST OF TYPE TESTS:**
- A) **TEST ON CONDUCTOR :**
- i) Tensile strength (Not applicable for compacted Circular Conductor)
- ii) Wrapping Test(Not applicable for compacted Circular Conductor)
- iii) Resistance Test
- B) Test for thickness of Insulation and sheath.
- C) Physical Tests for insulation:
- i) Tensile strength and elongation at break.
- ii) Ageing in air oven.
- iii) Hot Test.
- iv) Shrinkage Test.
- v) Water Absorption (Galvometric)
- D) Physical tests for outer sheath
- i) Tensile strength and elongation at break.
- ii) Ageing in air oven.
- iii) Shrinkage test.
- E) Loss of Mass in Air Oven, Heat Shock and Thermal Stability Test will be carried out as per IS:7098(Pt-II)/85.
- G) Partial Discharge Test.
- H) Bending Test.
- I) Dielectric Power Factor Test.
- a) As a function of Voltage.
- b) As a function of Temperature.
- J) Insulation Resistance (Volume Resistivity) Test.
- K) Heating Cycle Test.
- L) Impulse withstand test.
- M) High Voltage Test.
- N) Cold Impact Test.
- O) Type Test for Messenger Wire.
- a) Breaking Load test on individual galvanized steel wire.
- b) Breaking Load test on individual galvanized Aluminium Alloy Wire.
- 6.1 **ACCEPTANCE TEST :**
- The following test shall be carried out as acceptance tests
- a) Tensile Test



- b) Wrapping Test
- c) Conductor resistance test.
- d) Test for thickness of insulation and sheath.
- e) Partial discharge test (for screened cables only)
- f) High Voltage Test.

#### 6.2 ROUTINE TEST:

The following shall be carried out as routine tests :

- a) Conductor resistance test
- b) Partial Discharge Test (for screened cables only)
- c) High Voltage Test.

Type tests / Acceptance tests/ Routine tests and any other test required as per relevant Indian Standards shall also be got conducted.

#### 6.3 INSPECTION:

All acceptance tests shall be conducted at the time of inspection and inspection shall be made at the place of manufacture unless and otherwise specifically 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 charges to satisfy him that the material is being furnished in accordance with the specification.

#### 6.4 FAKE INSPECTION Calls

The manufacturer shall be responsible to pay penalty of Rs 20,000/- for each occasion at which the fake inspection call has been made or the material is rejected during testing/inspection by the authorized agency/representative of the Nigam. This penalty would be in addition to the expenses incurred by the Nigam in deputing the Inspecting Officer, carrying out such inspection.

#### 6.5 GUARANTEED TECHNICAL PARTICULARS :

The full guaranteed technical particulars as specified in IS shall be guaranteed and shall be given in the proforma given at Annexure-I. Any deviation from the specification referred to above shall be supported by adequate justification.

#### 7. Challenge Clause

The material offered/received after the inspection by the authorized Inspecting Officer may again be subjected to the test for losses or any other parameters from any testing house/in house technique of the Nigam having requisite capabilities and facilities. The results if found deviating/ unacceptable or non-complying to approved GTPs the lot shall be rejected and bidder shall arrange to supply the replacement within thirty (30) days of such detection at his cost including to & fro transportation. In addition to this penalty @10% of cost of the inspected lot of material shall be imposed.



## 8. Warranty Period:-

The supplier shall be responsible to replace, free of cost, with no transportation or insurance cost to the purchaser, up to destination, the whole or any part to the material which in normal and proper use proves the defective in quality or workmanship, subject to the condition that the defect is noticed within 18 months from the date of receipt of material in stores or 12 months from the date of commissioning whichever period may expire earlier. The consignee or nay other officer of Nigam actually using the material will give prompt notice of each such defect to the supplier. The replacement shall be effected by the supplier within a reasonable time, but not, in any case, exceeding 45 days/ The supplier shall, also, arrange to remove the defective within a reasonable period, but not exceeding 45 days from the date of issue of notice in respect thereof, failing which, the purchaser reserve the right to dispose of defective material in any manner considered fit by him (purchaser), at the sole risk and cost of the supplier. Any sale proceeds of the defective material after meeting the expenses incurred on its custody, disposal handling etc., shall however be credited to the supplier's account and set off against any outstanding dues of the purchaser against the supplier. The warranty for 12/18 months shall be one time.

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