WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED
(A Govt. of West Bengal Enterprise)

Office of the Chief Engineer,
Procurement & Contracts Department
VidyutBhavan, 4th. floor,
Bidhannagar, Kolkata – 700091.

Technical Specification

for

1.1 KV Grade Single Core XLPE Insulated PVC sheathed Armoured Aluminum Cables of different sizes

October'2024

TECHNICAL SPECIFICATION FOR 1.1 KV GRADE SINGLE CORE XLPE INSULATED PVC SHEATHED ARMOURED ALUMINUM CABLES

1.0 **Scope :**

This Specification covers the requirement of XLPE insulated PVC sheathed Cables for working voltages upto and including 1100 Volts suitable for LV side of Distribution Transformers, any other LV use in 3-Phase (Earthed) System.

2.0 **Location :**

2.1 The Cable shall be laid/buried directly in ground anywhere in West Bengal and terminated for outdoor connection.

2.2 The Cables may be laid within covered Cable Trenches in Cable Racks/Ladder/Air for certain portion of length.

3.0 **Standards :**

3.1 The Cables conform broadly, to the latest issue of the following standards including all additional, alterations and modifications thereof.

3.2 IS :7098 (Part-I) : 1988(With Latest amendment)
(Specification for XLPE insulated PVC sheathed heavy duty Electric Cables for working voltages upto and including 1100 Volts)

3.3 IS : 8130 : 1984, IS: 10462 (Part-I) : 1983, IS: 5831, IS: 7098 (Part-I) 1988, IS:10810-1984, IS:10418-1982,IS:3975-1979 with latest amendment.

4.0 **Shape of Cables :**

Cables shall be of circular in shape as per relevant IS.

5.0 **Conductors :**

5.1 Aluminium conductor shall be H4 grade, stranded compacted circular in construction with flexibility class 2,complying with the requirements as specified in IS-8130-1984with latest amendments.

5.2 The conductor shall be clean & reasonably uniform in size and shape and its surface shall be free from sharp edges.

6.0 **Insulation :**

6.1 The Conductor shall be provided with XLPE insulation applied by extrusion. Thickness of insulation should be as per IS:7098 (Part-I): 1988 with latest amendment. Thickness of insulation shall not fall below the nominal value(ti) by more than (0.1mm+0.1x ti).
The insulation shall be so applied that it fits closely on the conductor (or barrier, if any)and it shall be possible to remove it without damaging the conductor.

7.0 **Inner Sheath :**

Inner sheath is not applicable as per IS:7098 (Part-1).

8.0 **ARMOURING :**

Single layer of round hard drawn aluminum wires with more than 90% coverage (Armour wires shall be applied as closely as practicable so that gap between the armour wires should be less than the diameter of the single wire)shall be used as per the relevant IS.

9.0 **Outer Sheath :**

The outer sheath shall be PVC ST-2 type. The colour of outer sheath **shall be black**. Thickness of outer sheath shall be as per IS:7098 (Part I) – 1988 with latest amendment thereof.
The quality of PVC over sheath shall be ensured for service reliability against moisture intrusion and shall conform to type ST-2 of IS:5831.

10.0 **Test and Test Certificates :**

10.1 All the type tests and routine tests shall be carried out in the Manufacturer's Works as per IS:7098

(Part-I) 1988 or latest amendment thereof as per IS-3975 & IS-5831.

10.2 The tests commensurate under 'Acceptance Tests' in the relevant IS shall be carried out as 'Acceptance Test'.

10.3 All tests shall be performed in presence of Purchaser's representative, if so desired by the Purchaser. The manufacturer shall give at least thirty (30) days advance notice of shop tests.

10.4 All tests carried out at Works shall be furnished in six(6) copies for approval of the purchaser.

10.5 The Cable shall be dispatched from Works only after receipt of Purchaser's written approval of shop test reports.

11 .0 CABLE IDENTIFICATION :

The following shall be embossed on the outer sheath of the cable throughout the length of cable at 1.0 meter spacing for identification.

a) Manufacturer's Name or Trade Mark.
b) Type of Cable / Cable Code
c) Voltage Grade.
d) Type of insulation& Material of conductor (XLPE Armoured, PVC sheathed Aluminium).
e) Nominal section and number of cores.
f) Month &Year of manufacture.
g) Inscription for length of cables at 1.0 meter interval on outer sheath by printing/ engraving.
h) Name of the purchaser: WBSEDCL
i) Marking "Electric".

12.0 PACKING :

12.1 The Cable shall be supplied in non-returnable wooden drums each containing length of **500 Meters** of Cable with tolerance of **± 5% per drum subject to overall maximum minus (-) 1%** on total quantity will be accepted.

Cable Size	Drum Length
1C x 95 sq. mm	500 Mtr±5%
1C x 185 sq. mm	500 Mtr±5%
1C x 300 sq. mm	500 Mtr±5%
1C x 630 sq. mm	500 Mtr±5%

12.2 The drums shall be proofed against attack by white ant or termite, conforming to IS:10418:1982

13.0 MARKING ON DRUM :

13.1 The following information shall be marked on each drum:

(a) Reference Indian Standard i.e 7098 (part-I)/1988 and License Number
(b) Drum identification No.
(c) Manufacturer's Name, Brand Name or Trade Mark if any.
(d) Nominal cross-sectional area of the Conductor of the Cable.
(e) No. of Cores.
(f) Type and Voltage grade of the Cable with cable code.
(g) Colour of outer sheath
(h) Length of the Cable in the Cable drum.
(i) Direction of rotation of Drum (by means of an arrow)
(j) Approximate Weight: Tare: Gross
(k) Year& Month of Manufacture.
(l) Purchase Order No& date.
(m) Month of Delivery
(n) Name of the Purchaser: WBSEDCL
(o) **Colour of the drum: Yellow**

13.2 Drums shall be proofed against attack by white ants or termite conforming to IS: 10418. The Drums may also be marked with ISI Certificate Mark, if applicable.

14.0 DESCRIPTION :

1.1 KV Grade single-core stranded Aluminium Conductor XLPE insulated, Non-magnetic round armoured, extruded PVC ST-2 outer sheathed conforming to IS:7098 (Part-I): 1988 read with its latest amendment and desired (as per tender specification) technical specification.

15.0 DRAWING DATA &MANUAL :

The following information shall be furnished in triplicate along with Tenders :

(a) Manufacturer's leaflet giving construction details, dimensions and characteristics of different Cables.
(b) Current rating of Cables including de-rating factor due to grouping, ambient temperature and type of various installations.
(c) Write up, sketch illustrating the manufacturer's recommendation and splitting, jointing and termination of cables.
(d) List of customers to whom the cable of similar rating have been supplied.

16.0 CLASSIFICATION OF TESTS :

16.1 **Type Test Report** Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 and it latest amendment within last 5 years from the due date of Opening of Tender on each offered item of identical type, voltage grade, size, material and design(as per Tender Specification) from a **Third party NABL accredited Test House or Laboratory** are to be submitted along with the tender otherwise tender may be rejected. Certificate should bear NABL Logo with certification number.

a) Tests on conductor: ResistanceTest,TensileTest,Wrapping Test.
b) Tests for armouring Wires.
c) Test for thickness of insulation and sheath
d) Physical test for insulation.
i) Tensile strength and elongation at break.
ii)Ageing in air oven
iii) Hot set test
iv)Shrinkage test
v) Water absorption (Gravimetric)
e) Physical tests for outer sheath
i) Tensile strength and elongation at break
ii) Ageing of air oven
iii) Loss of mass in air oven
iv) Shrinkage tests
v) Hot deformation
vi) Heat shock test
vii) Thermal stability
f) Insulation resistance (VOLUME RESISTIVITY) TEST
g) High voltage Test
h) Flammability Test

16.2 **Acceptance Test:** The following shall constitute Acceptance Tests :
a) Tensile Test
b) Wrapping Test
c) Conductor resistance test.
d) Test for thickness of insulation and sheath.
e) Hot set test for insulation.
f) Tensile strength and elongation at break test for insulation and outer sheath.
g) High Voltage test.
h) Insulation resistance (VOLUME RESISTIVITY) TEST

16.3 **Routine Test:** The routine test shall be carried out on all cables manufactured in accordance with this specification. The following routine tests shall be made on cable length as specified in the ISS.
a) Conductor resistance test.
b) High voltage test.

17.0 Valid Calibration Certificate of instruments/equipment used for testing purpose conducted by NABL accredited Laboratory provided the certificate bears an accreditation body logo. Documents to be submitted at the time of physical delivery at consigned stores.

18.0 **Documents to be submitted at the time of physical delivery at consignee stores:**
The following documents are to be submitted by the venders to the consignee stores at the time of Dispatch to stores by the venders:
a) Copy of Purchase Order
b) Copy of dispatch instruction
c) Inspection Test certificate .

d) Guarantee certificate
e) Proforma Invoice
f) Calculation Sheet for price variation on the basis of IEEMA or CACMAI as applicable with base date of order
g) Seal list and packing list
h) Challan in triplicate
i) Way Bill, if applicable

GUARANTEED TECHNICAL PARTICULARS FOR 1.1 KV Grade 1Core XLPE Armoured Aluminum Cable					
SL. NO	**NAME OF MANUFACTURER**	**M/s.----------**			
	Factory Address				
A)	**Size of Cable**	**1Cx95 sq.mm.**	**1Cx185 sq.mm.**	**1Cx300 sq.mm.**	**1C x 630 sq. mm**
	Rated Voltage	1100V			
	Type of Cable/ Cable Code	**A2XWaY**	**A2XWaY**	**A2XWaY**	**A2XWaY**
B)	**Applicable Standard**	IS: 7098(Part-I)-1988, IS:8130-1984, IS:5831-1984, IS: 3975-1970,IS:10810-1984&IS:10418-1982 with latest amendment			
C)	**Conductor**				
	i) Material	H4 Grade Aluminium wires of Class 2 as per IS:8130/84			
	ii) Nominal Area of Cross-section (sq. mm)	**95**	**185**	**300**	**630**
	iv) Shape of conductor	**Stranded compacted circular**			
	v) No. of Strands				
	vi)Overall Diameter of compacted Conductor (in MM)				
	Vii)Maximum DC resistance of conductor at 20^0C	**0.320**	**0.164**	**0.100**	**0.0778**
D)	**Insulation**				
	i) Material	**XLPE as per IS:7098 (Part-I):1988**			
	ii) Method of application	By Extrusion			
	iii) Nom. Thickness (mm)	**1.4**	**1.9**	**2.1**	**2.8**
	iii) App. Dielectric strength (Kv/mm)				
E)	**Armouring**				
	i) Material & Type	**Hard drawn Aluminium round wire**			
	ii) Nom. dia. of armour wires in mm	**1.6**	**1.6**	**1.6**	**2**
	iiii) Max. D.C. resistance at 20 deg.C (Ohm/Km.)				
	iv) Armour Coverage Percentage	**Min 90%**			
F)	**Outer sheath**				
	i) Material	**PVC Type -ST-2 as per IS:5831**			
	ii) Method of application	By Extrusion			
	iii) Minimum thickness of sheath (mm)	**1.4**	**1.4**	**1.56**	**1.72**
	iv) Colour	**Black**	**Black**	**Black**	**Black**
G)	**Approx. overall dia of Cable (in mm)**				
H)	**Minimum Bending Radius**	**15 X O/D of Cable**			
I)	**Maximum operating temperature of Conductor**				
J)	**Maximum temperature of conductor during short circuit**				
K)	**Drum length & tolerance of each drum**	**500±5%**			
L)	**Overall tolerance in total quantity**	**-1%**			

M)	**Approximate net weight of Cable**				
N)	**Continuous current rating of the Cable under standard condition when laid**				
i)	Direct in the ground at 30^0C				
ii)	In duct at 30^0C				
iii)	In air in 40^0C				
O)	**Maximum permissible short circuit current for 1 sec**				
P)	**Minimum specific insulation resistance at 90□C (Ohm-Cm)**	1 x 10^{12} ohm.cm			
Q)	**Vol. Resistivity at 27^0C (ohm-Cm)**	1 x 10^{14} ohm-cm			
R)	**Cable identification & sequential length marking**	**Cable identification by Embossing** The following shall be embossed on the outer sheath of the cable throughout the length of cable at 1.0 meter spacing for identification: a) Manufacturer's Name or Trade Mark. b) Type of Cable / Cable Code c) Voltage Grade. d) Type of insulation & Material of conductor (**XLPE, Armoured, PVC sheathed Aluminium Cable**) e) Nominal x-section & and number of cores. f) Month & Year of manufacture. g) Inscription for length of cables at 1.0-meter interval on outer sheath by printing/ engraving. h) Name of the purchaser: **WBSEDCL** i) Marking **"Electric"**.			
S)	**Marking on each drum**	a) Manufacturer's License Number b) Drum identification No. c) Manufacturer's Name, Trade Name/Trade Mark, if any. d) IS reference i.e 7098 (part-I):1988 e) Nominal sectional area of the conductor of the cable. f) No. of Cores. g) Type of Cable and Voltage Grade with Cable Code. h) Colour of outer sheath i) Length of the Cable in Cable Drum. j) Direction of rotation of Drum (by means of an arrow) k) Approximate Weight : Tare : Gross l) Month & Year of Manufacture. m) Purchase Order No. & date n) Month of Delivery o) Name of the Purchaser: **WBSEDCL**			

Signature with Designation & Seal
With Name of the Firm