



SUPPLY CHAIN MANAGEMENT

THIRUVANANTHAPURAM

SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

APPLICABLE TO KSEBL	Rev#0	DOC. NO.: SCM-SPEC/XH/11kV, 3x300mm² XLPE UG Cable
		EFF. DATE: 14/12/2021

Number of Pages: 25

Technical Specification and Evaluation Committee for Distribution Material



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: SCM-SPEC/XH/11kV,3x300² XLPE UG Cable

Rev.#: 0

Effective Date 14/12/2021

(i) Document Approval & Control Status

	Compiled by	Verified by	Approved by
Name	Smt.Anu.V.R	Smt.Bindu.T.Wilson	Smt.Presannakumari.S
Position	Assistant Engineer (Supply Chain Management)	Executive Engineer (Supply Chain Management)	Chief Engineer (Supply Chain Management)
Date	14/12/2021	14/12/2021	14/12/2021
Signature	Sd/-	Sd/-	Sd/-

(ii) Amendments and History

Sec. #	Rev. #	Date	History of Change



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XH/11kV,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

1. PURPOSE:

Purpose of this document is to document updates & history, upkeep and publish the specifications related to **11kV, 3x300mm² Dry Cured XLPE UG Cable** in a professional manner

2. SCOPE:

The Scope of this document is to inform and alert all relevant stakeholders including KSEBL, Public, KSERC etc regarding the current specifications and historical changes adopted in specifications of **11kV, 3x300mm² Dry Cured XLPE UG Cable** used in field by KSEB.

3. RESPONSIBILITY:

The Executive Engineer (H), Office of Chief Engineer, Supply Chain Management shall compile and take necessary steps to publish the specification in KSEBL website and shall inform relevant stakeholders regarding updates and revisions

4. PROCEDURE FOR REVISION:

Modifications if any, in the technical specification will be incorporated as **Revisions**. Any changes in values, minor corrections in pages, incorporation of small details etc. will be considered as Minor Modification. **The Revisions due to minor modifications will be assigned as Rev. No.0.1, 0.2 etc.**

A complete updation of the technical specification will be considered as Major modification. **The Revisions due to major modifications will be assigned as Rev. No.1.0, 2.0 etc.**

All the details of regarding the revisions (both minor and major) will be incorporated in **“(ii)-Amendments and history”** above.

The concerned officers, in consultation with the Technical Committee will review and suggest changes required and the revision suggestion will be approved by **Chief Engineer (SCM)**. Those who notice any discrepancy or have any suggestion regarding revision, may bring the matter to the attention of Chief Engineer (SCM) in writing or through e-mail id:**cescm@kseb.in**



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: SCM-SPEC/XH/11kV,3x300² XLPE UG Cable

Rev.#: 0

Effective Date 14/12/2021

CONTENTS

1) Scope:	5
2) System Details	5
3) Applicable Standards	6
4) Specification for Cross Linked Polyethylene Insulated PVC Sheathed Cables	6
5) Type Tests	9
6) Packing & Marking	12
7) Inspection and Despatch	13
8) Sealing of Cable Ends on Drums	14
9) Documents / Drawings	14
10) Specific Technical Requirements	16
20) Guaranteed Technical Particulars	18



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: SCM-SPEC/XT/11kV,3x300² XLPE UG Cable

Rev.#: 0

Effective Date 14/12/2021

TECHNICAL SPECIFICATIONS FOR 11 kV XLPE UG CABLE

Specification for 3 Core 300 mm² Dry cure type 11 kV UG XLPE Cable:-

The specification covers design, manufacture, factory testing, packing and delivery of 11kV grade cross-linked polyethylene insulated dry cured UG Cable with stranded aluminium conductor. The conductor screening shall consist of an extruded layer of semi conducting XLPE compound. The insulation screening shall consist of a non-metallic part shall be directly over the insulation of each core and shall consist of a layer of extruded semi conducting XLPE compound. The metallic part shall be a layer of copper tape over the individual core and the cores should be laid up, with fillers in the interstices. The cable should have inner sheath of extruded PVC(type ST2), Single layer galvanized flat steel strip armour and overall extruded PVC(type ST2) outer sheath covering conforming to IS:7098 Part II/1985, with amendment and REC Specifications suitable for 11 kV solidly earthed neutral system and manufactured through dry cure technology. (Nitrogen gas ie, with inert gas curing using CCV system only)

Cable manufacture should be in accordance with the above specification and also should be according to REC specification & IEC 502.

REC Guidelines for Manufacture of 11kV 3X300 mm² XLPE UG Cable:-

1) Scope:- This specification covers requirement of 11 kV cross-linked polyethylene (XLPE) insulated and PVC sheathed aluminum cable.

2) System Details:-

Nominal system voltage (rms) V	-	11 KV
Highest system voltage (rms) Vm	-	12 KV
Number of phases	-	3
Frequency	-	50 Hz.
Variation in frequency	-	± 3%



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

Type of earthing – Solidly earthed.

3) Applicable Standards:- Except when it conflicts with specific requirements of this specification the cable shall comply with the latest version of IS (7098) (Part II) 1985 and its amendments.

Unless otherwise specified, the latest version of the following standards shall be applicable.

- a) IS 7098 (Part 2) – Cross linked polyethylene insulation for cables.
- b) IS 8130 - Conductor for insulated electrical cables and flexible cords.
- c) IS 10810 (Series) – Methods of tests for cables.
- d) IS 10418 – Drums for electric cables.
- e) IS 3979 – Specification for mild steel wires, stripes and tapes for armouring of cables.
- f) IS 5831 – Specification for PVC insulation sheath for electric cables.
- g) IS 10462 – Fictitious calculation method for determining of dimensions of Protective coverings of cables Part I elastomeric and thermoplastic insulated cables.
- h) IEC.502- Cross Linked Polyethylene Insulation for Cables.

4) Specification for Cross Linked Polyethylene Insulated PVC Sheathed Cables:

- 1) Rated Voltage and Temperature:-** The rated voltage of the cables shall be 11kV and the maximum voltage shall be 12 kV. Maximum continuous operating temperature (combination of ambient temperature and temperature rise due to load) shall be 90°C under normal operation and 250°C under short circuit conditions.
- 2) Type of Cables:-** The type of cables covered in this specification shall be three cored armoured screened.
- 3) Continuous Current and Short Circuit Rating:-** The indicative values of the continuous current carrying capacities (for design purposes by field engineers) of the required sizes are given below.



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: SCM-SPEC/XT/11kV,3x300² XLPE UG Cable

Rev.#: 0

Effective Date 14/12/2021

4) Three Core Cables:-

Sl. No.	Size of Cable Sq.mm	Indicative value of continuous current carrying capacity in amps at Maximum conductor temperature of 90 degree	
		(In Ground)	(In Air)
1	300	Greater than 340	398

The short circuit rating for the various sizes of the cable (single core and three core) calculated for duration of 1 second at maximum temperature of 250 degrees is given below.

Sl. No.	Size Sq.mm (Three phase/ Single Phase)	Short circuit rating kA (RMS Value)	
1	300	28.2	28.2

Minimum Technical Requirement

Details	Earthed	Variation
	Approx. weight in Kilograms	
Aluminium	2352	+/- 1 %
Copper tape (45 micron)	122	+/- 1 %
No. of Armouring Strips	44 nos.	+/- 1 No.

- Note:-**
1. The weight of Aluminium given above is after compacting.
 2. Sqmm size of the conductor may reduce by about 2.5 to 3 % after compacting.
 3. Aluminium used for the conductor should be sourced only from established sources in India. In case , it is imported, specifications of the same should meetas given in IS 8130/ equivalent.



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

5) Details of Cable:-

- a) **Conductor:-** The cable conductors shall be of round, stranded and compact aluminum of nominal size as stipulated in Table under clause, standard size of cables, corresponding wire diameter and number of wires in the conductor as given in IS.8130.
- b) **Conductor Screen:-** Conductor screening shall be provided over the conductor by applying non-meseif attested
- c) tallic semi-conducting tape or by extrusion of semi conducting compound or a combination of the two.
- d) **Insulation:-** The insulation shall be of extruded cross-linked polyethylene (XLPE) of nominal insulation thickness, 3.6mm and its properties shall conform to IS:7098 (Part II).
- e) **Insulation Screen:-** The insulation screen shall consist of two parts, namely metallic and non-metallic. Non-metallic part shall be applied directly over the insulation of each core and shall consist of either a semi-conducting tape or extruded semi conducting compound or a combination of each core and shall consist of either a semi-conducting tape or extruded semi conducting compound or a combination of the two or either material with semi conducting coating.

The metallic part shall consist of either tape, or brand or concentric serving of wires or a sheath; shall be non-magnetic and shall be applied over the non-metallic part.

- f) **Core-identification & Laying up of Cores:-** The core identification and laying up of cores shall be as per IS.7098 (Part II). For identification of different cores in three-core cable, use of coloured strips, red, yellow and blue or use of numbered strips shall be employed.

- 6) **Inner Sheath:-**The laid up cores shall be covered with inner sheath made of thermoplastic material applied either by extrusion or wrapping. It shall be ensured that the shape is as circular as possible. Thickness of inner sheath shall confirm to IS:7098



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

(Part II) at par with Table.5 clause16.3. Single core cables shall have no inner sheath, but in case of cables having both metallic part of screen and armour, there shall be an extruded inner sheath between them.

- 7) Armouring:-** Armouring shall be applied over the insulation or protective barrier or non-metallic part of insulation screening over the inner sheath. The method, type, dimensions, joints, conductance etc. of armour shall conform to IS 7098 (Part II).
- 8) Outer Sheath:-** The outer sheath shall be applied over the armouring by extrusion. The minimum thickness and properties of outer sheath shall conform to the requirements of IS:7098 (Part II).

The following tests shall be carried out on the cables as per IS:7098 (Part II).

- 5) I) Type Tests:-** Type test shall be Obtained from CPRI/ERDA/Govt. Approved NABL Lab i.e., independent Lab.
- 1) Test on conductors:
 - Resistance test
 - 2) Test for armouring wires / strips
 - 3) Tests for thickness of insulation and sheath (eccentricity)
 - 4) Physical test for insulation:
 - a) Tensile strength and elongation at break
 - b) Ageing in air oven
 - c) Hot Set test
 - d) Shrinkage test
 - e) Water absorption(gravimetric)
 - 5) Physical Test for Outer Sheath:
 - a) Tensile strength and elongation at break
 - b) Ageing in air oven



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

- c) Shrinking test
- d) Hot deformation
- e) Thermal Stability
- f) Loss mass in air oven
- g) Heat Shock
- 6) Partial discharge test
- 7) Thermal ageing Test for complete cable
- 8) Bending test
- 9) Dielectric power factor test
 - a) As a function of voltage
 - b) As a function of Temperature
- 10) Insulation resistance test (Volume Resistivity)
- 11) Heating cycle test
- 12) Impulse withstand test
- 13) High voltage test
- 14) Flammability test for PVC Sheathed Cable

II) Short Circuit Test:- The short circuit test for 28.2KA for 1 sec shall be treated as one of the special test and is mandatory. This test is to be carried out at a recognized test centre such as **CPRI / ERDA/ NABL Accredited Lab.**

The short circuit test shall be preceded and followed by the following tests so as to ensure that the characteristics of the cable remain within the permissible limits even after it is subjected to the required short circuit rating.

- a) Partial Discharge test
- b) Conductor Resistance
- c) High voltage test



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

The above tests shall be carried out on a sample length of the cable of the approved size.

In case the bidder has not furnished the special test report at the time of bid submission the manufactured cable will be acceptable only after such a sample test is successfully carried out at CPRI /ERDA/Govt. Owned NABL Lab and approved by the purchaser. Also buyers reserve the right to draw samples at random from its stores/ site out of the cables supplied and send the same for testing to any NABL approved laboratory of their choice for 3rd party testing at the cost of the supplier.

If the samples fails in this test, the buyer reserve the right to reject the entire ordered quantity / consignment from which the sample was drawn.

III) **Additional Tests:-** Mandatory

The following shall constitute additional type test for the cables with improved fire performance as per the Category C2

- a) Oxygen index
- b) Flame retardance test on bunched cables
- c) Smoke density test (on sheathing material)
- d) Test for halogen acid gas evolution
- e) Temperature index

IV) **Routine Acceptance test:-**

- 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 sheath
- g) Partial discharge test
- h) High voltage test



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

i) Insulation resistance (volume resistivity test)

j) Measurement of Capacitance

V) Routine Tests:-

a) Conductor resistance test

b) Partial discharge test

c) High voltage test

6) Packing & Marking:-

a) Packing:- The cables shall be supplied in well seasoned sturdy wooden drums (conforming to the latest edition of IS 10418) suitable for vertical / horizontal transport, as the case may be and shall be suitable to withstand rough handling during transport and outer storage. Similarly, the inside surface of drum shall have the protective layer of varnish / paint to protect it from white ants. There shall be no gaps in the wooden lagging around the drum. The wooden drums shall be reinforced with steel bends and strips for better protection reinforcements so as to withstand rough handling during transport by Rail, Road etc. The firm shall be responsible for any damage to the cables during transit due to improper and inadequate packing. Wherever necessary, proper arrangement for lifting, such as lifting hooks, shall be provided. The packing should withstand extended storage conditions in open yards. The standard length of the cable in each drum shall be 250 metre \pm 2.5%. Any cable found short inside the packing cases will be rejected.

b) Marking:- Cable drum shall carry all the information as per IS:7098 (Part-II) stenciled clearly in the drum. In addition to the standard information as above, the drum should also carry the following information clearly stencilled in it:

(i) The letters "KSEBL"

(ii) Purchase Order No. and Date

(iii) Address of consignee.



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

c) Manufacturer's Identification in the Cable

The manufacturers name, trade mark, voltage grade, year of manufacture etc. shall be embossed on the cable as stipulated in IS 7098 (Part II). The embossing shall be done only on the outer sheath. Further, improved fire performance for Category C2 shall be identified by indenting, embossing the appropriate legend on the outer sheath throughout the cable length in addition to the existing marking requirements.

Bidder shall submit attested photo copy of valid ISI Licenses with technical bid.

- 6) **Inspection and despatch**:- All the test and inspection shall be made at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and purchaser at the time of purchase. All Tests shall be performed in presence of Purchaser's representative if so desired by the Purchaser. The manufacturer shall give at least Twenty (20) days advance notice for witnessing such tests.

The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charge, to satisfy him that materials is being furnished in accordance with the inspection.

Certified copies of all routine tests carried out at works for each batch shall be furnished in two (2) copies along with the inspection call (pre-factory report) for approval of the purchaser. The acceptance test report signed by the manufacturer and inspector shall be furnished for obtained MDCC. The cables shall be despatched from Works only after receipt of Purchaser's written approval of the test reports and MDCC.

Upon delivery of the cable KSEBL will inspect them and / or may perform relevant tests in order to verify compliance with this specification. The Manufacturer / Supplier shall replace/rectify without any extra or additional charge to KSEBL, cables which upon examination, test or use, fail to meet any of the requirements in the specification.



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

- 7) **Sealing of Cable Ends on Drums:-** The Cable ends shall be sealed properly so that ingress of moisture is completely prevented. The individual core endings shall be sealed effectively with water resistant compound applied over the core and provided with a heat shrinkable or push-on or Tapex or cold shrinkable type cap of sufficient length, with adequate cushion space so that the conductor does not puncture the cap in case of movement of the core during unwinding or laying.

The three core should have all over all heat shrinkable or push-on or Tapex or cold shrinkable type cap with adequate end clearance and sufficient cushioning to prevent puncturing of the overall sealing cap due to stretching of cores. The sealing cap shall have sufficient mechanical strength and shall prevent ingress of moisture into the cable.

- 8) **Documents/Drawings:-** The following shall be submitted by the Bidder along with the tender for tender evaluation. All the required details in complete form shall be submitted through relevant, legible documents in English to avoid delay due to back reference. **Partial submission shall not be restored to by the bidder.**

- a) Guaranteed Technical Particulars completely filled and signed by the bidder.
- b) Copies of certificates of type tests required as per IS: 7098 (Part-II) carried out in **NABL accredited lab/Approved Lab of Government of India/CPRI**. The tests shall be carried out in accordance with appropriate part of IS: 10810. The Type Test Certificates for a cable of the same type and design of the Cable offered and carried out within 10 years before the date of opening of the Tender shall be furnished.
- c) Manufacturer's Catalogue giving cable construction details, characteristics and Cross sectional drawings of the cable showing detail dimensions.
- d) List of Customers to whom the Cable of similar rating have been supplied.
- e) Quality Assurance Plan / Procedure adopted by the manufacturer for ensuring the quality of the manufacturing process from raw material procurement to supply.



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

- f) Detailed test program to be followed during factory testing.
- g) Bidder shall submit attested photocopy of valid ISI Licenses with technical bid.

An illustrated literature on the cable, giving full technical information on current ratings, cable constants, short circuit ratings, derating factors for different types of installations, packing details, weights and other relevant information.

Sd/-
Chief Engineer (SCM)



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

SECTION II

SPECIFIC TECHNICAL REQUIREMENTS

1.0. SCOPE:- This section of the specification covers Service Conditions, System Particulars desired technical parameters

2.0. SERVICE CONDITIONS:- Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

- a) Maximum ambient temperature (deg C) : 50
- b) Maximum temperature in shade (deg C) : 40
- c) Minimum temperature in air (deg C) in shade: 17
- d) Relative Humidity (%) : 10 to 100
- e) Maximum annual Rainfall (mm) : As per published Meteorological/
Climatological data
- f) Maximum Wind Velocity (m/s) : 39
- g) Maximum altitude above mean sea level (Meters) : 1000
- h) Isoceraunic level (days/year) : 60
- i) Maximum soil temperature at cable depth 0C : 30
- j) Maximum soil thermal resistivity 0C cm/watt : 150
- k) Moderately hot and humid tropical climate, conducive to rust and fungus growth.

Areas having seasonal climate of cold (snowfall prone) are also there.

The cables in service will be subject to daily load cycles, of morning peak, day peak and evening peak with reduced loading during night off-peak hours.

3.0. SYSTEM PARTICULARS

a.	Line Voltage (kV)	11
	Highest System Voltage (kV)	12
	Number of phase	3
	Frequency	50Hz
	Neutral	effectively earthed
	Short circuit level (KA)	22.77 kA, 31.8kA



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

4.0 SPECIFIC TECHNICAL REQUIREMENTS

Technical Parameters of the cable shall be as follows:

.	PARTICULAR	Unit	DATA
	Rated Voltage	kV	6.35/11
b.	Type of Insulation	-	XLPE
c.	Multi core	-	Three core
d.	Armoured/ Unarmoured	-	Armoured
e.	Material of Conductor	-	Aluminium
f.	System	-	11 kV Earthed
g.	Highest System Voltage	kV	12
h.	Conductor size	sq. mm	300
i.	Material		Stranded Aluminium
j.	Shape of Conductor		Circular
k.	Short Circuit Current	kA	28.2 for 1 Sec.
l.	Power Frequency Withstand Voltage	KV rms	28
m.	Lightning Impulse Withstand Voltage	kVp	75
n.	Continuous Withstand Temperature	Deg C	90
o.	Short Circuit withstand Temperature	Deg C	250
p.	Oxygen Index		Min 29 (as per ASTM D 2863)
q.	Acid Gas Generation		Max 20% (as per IEC 754-1)
r.	Smoke Density Generation		60% (As per ASTM D 2843)
s.	Flammability Test		As per Swedish Chimney test

Sd/-

Chief Engineer (SCM)



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kv,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

GUARANTEED TECHNICAL PARTICULARS

Sl. No	Particulars	KSEBL's Requirement
1	Manufacturers Name & Address	
2	Country of manufacturer	INDIA
3	Type of cable	A2XFY
4	Applicable standards for manufacturing	IS:7098(P-2)with latest amendment
5	Applicable standards for testing	IS:7098(P-2) & IS10810 with latest amendments
6	Rated voltage (kV)	6.35/11 (E)
7	Maximum service voltage (kV)	12
8	Continuous current carrying capacity in ground (Amp)	354
9	Continuous current carrying capacity in air (Amp)	441
10	Short circuit withstand capacities for 1 second of (With a conductor temperature of 90°C at the commencement	
i)	Conductor (KA) for 1sec	28.20
ii)	Screen (KA)	
iii)	Armour (KA)	
iv)	Combined value for Screen &	7



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kv,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

	Armour	
11	Conductor	
i)	Material & Grade	Aluminium of H2/H4 grade as per class-2 of IS:8130
ii)	Nominal cross – sectional area (mm ²)	300
iii)	No. of strands (Min)	36 approx. (Before Stranding) complying 30 (minimum) as per IS:8130
iv)	Diameter of each strand (Nominal) (mm)	3.25 approx. (Before Stranding)
v)	Max. DC resistance of conductor at 20 Deg. C (ohm/kM)	0.100
vi)	Max. AC resistance of conductor at 90 Deg. C (ohm/kM)	0.128
vii)	Tensile strength of Aluminium (N/mm ²)	100-150 - H2 Above 150 - H4
12	Reactance of cable at normal frequency (Approx) (ohm/kM)	<0.085
13	Electrostatic capacitance at normal frequency (µF/kM)	<0.48
14	Charging current (A/kM)	1
15	Loss tangent at normal frequency at U _o	<0.004 /km
16	Conductor screen	
i)	Material	Extruded Semi Conducting Compound



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

ii)	Nominal thickness (mm)	0.3
17	XLPE Insulation	
i)	Composition	Extruded XLPE as per IS:7098(P-2)
ii)	Type of curing	Dry curing
iii)	Thickness of insulation (nominal) mm	3.6
iv)	Tolerance on thickness (mm)	0.1+0.1*t (Where t = nominal thickness of insulation)
v)	Dielectric constant at normal frequency	2.3
vi)	Specific insulation resistance at 20 deg. C	As per IS7098 P-2 2011
vii)	Min. Volume resistivity at 20 deg. C (Ohm-cm)	1×10^{14} (Min.)
viii)	Min. volume resistivity at 90 deg.C (Ohm-cm)	1×10^{12} (Min.)
ix)	Min. Tensile strength (N/mm ²)	12.5
x)	Min. Elongation % at rupture	200
xi)	Identification of cores	Colored strips of Red, Yellow & Blue
18	1.2/50 microsecond impulse wave withstand voltage (kVp)	75
19	power frequency withstand voltage (kV) (rms) 5 min.	28 – 1minute



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kv,3x300² XLPE UG Cable** Rev.#: 0 Effective Date 14/12/2021

		21 – 5 minute
20	Max. Dielectric stress at the at insulation screen	2 kV/mm (Approx.)
21	Max. Dielectric stress at the conductor screen (kV/cm)	1.5 kV/mm (Approx.)
22	Insulation screen	
i)	Material	Extruded non metallic semi conducting compound (Strippable)
ii)	Extruded/ wrapped	Extruded
iii)	Nominal thickness (mm)	0.3 mm
iv)	Colour	Black
23	Metallic screen	
i)	Material / composition	Copper tape
ii)	Nominal radial thickness / dia (mm)	0.04
24	Nominal diameter over metallic screen	29.5 mm approx.
25	Nominal radial clearance allowed under metal sheath	as per IS: 7098 (P-2)
26	Type and material of filler	Non-Hygroscopic PVC Fillers
27	Armour	
i)	Material and type	Galvanized Steel flat Strip as per IS:3975
ii)	Size of Armour (mm) (Min)	4.0x0.8



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kv,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

28	Inner Sheath	
i)	Material	Extruded PVC ST-2
ii)	Thickness (Min)	0.7mm
	Colour of sheath	Black
29	Outer Sheath	
a	Material	FRLSH PVC ST-2
b	Thickness (Min)	2.68mm
c	Colour of sheath	Black
30	Approx overall diameter (mm)	73 Approx.
31	Minimum bending radius	15*OD
32	Net weight of cable	
33	Approx Conductor weight - Kg/Km	
34	Embossing	
35	Standard drum length(m)	250+/-2.5%
36	Overall quantity tolerance	+/-1%
37	Sequential Length Marking	
38	Packing material	Non-returnable Wooden drum
39	FR-LSH TEST	
i)	Oxygen Index at room temp. as per ASTM D - 2863	29% (Min.)
ii)	Temp. Index at 21% oxygen Index as	250°C (Min.)



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kV,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

	per ASTM D - 2863	
iii)	Smoke density rating (Average light absorption) as per ASTM D - 2843	60.00%
iv)	Acid gas degeneration	20%
v)	Flammability test	

Sd/-
Chief Engineer (SCM)



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: SCM-SPEC/XT/11kv,3x300² XLPE UG Cable

Rev.#: 0

Effective Date 14/12/2021

ANNEXURE - IV

PROPERTIES OF XLPE INSULATION

Sl. No.	Property	Requirement
I.	Tensile Strength	12.5 N/mm ² (Min.)
II.	Elongation at break	200 percent (Min.)
III.	Ageing in air oven	
	(a) Treatment	
	Temperature	135 ± 3 °C
	Duration	7 days
	(b) Tensile Strength variation	± 25% Max.
	(c) Elongation variation	± 25% Max.
IV.	Hot set	
	(a) Treatment	
	Temperature	200 ± 3 °C
	Time under load	15 Minutes
	Mechanical Stress	20 N/cm ²
	(b) Elongation under load	175 percent, Max.



SUPPLY CHAIN MANAGEMENT

Thiruvananthapuram

TECHNICAL SPECIFICATION

11KV, 3X300MM² DRY CURED XLPE UG CABLE

Doc. #: **SCM-SPEC/XT/11kv,3x300² XLPE UG Cable**

Rev.#: 0

Effective Date 14/12/2021

	(c) Permanent elongation (set) after cooling	15 percent, Max.
V.	Shrinkage	
	(a) Treatment	
	Temperature	135 ± 3 °C
	Duration	1 hour
	(b) Shrinkage	4% Max.
VI.	Water absorption (Gravimetric)	
	(a) Treatment	
	Temperature	85 ± 2 °C
	Duration	14 days
	(b) Water absorbed	1Mg/Sq. cm, Max.
VII.	Volume resistivity	
	(a) at 27 °C	1x10 ¹⁴ ohm-cm, Min.
	(b) at 90 °C	1x10 ¹² ohm-cm, Min.

Sd/-

Chief Engineer (SCM)