GUJARAT ENERGY TRANSMISSION CORPORATION LTD.
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TECHNICAL SPECIFICATIONS

OF

66 KV 1C 630 SQ.MM. XLPE POWER CABLE WITH ALUMINUM CORRUGATED METALLIC SHEATH FOR UNDER GROUND LINE

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SECTION – I

TECHNICAL SPECIFICATIONS FOR 66 KV (CROSS LINKED POLYETHYLENE INSULATED) POWER CABLE :

1.1 SCOPE :

1.1.1 The scope under this section covers design, engineering, manufacture, testing, packing, supply of 66 KV, 630 Sq.mm, XLPE, insulated power cable for use with solidly grounded distribution systems.

The XLPE cable and its accessories shall be complete with all fittings and components necessary for the satisfactory performance and ease of maintenance.

1.2 STANDARDS: Unless otherwise specified, the cables shall conform, in all respects, to IEC-502, IEC-60840 and IS: 7098 (Part-III) / 1993 with latest amendment or latest edition for cross linked polyethylene insulated Thermoplastic High Density Polyethylene sheathed cable for working voltage of 66 KV.

1.3 CLIMATIC CONDITIONS: The climatic conditions under which the cable shall operate satisfactorily are as follows :

a)	Maximum ambient temperature of air in shade	^{0}C	:	50
b)	Minimum ambient temperature of air in shade	^{0}C	:	4
c)	Maximum daily average ambient temperature	^{0}C	:	40
d)	Maximum yearly average ambient temperature	^{0}C	:	30
e)	Maximum relative humidity	%	:	95
f)	Average number of the thunder storm days per annum.		:	15
g)	Average annual rainfall	Cm	:	150
h)	Maximum wind pressure	kg/m2	:	150
i)	Altitudes not exceeding above MSL	Meter	:	1000
j)	Max. soil temp. at cable depth	^{0}C	:	30
k)	Max. soil thermal resistivity	ohm-cm	:	150

1.4 PRINCIPAL PARAMETERS:

1.4.1 66 KV (E) grade XLPE single core power cable, with H. D. aluminium conductor, shielded with extruded semi-conducting layer, insulated with dry gas cured cross linked polyethylene (XLPE) insulation(super cleaned), insulation screened with extruded semi-conducting layer followed by semi-conducting water swellable tapes followed by copper woven semiconducting tape,

corrugated seam welded/seam less (extruded) Aluminium sheath with anticorrosive protective coating [suitable for 31.5 KA for 1 second] and overall HDPE outer sheathed with extruded semi-conductive layer OR Graphite coating on it, confirming to IEC-60502 for construction, IEC-60840 for Testing and in line with to IS : 7098 (Part-III) / 1993 or any latest amendments thereof. Outer sheathing should be designed to afford high degree of mechanical protection and should also be heat, oil, chemicals and weather resistant. Common acid. Alkalis and saline solution should not have adverse effect on the Thermoplastic HDPE sheathing material used.

1.4.2 The cable should be suitable for laying in covered trenches and / or under ground for outdoor.

1.4.3	**CABLE PARAMETERS**	**66 KV**
i)	Voltage grade (Uo/U) KV	38 / 66
ii)	No. of cores	Single
iii)	Size (mm^2)	630
iv)	Nominal system voltage KV	66
v)	Highest system voltage KV	72.5
vi)	System Frequency Hz	50
vii)	Variation in frequency	± 5 %
viii)	Fault level individually for	
	i) Conductor	59.22 KA / 1 Sec.
	ii) Aluminium sheath (for one second)	31.5 KA / 1 Sec.
ix)	Maximum allowable temperature	
	a) Design continuous operation at rated full load current, the max. temp. of conductor shall not exceed	^{0}C 90
	b) The conductor temperature after a short circuit for 1.0 sec. shall not exceed.	^{0}C 250
x)	Basic insulation level. (1.2 / 50 Micro second wave)	350 KVP
xi)	1-min. power frequency withstand voltage (rms)(wet)	140 KV
xii)	System earthing	Solidly grounded

1.5 GENERAL TECHNICAL REQUIREMENTS:

1.5.1 **CONDUCTOR:** The cable conductor shall be made from stranded H.D. aluminium to form compact circular shaped conductor having resistance within limits specified in IS: 8130 / 1984 and any amendment thereof. The conductor shall confirm to IEC: 228 and the shape shall be compacted circular shaped. Nominal diameter of individual strand & number of strands shall be selected such that calculated conductor nominal cross section shall be 630 sq. mm.

1.5.2 **CONDUCTOR SHIELD**: The conductor having a semi-conducting screen shall ensure perfectly smooth profile and avoid stress concentration. The conductor screen shall be extruded in the same operation as the insulation; the semi-conducting polymer shall be cross-linked.

1.5.3 **INSULATION:** The XLPE insulation should be suitable for specified 66KV system voltage. The manufacturing process shall ensure that insulations shall be free from voids. The insulation shall withstand mechanical and thermal stresses under steady state and transient operating conditions. The extrusion method should give very smooth interface between semi-conducting screen and insulation. The insulation of the cable shall be of high standard quality, generally confirming to IEC-60840 and I.S. 7098 part-III / 1993 (latest edition).

1.5.4 **INSULATION SHIELD:** To confine electrical field to the insulation, non-magnetic semi-conducting shield shall be put over the insulation. The insulation shield shall be extruded in the same operation as the conductor shield and the insulation by triple extrusion process. The XLPE insulation shield should be bonded type.

1.5.5 To prevent entry / propagation of longitudinal ingress of moisture, semiconducting woven / non-woven water swellable tapes shall be provided. Further, one layer of copper woven semi-conducting tape should be applied. Suitable layers of tapes shall be provided with overlap to achieve minimum thickness of 1.0 mm.

METALLIC SHEATH : The metallic sheath shall comprise of a corrugated seam welded / seamless (extruded) aluminium sheath. The radial thickness of Aluminium sheath shall be 2.0 mm minimum for 630 sq. mm. cable. The Cross section Area of metallic sheath shall be 444 sq.mm minimum whose detailed calculation to be submitted by Bidder as per Cl 2.2.14. A suitable anti-corrosive treatment should be given to outer surface of Aluminium sheath. It should be of adequate thickness, consistent quality and free from all defects. Also, Aluminium sheath should be suitable to carry 31.5 KA earth fault current for one second minimum. Detailed calculation with support documents shall be submitted with technical bid. For seam welded sheath, the welding shall be of high quality & ensure minimum strength as that of Aluminum with no porosity. Necessary fillers and water swellable non woven binder tape shall be used above metallic sheath to ensure overall round shape of cable.

1.5.6 **OUTER SHEATH:** Extruded HDPE type ST7 outer sheath confirming to IEC: 502/1983, shall be applied over Aluminium Sheath with suitable additives to prevent attack by rodents and termites. The outer sheath shall be coated with thin layer of extruded semiconducting material OR graphite throughout the length of cable. Thickness of outer sheath shall be one step higher, than required as per IS:7098 i.e. not less than 3.6 mm. Nominal and 2.68 mm. Minimum.

Each cable length shall be provided with a pulling socket/eye which shall be fitted to pulling end on conductor. The pulling socket/eye shall be able to take pulling tension as per recommended for cable conductor size along with reasonable factor of safety. The pulling socket/eye shall be fitted in such a fashion to avoid moisture/water ingress during storage/transit.

1.5.7 **CONSTRUCTION:**

1.5.7.1 All materials used in the manufacture of cable shall be new unused and of finest quality. All materials should comply with the applicable provision of the tests of the specification. IS, IEC, Indian Electricity Rules, Indian Electricity Act and any other applicable statutory provisions rules and regulations.

1.5.8 **CURRENT RATING:** The cable will have current ratings and derating factors as per relevant standard IEC.

1.5.8.1 The one-second short circuit current rating values each for conductor & Aluminium sheath shall be furnished with detailed calculation along with support documents and shall be subject to the purchaser's approval.

1.5.8.2 For calculating short circuit rating of Aluminium sheath, initial temperature of sheath shall be considered not less than 80 °C & final temperature not more than 160 °C.

1.5.8.3 The current ratings shall be based on maximum conductor temperature of 90 deg. C with ambient site condition specified for continuous operation at the rated current.

1.5.9 **OPERATION:**

1.5.9.1 Cables shall be capable of satisfactory operation under a power supply system frequency variation of ±5% voltage variation of ±10 % and combined frequency voltage variation shall be +10 % & - 15%.

1.5.9.2 Cable shall be suitable for laying in ducts or buried under ground.

1.5.9.3 Cable shall have heat and moisture resistance properties. These shall be of type and design with proven record on transmission network service.

1.5.10 **LENGTHS**: The cable shall be supplied in standard drum lengths as below:

Size of cable	Standard Drum length
a) 66 KV, 1C x 630 sq.mm.	1000 meters ± 5% tolerance and ± 2 % overall tolerance in total quantity of cable.

1.5.11 **INDENTIFICATION MARKING**: Identification of cables shall be 'provided externally at three meters' intervals to identify as under.

i) 'Name of manufacture'

ii) 'Per meter marking'

iii) 'Year of manufacture'

iv) 'Voltage grade' to be printed / embossed at the interval of one meter-length. The identification, by printing or embossing shall be done only on the outer sheath. Name of the purchaser shall also be embossed.

1.6.0 **TESTS:**

TYPE TESTS: The cable & accessories offered shall be fully type tested as per the relevant standards with latest / amended / up to date IS/IEC. In case the cable & accessories of the type and design offered has already been type tested in a Govt. approved NABL approved laboratory, the Bidder shall furnish two sets of type test Hard Copy/Color Scan reports along with the offer. Type test reports shall not be older than TEN years and shall be valid as on the last date of submission of bid. The purchaser reserves the right to demand repetition of some or all the type tests in the presence of purchaser's representative. Furthermore, purchaser reserve right to select the sample from Manuf. Works & recommend the NABL lab to carry out type tests in case of non-submission / partial submission or type test reports of which validity is over.

Type Test reports for cable of construction other than specified in tender, will be considered for evaluation purpose, but the bidder shall have to carry out all Type Tests at Govt. approved NABL approved/ laboratory without affecting delivery schedule and at no extra cost to GETCO, on required construction, for which necessary confirmation shall be submitted with technical bid.

1.6.1 **Type Tests**

a) Tests on conductor:
   i) Resistance test

b) Physical test on insulation:

   i) Test for thickness and dimensions of insulation
   ii) Tensile strength and elongation at break

iii) Thermal ageing in air oven
iv) Hot set test
v) Shrinkage test

c) Resistivity test for semi-conducting layers

d) Test on Aluminium sheath
i) Thickness of Aluminium sheath

e) Physical tests for outer sheath:

i) Measurement of thickness

1) PE sheath

i) Carbon black content
ii) Tensile strength
iii) Elongation at break before and after aging
iv) Hot-deformation

f) i) Thermal ageing on complete cable sample
ii) Tensile strength and elongation at break for insulation and outer sheath
iii) Resistivity test for semi-conducting layer

g) Bending test followed by P.D. test

h) Dielectric power factor and capacitance measurement at ambient temperature

i) Dielectric power factor measurement at elevated temperature

j) Load cycle test followed by P.D. test

k) Impulse withstand test (@350 kvp) followed by HV test

l) Insulation Resistance Test (at room temperature & elevated temperature)

Important Note:

In case of non-submission / partial submission or type test reports of which validity is over, the bidder shall submit pending type test report/s from NABL accredited laboratory, in the event of an order, before commencement of supply without affecting delivery schedule, free of cost to GETCO. Confirmation for above shall be invariably submitted along with technical bid.

1.6.2 ACCEPTANCE AND ROUTINE TESTS:

1.6.2.1 All acceptance and routine tests as stipulated in the IEC-60840 and IS: 7098 (Part-III) / 1993 shall be carried out by the supplier in presence of purchaser's representative.

Sample shall be selected from offered lot, for not less than 10% (Ten percent) of nos. of cable drums, for conducting acceptance tests after considering the next highest whole numbers.

Minimum 5% of the drums offered subject to minimum two in any lot offered for inspection shall be subjected to length verification & physical check of outer sheath & identification markings.

1.6.2.2 Acceptance Tests

a) Conductor resistance test
b) Test for dimensions of insulation
c) Hot set test for insulation
d) Void and contaminants test
e) Test for thickness of Aluminium sheath
f) Sheath Integrity Test for metallic sheath (Refer Annexure - A) (to perform as stage Inspection before outer sheathing)
g) Mechanical strength of welded sheath (Refer Annexure - A) (to perform as stage Inspection before outer sheathing)
h) Test for thickness of outer sheath
i) Partial discharge test
j) High voltage test (30 min. on full drum as well as 4Hrs. on sample)
k) Measurement of capacitance
l) Insulation Resistance Test (at room temperature & elevated temperature)
m) Conductor Weight KG/meter (for reference Only)

Note that tests mentioned at (f) & (g) above shall be offered & performed in presence of GETCO inspector as stage inspection on 100% cable drums for seam weld metallic sheath & 25% cable drums for seamless/extruded metallic sheath, after metallic sheath operation completion & before doing outer sheathing or any associated activity like bitumen layer etc. The same shall be included in Manufacturing Quality Plan to be submitted by bidder. However, note that GETCO reserves right for reduction of sampling plan or waivel of the stage inspection tests.

1.6.2.3 Immediately after finalization *of* the programme of type/acceptance/routine testing, the supplier shall give fifteen days advance intimation to the purchaser, to enable him to depute his representative for witnessing the tests.

1.7 INSPECTION:

The inspection may be carried out by the purchaser at any stage of manufacture. The successful Bidder shall grant free access to the purchaser's representative at any reasonable time when the work is in progress. Inspection and acceptance of any equipments/items under this specification by the Purchaser shall not relieve the supplier, of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection, if the equipment/items is found to be defective.

The supplier shall keep the purchaser informed in advance, about the manufacturing program, so that arrangement can be made for inspection, without delay.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items.

1.8 DOCUMENTATION:

1.8.1 LIST OF DRAWINGS AND DOCUMENTS: The Bidder shall furnish two sets of following documents along with his offer. The offer without documents shall be considered incomplete.

a) The sectional view drawing showing general constructional features of power cable with details of materials / conductor / conductor screen / XLPE insulation / water swell able tape / Aluminium sheath /HDPE sheath etc. with offer dimensions.

b) Literature for offered items.

c) Unpriced schedule of price bid (without prices)

d) Type test reports for the offered items in case the items have already been type tested for specified type of cable.

e) All the drawings, i.e. elevation, side view, plan, cross sectional view etc., in AutoCAD format and manuals in PDF format, for offered item shall be submitted. Also the hard copies as per specification shall be submitted.

f) The bidder shall submit Quality Assurance Plan for manufacturing process and Field Quality Plan with the technical bid.

g) All the points other than GTP, which are asked to confirm in technical specifications must be submitted separately with the bid.

1.9 PACKING AND FORWARDING:

1.9.1 The cable shall be packed returnable steel drums suitable for vertical/horizontal transport as the case may be, and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the items during transit, due to improper and inadequate packing. Wherever necessary, proper arrangement for lifting shall be provided. Any item found short shall be replenished by supplier without any extra cost.

1.9.2 Each consignment shall be accompanied by a detailed packing list containing the following information:

a) Name of the consignee

b) Details of consignment

c) Destination

d) Total weight of consignment

e) Handling and unpacking instructions

f) Bill of material indicating contents of package

1.10 TECHNICAL & GUARANTEED PARTICULARS: The Bidder shall furnish guaranteed technical particulars as called for in appendix-I (Schedule-A) of this specification. Particulars, which are subject to guarantee, shall be clearly marked. Offer not containing this information will not be considered.

1.11 GENERAL PARTICULARS:

a) The bidder is required to impart training in view of manufacture, assembly, erection, operation and maintenance for offered item, at his works, to the person/s identified by GETCO, in the event of an order, free of cost. The cost of logistics will be bear by GETCO.

b) Please note that the evaluation will be carried out on the strength of content of bid only. No further correspondence will be made.

c) The bidder shall bring out all the technical deviation/s only at the specified annexure.

d) The bidder should indicate manufacturing capacity by submitting latest updated certificate of a Chartered Engineer (CE).

SECTION – II

SPECIFICATION FOR CABLE TERMINATION ACCESSORIES

2.1 SCOPE:

2.1.1 This section covers the scope of general technical requirement of the 66 kV cable associated end termination kits, end termination connections and pre-commissioning tests to be undertaken by the Bidder.

2.2 CABLE JOINTING ACCESSORIES (KITS):

2.2.1 66 kV XLPE cable accessories shall be suitable for the specified size of the cable. The terminating kits shall be suitable for termination of the cables for outdoor installation.

2.2.2 Cable accessories shall be heat shrinkable type OR Polymeric termination as defined in IEEE 48-1990.

2.2.3 The cable jointing accessories shall include the end terminating kit and any special tools and tackles, required for making these joints.

2.2.4 i) Cable end termination accessories (kits) shall be suitable for tropical climatic conditions as specified as below. The joint shall be compatible with sheath bonding system and method of earthing.

CLIMATIC CONDITIONS: The climatic conditions under which the cable shall operate satisfactorily are as follows :

l)	Maximum ambient temperature of air in shade	^{0}C	:	50
m)	Minimum ambient temperature of air in shade	^{0}C	:	4
n)	Maximum daily avenge ambient temperature	^{0}C	:	40
o)	Maximum yearly average ambient temperature	^{0}C	:	30
p)	Maximum relative humidity	%	:	95
q)	Average number of the thunder storm days per annum.		:	15
r)	Average annual rainfall	Cm	:	150
s)	Maximum wind pressure	kg/m2	:	150
t)	Altitudes not exceeding above MSL	Meter	:	1000
u)	Max. soil temp. at cable depth	^{0}C	:	30
v)	Max. soil thermal resistivity	ohm-cm	:	150

ii) The particulars of requirement of electrical performance of termination shall be suitable for power cable of below specification.

	CABLE PARAMETERS	**66 KV**
i)	Voltage grade (Uo/U)	38 / 66 KV
ii)	No. of cores	Single
iii)	Size (mm^2)	630
iv)	Nominal system voltage	66KV
v)	Highest system voltage	72.5KV
vi)	System Frequency Hz	50
vii)	Variation in frequency	± 5%
viii)	Fault level individually for	
	i) Conductor) KA ii) Aluminium sheath) for one second	59.22KA / 1 Sec. 31.5KA / 1 Sec.
ix)	Maximum allowable temperature	
	c) Design continuous operation at rated full load current, the max. temp. of conductor shall not	^{0}C 90

	exceed		
	d) The conductor temperature after a short circuit for 1.0 sec. shall not exceed.	^{0}C	250
x)	Basic insulation level. (1.2 / 50 Micro second wave)	350KV	
xi)	1-min. power frequency withstand voltage (rms)(wet)	140	
xii)	System earthing	Solidly grounded	

2.2.5 i) Cable termination kits shall be suitable for tropical climatic conditions as specified in above. The joint shall be compatible with sheath bonding system and method of earthing. The cable termination kits shall be suitable for 66 kV (E) XLPE power cable suitable for total system.

ii) The particulars of requirement of electrical performance of termination shall be as above.

2.2.6 The end termination arrangement shall be of outdoor antifog type and shall be complete with all accessories, including conductor fittings, insulating, sealing, consumable items, filling materials, creepage extenders (skirts) and terminal studs etc. complete.

2.2.7 The kits must eliminate all disadvantages normally encountered in resin based termination and jointing system i.e. shelf life limitations, health hazards, delay in curing.

2.2.8 These shall be weather resistant and should withstand the long-term weather effects either due to rain-polluted atmosphere or by heavily industrial and saline polluted atmosphere. Accelerated testing conducted by the Bidder or manufacturer on the kits as per IEC-112 / VDE-0303 to confirm non-tracking properties of outer surface in detail shall be submitted in their offer.

2.2.9 The kit shall be suitable for storage without deterioration at a temperature up to 50 ^{O}C under normal condition of storage and should have adequate storage life preferably for period not less than 8/10 years.

2.2.10 Suitable size of the kit shall be stated in case a particular size of cable kit does not confirm to the size of cable.

2.2.11 a) The joints and termination shall have suitability to adopt the bonding system with SVL at end (termination) and end point, solidly grounded.

b) The successful bidder shall have to submit technical details along with the connection diagram, details of link boxes, SVL etc.

c) The connecting cable from end terminations to link boxes shall be laid in heavy duty PVC / Polyethylene pipes at minimum depth of **1 meter from road level.**

d) The link box shall be installed on structure OR pillar. The box shall be easily accessible for maintenance purpose in whether proof masonry manhole boxes.

e) Suitable size of the kit shall be stated in case a particular size of cable kit does not confirm to the size of cable.

f) The link boxes should be dust proof and weather proof.

2.2.12 The Bidder shall furnish the detailed Guaranteed technical Particulars of the accessories like termination kits offered by them in the prescribed format. Any additional details, if desired, shall also be submitted in the offer.

2.2.13 Type Tests on cable accessories

The bidder shall submit the following type test in sequence for joints and termination as per IEC 60840

a) Partial discharge test at ambient temperature,
b) Heating cycle voltage test
c) Partial discharge test
- At ambient temperature and
- At high temperature.

The tests shall be carried out after the final cycle of (b) above or alternatively after the impulse voltage test in (d) below.

d) Impulse voltage test followed by P.F. voltage test
e) Partial discharge tests if not previously carried out in (c) above.
Test of outer protection for buried joints.

2.2.14 AREA OF CORRUGATED ALUMINIUM SHEATH

Area of Corrugated Aluminium Sheath

$$\text{Area} = \frac{\pi}{4} (D_t^2 - D_g^2) * f$$

where D_t = Diameter over trough in mm

D_g = Diameter over gap below Aluminium Sheath in mm

$$f = \text{Corrugation factor} = \frac{1}{\cos\{\tan^{-1} \frac{2h}{p}\}}$$

h = Height of Corrugation
p = Pitch of Corrugation

ANNEXURE – A

1. Sheath Integrity Test for Metallic sheath:

This test shall be offered & performed in presence of GETCO inspector as stage inspection on cable drums after metallic sheath operation completion & before doing outer sheathing or any associated activity like bitumen layer etc. Intention of this test is to ensure no crack, porosity, blow holes or poor welding is left with metallic sheath to ensure its function of radial water barrier. This test is applicable for both types, seam welded / seam less (extruded) metallic sheath.

The cable (core + metallic sheath) shall be sealed on one side with appropriate arrangement to arrest any leakage from test accessory joints & to be provided with pressure gauge & valve to work as outlet only. The other side of cable shall be sealed with appropriate arrangement to arrest any leakage from test accessory joints & to be provided with pressure gauge & valve to be connected with inlet for dry air or nitrogen gas. Keeping outlet valve closed the inlet valve shall be opened slowly & suitably to allow inlet of dry air or nitrogen gas. Pressure of minimum 1 bar shall be achieved (indicated in both pressure gauges) & maintained for 1/2 hr. period without any drop. The pressure shall not drop.

In case of pressure drop observed in any drum of cable, that drum shall be considered as non-compliance of requirement & shall not be included for further activity. The cable shall be properly sealed & signed by GETCO inspector at both ends. Any corrective action in cable shall be done with prior intimation & confirmation of GETCO only.

2. Mechanical strength of welded sheath:

This test shall be offered & performed in presence of GETCO inspector as stage inspection on cable drums after metallic sheath operation completion & before doing outer sheathing or any associated activity like bitumen layer etc. Intention of this test is to ensure high quality welding. This test is applicable for seam welded metallic sheath only.

Ring of metallic sheath shall be cut & shall be straightened. The strip shall be cut in two pieces, sample one to include welding line & sample two without welding line. Sample two (without welding line) shall be subjected for tensile strength test & the value achieved shall be considered as reference. Now sample one shall be subjected for tensile strength test & the value achieved shall be not less than 90% of sample two (or reference value).

(Technical Bidding Schedule)

(To be filled in and signed by the Bidder)

The bidder must fill up all the point of GTP for offered item/s. Instead of indicating "refer drawing, or as per IS/IEC", the exact value/s must be filled in.

SCHEDULE – 'A'

GUARATEED TECHNICAL PARTICULARS FOR POWER CABLES

	Technical Particular	**To be filled by bidder**
1.00.00	GENERAL	
1.01.00	Name of the contractor, if any	
1.02.00	General tech. Requirement of cable shall be as per clause 1.5 of the tender specification (To tick mark whichever as applicable)	Yes / No.
2.00.00	CABLE	
2.01.00	Name of the Manufacturer	
2.02.00	Place of manufacture	
2.03.00	Cable type	
2.04.00	Applicable specifications and standards	
2.05.00	Voltage grade	
2.06.00	No. of cores and size	
2.07.00	Suitable for neutral earthed / unearthed system	Yes / No
2.08.00	(a) Describe extrusion technique for conductor screen, insulation and insulation screen (b) Permissible voltage and frequency variation for satisfactory operation	

2.09.00	Continuous current carrying capacity in Amp.	
2.09.01	For site conditions : 1. In air (A) 2. In ground (A) 3. In duct (A) 4. In trench (A)	
2.09.02	Group rating factor for two circuits laid in trefoil with spacing 400 / 600 / 800 mm.	
2.09.03	Derating factors, for various Conditions of laying, are not worse than those specified in applicable IS / IEC	Yes / No
2.09.04	Derating factor for fire resistance treatment	
2.10.00	CONDUCTOR :	
2.10.01	Material	
2.10.02	Shape of conductor	
2.10.03	Nominal cross section area (mm2)	
2.10.04	Number of wires	
2.10.05	Diameter of each wire	
2.10.06	Diameter of conductor (mm)	
2.10.07	Current carrying capacity (a) On continuous basis (b) S.C. Current for 1-sec basis (59.22KA)	
2.10.08	Conductor Weight KG/meter (for reference Only)	
2.11.00	Conductor Screen	
2.11.01	Type	
2.11.02	Material	

2.11.03	Continuous working temp. (^{0}C)	
2.11.04	Maximum allowable temp. at termination of short circuit (^{0}C)	
2.11.05	Thickness	
2.12.00	Insulation	
2.12.01	Material	
2.12.02	Thickness of insulation	
2.12.03	Tolerance on thickness (percent) of insulation	
2.12.04	Maximum eccentricity	
2.12.05	Diameter of core over insulation (mm)	
2.12.06	Specific insulation (ohm-cm) resistance at ninety (90) degrees centigrade	
2.12.07	Whether XLPE insulation dry gas cured or not	
2.13.00	Insulation Screen	
2.13.01	Material	
2.13.02	(1) Thickness extruded semi-conducting (2) Details of semi conducting water swellable tapes applied over core to be given (3) Thicknesses of copper woven tapes (mm) (4) Total thickness of tapes	
2.13.03	Diameter of cable over extruded screen (mm)	
2.13.04	Whether insulation screen is removable without the application of heat	Yes / No
2.14.00	Metallic sheath	

2.14.01	Material	
2.14.02	Type (seam weld / seamless (extruded)) (annular / spiral) (for reference)	
2.14.03	Thickness of metallic sheath (nom./min.)	
2.14.04	Current carrying Capacity of Aluminium sheath a) S. C. current for 1-sec basis	
2.14.05	For corrugated Aluminium Sheath i. Approx. Height of corrugation ii. Approx. Pitch of corrugation iii. Diameter of cable over trough iv. Diameter of cable over gap v. Nominal cross section area (Minimum Cross Section Area- 444 Sq. mm) vi. DC Resistance of Al Sheath at 20 ^{o}C)	
2.14.06	Filler Material	
2.15.00	Outer Sheath	
2.15.01	Material	
2.15.02	Thickness of sheath (mm)	
2.15.03	Tolerance on thickness (mm)	
2.15.04	Overall diameter of cable (mm)	
2.16.00	Short circuit withstand capacity of offered cable	
2.16.01	Short circuit current (KA)	
2.16.02	Duration of short circuit (sec)	
2.17.00	Allowable / attainable maximum conductor temperature (^{0}C) when carrying continuous currents as per item 2.09.00 above	

2.18.00	Allowable / attainable maximum conductor temperature (^{0}C) at the termination of short circuit current as per item 2.16.00 above.	
2.19.00	Cable Constants :	
2.19.01	DC resistance at twenty (20) degrees centigrade (ohm / km)	
2.19.02	AC resistance at maximum operating temperature (ohm / km)	
2.19.03	Loss tangent (Maximum) (Measured at maximum conductor temp. & voltage as per IS/IEC)	
2.19.04	Dielectric constant	
2.19.05	Electrical stress at conductor screen (Ei)	
2.19.06	Electrical stress at insulation screen (Eo)	
2.19.07	Impedances at 50 Hz for trefoil touching formation. 1.Positive & Negative Sequence = Ω/Km 2. Zero sequence = Ω/Km	
2.20.00	Maximum cable charging current at normal operating voltage (Amp/km)	
2.21.00	Permissible overload capacity of cable a) conductor temperature b) Ampere c) Duration	
2.22.00	Are the offered 1 core cable guaranteed to perform satisfactorily under installation conditions specified in clause 1.3 (section – I) If yes, furnish relevant calculations in support including following data when both ends grounded with SVL and middle point	Yes / No.

	solidly grounded for considering 5km of route length (a) Induced voltage in the Aluminium sheath when (1) Cable carrying rated load (Volts) (2) Cable carrying SC current of 1.0 KA(Per KM) (Volts) (b) Whether calculation for the (a) are furnished ?	
2.23.00	Recommended minimum bending radius (mm)	
2.24.00	Safe pulling force (kg)	
2.25.00	Cable weight (kg / km)	
2.26.00	Length of cable per drum (mm)	
2.27.00	Cable drum	
2.27.01	Net weight (kg)	
2.27.02	Drum weight (kg)	
2.27.03	Shipping weight (kg)	
2.27.04	Marking on outer sheath	

Signature of the Bidder : _____

Name : _____

Designation : _____

Date : _____

Authorized common rubber
Stamp / seal of the bidder _____