

DEENDAYAL PORT AUTHORITY

An ISO 9001 : 2008 & ISO 14001 : 2004 Certified Port



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No.: EL/AC/EOI/2613

Date: 25/04/2023

EXPRESSION OF INTEREST [EOI] for

“Supply of 1050 mtrs. 1C X 630 Sq. mm. XLPE Power Cable for Under Ground line.”

Executive Engineer (Electrical), DPA invites Expression of Interest for the Supply of “1050 mtrs. 1C X 630 Sq. mm. XLPE Power Cable for 66 KV power supply to IOCL, Kandla.” from the reputed firms, who have executed similar supply in Government/public sectors and other leading private organizations. The Expression of Interest (EOI) documents containing details of Scope of supply and technical specifications are enclosed herewith.

The interested firms are requested to submit budgetary quotation for the said supply in format enclosed at Annexure I. The completed EOI (Expression of Interest) shall be submitted to the office of the undersigned on or before 03/05/2023.

S/d

Executive Engineer (E)
Deendayal Port Authority

TECHNICAL SPECIFICATIONS

OF

66 KV 1C 630 SQ.MM. XLPE POWERCABLE FOR UNDER GROUND LINE

SPECIAL INSTRUCTIONS TO BIDDER

Please read following instructions carefully before submitting your bid.

1. 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.
2. The bidder shall submit Quality Assurance Plan for manufacturing process and Field Quality Plan with the technical bid.
3. The bidder shall have to submit all the required type test reports for the offered item. However, in the event of partial submission or reports older than specified limit, bidder must submit his confirmation for those type test report/s to be submitted in the event of an order, without affecting delivery schedule, before commencement of supply, free of cost. In absence of this confirmation, the evaluation shall be carried out accordingly as non submission of type test reports.
4. 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.

5. All the points other than GTP, which are asked to confirm in technical specifications must be submitted separately with the bid.
6. Please note that the evaluation will be carried out on the strength of content of bid only. No further correspondence will be made.
7. The bidder shall bring out all the technical deviation/s only at the specified annexure.
8. The bidder should indicate manufacturing capacity by submitting latest updated certificate of a Chartered Engineer (CE).

Technical Specification No: - 01

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.
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.
3. 66 KV (E) grade XLPE single core power cable of single length, with H.D.aluminium conductor, shielded with extruded semi-conducting layer, insulated with dry gas cured cross linked polyethylene (XLPE) insulation, insulation screened with extruded semi-conducting layer followed by semi-conducting non-woven water swellable tape, insulated core copper-wire, screened (suitable for 31.5KA for 1 sec) tapped with a combination of semi-conducting water swellable and poly aluminium laminated followed by black extruded Thermoplastic HDPE (Poly-ethylene) inner sheath. Single H.D. aluminium wire armoured (suitable for 31.5KA for 1 sec) and extruded semi-conductive layer OR graphite coated Thermoplastic HDPE outer sheathed overall cable, confirming to IEC-60840 for construction and also confirming 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. The cable should be suitable for laying in covered trenches and / or under ground for outdoor.

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) Cu.screen	31.5 KA / 1 Sec.
iii) Armour	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 0C	90
b) The conductor temperature after a short circuit for 1.0 sec. shall not exceed. 0C	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. GENERAL TECHNICAL / PRINCIPAL PARAMETERS

2.1 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 conform 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

2.2 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 semiconducting polymer shall be cross-linked.

2.3 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).

2.4 INSULATION SHIELD: To confine electrical field to the insulation, nonmagnetic 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. Metallic screening shall be provided. The metallic screen shall be of copper wire having fault current capacity (31.5 KA for 1-sec.). Copper wires shall be followed by open helix copper tape of suitable size. Diameter of individual copper wire, number of wires & tape size shall be selected such that calculated minimum cross section shall be 210 sq. mm. collectively.

A semi-conducting non-woven water blocking tape shall be provided over the extruded semi conducting layer and over the copper wire metallic screen. To avoid the ingress of moisture, poly-aluminium laminate tape shall be applied longitudinally with suitable overlap.

INNER-SHEATH: The sheath shall be suitable to withstand the site conditions and the desired temperature. It should be of adequate thickness, consistent quality and free from all defects. The sheath shall be extruded and of black Thermoplastic H.D.P.E. (Poly-ethylene).

ARMOUR: Single H.D. Aluminium wire armouring shall be provided. The dimension of H.D. Aluminium wire armouring shall be as per latest IS: 3975/19988. The armour shall be having fault current capacity (31.5 KA for 1-sec.). However, diameter of armour wire shall be 3.15 mm. nominal & number of such armour wires shall be not less than 56 in any case.

OUTER SHEATH: Extruded Thermoplastic HDPE outer sheath confirming to IEC: 502/1983, shall be applied over armouring 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.

CONSTRUCTION: 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.

CURRENT RATING: The cable will have current ratings and derating factors as per relevant standard IEC. The one-second short circuit current rating values each for conductor, screen & armour shall be furnished and shall be subject to the purchaser's approval. 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.

OPERATION: Cables shall be capable of satisfactory operation under a power supply system frequency variation of $\pm 5\%$ voltage variation of $\pm 10\%$ and combined frequency voltage variation shall be $+10\%$ & -15% . Cable shall be suitable for laying in ducts or buried under ground. Cable shall have heat and moisture resistance properties. These shall be of type and design with proven record on transmission network service.

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.	1050 meters $\pm 5\%$ tolerance and 2 % overall tolerance in total quantity of cable.

IDENTIFICATION 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.

TESTS:

TYPE TESTS: The cable & accessories offered shall be fully type tested as per the relevant standards. In case the cable & accessories of the type and design offered has already been type tested in a Govt. recognized laboratory, the Bidder shall furnish two sets of type test 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. For this purpose, the Bidder may quote unit rates for carrying out each type test.

These prices shall be taken into consideration for bid evaluation. For any change in the design/type already type tested and the design/type offered against this specification, fresh Type Tests need to be performed on offered design/type without affecting delivery schedule & no extra cost to DPT.

Type Tests

a) Tests on conductor:

- i) Wrapping,
 - ii) 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
 - vi) Void and contaminants test

c) Resistivity test for semi-conducting layers

d) Test for concentric metallic screen:

- i) Test for concentric copper wire
- ii) Test of concentric copper tape

e) Thickness of metallic screen

f) Tests for armouring material

- i) Dimensions
- ii) Tensile strength and elongation at break
- iii) Wrapping test
- iv) Resistivity test

g) Physical tests for outer sheath:

1) Measurement of thickness

2) PE sheath

i) Carbon black content

ii) Tensile strength and elongation at break before and after aging

iii) Hot-deformation

h) Water tightness test

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
- j) Bending test followed by P.D. test
- k) Dielectric power factor and capacitance measurement at ambient temperature
- l) Dielectric power factor measurement at elevated temperature
- m) Load cycle test followed by P.D. test
- n) Impulse withstand test (@350 kvp) followed by HV test
- o) Insulation Resistance Test (at room temperature & elevated temperature)

ACCEPTANCE AND ROUTINE TESTS:

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.

Acceptance Tests

- a) Conductor resistance test
- b) Annealing test
- c) Test for dimensions of insulation
- d) Hot set test for insulation
- e) Void and contaminants test
- f) Test for thickness of metallic screen & Poly Al layer
- g) Test for thickness of inner & outer sheath
- h) Partial discharge test
- i) High voltage test (30 min. on full drum as well as 4Hrs. on sample)
- j) Measurement of capacitance
- k) Insulation Resistance Test (at room temperature & elevated temperature)

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.

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 programme, 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.

DOCUMENTATION:

LIST OF DRAWINGS AND DOCUMENTS:

- 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 / HD Al. armouring/HDPE sheath etc.
- 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.

PACKING AND FORWARDING:

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.

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

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.

DPT approved Make / Brand List i.e. POLYCAB/TORRENT/RPG ASIAN/
NICCO/HAVELLS/GLOSTER/ UNISTAR/ UNIVERSAL /RAVIN- PRIME CAB.

**Signature & Seal of
Contractor**

**XEN(E)
Deendayal Port Authority**

GUARANTEED TECHNICAL PARTICULARS **FOR POWER CABLES**

(630 sq. mm.)

	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)	
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	
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	Derating factors, for various Conditions of laying, are not worse than those specified in applicable IS / IEC	
2.09.03	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 (mm ²)	
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)	
2.11.00	Conductor Screening	
2.11.01	Type	
2.11.02	Material	
2.11.03	Continuous working temp. (°C)	
2.11.04	Maximum allowable temp. at termination of short circuit (°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 Screening	
2.13.01	Material	
2.13.02	(1) Thickness semi-conducting (2) Metallic part - Dia of each copper wire (mm) (3) ----- do ----- but total nos. of such copper wire (4) Size of copper tape (5) Total minimum cross section area of metallic part of insulation screen (in sq.mm.) (6) Current carrying capacity (a) S.C. Current for 1-sec basis(31.5KA)	
2.13.03	Diameter of cable over screen (mm)	
2.13.04	Whether insulation screen is removable without the application of heat	Yes / No
2.14.00	Inner Sheath	
2.14.01	Material	
2.14.02	Extruded	Yes

2.14.03	Thickness (mm)	
2.14.04	Diameter of cable over inner sheath (mm)	
2.14.05	Thickness of water swellable tape (mm)	
2.14.06	Thickness of poly aluminum layer (mm)	
2.16.00	Armouring	
2.16.01	Material	
2.16.02	Type of armouring	
2.16.03	Diameter of each wire armour (mm)	
2.16.04	Nos. of such wire	
2.16.05	Diameter of cable over armour (mm)	
2.16.06	Current carrying Capacity of Armour (a) S.C. Current for 1-sec. Basis (31.5KA)	
2.17.00	Outer Sheath	
2.17.01	Material	
2.17.02	Thickness of sheath (mm)	
2.17.03	Tolerance on thickness (mm)	
2.17.04	Overall diameter of cable (mm)	
2.19.00	Short circuit withstand capacity of offered cable	
2.19.01	Short circuit current (KA)	
2.19.02	Duration of short circuit (sec)	
2.20.00	Allowable / attainable maximum conductor temperature ($^{\circ}\text{C}$) when carrying continuous currents as per item 2.09.00 above	
2.21.00	Allowable / attainable maximum conductor temperature ($^{\circ}\text{C}$) at the termination of short circuit current as per item 2.19.00 above.	
2.22.00	Cable Constants :	

2.22.01	DC resistance at twenty (20) degrees centigrade (ohm / km)	
2.22.02	AC resistance at maximum operating temperature (ohm / km)	
2.22.03	Loss tangent (Maximum) (Measured at maximum conductor temp. & voltage as per IS/IEC)	
2.22.04	Dielectric constant	
2.22.05	Electrical stress at conductor screen (Ei)	
2.22.06	Electrical stress at insulation screen (Eo)	
2.23.00	Maximum cable charging current at normal operating voltage (Amp/km)	
2.24.00	Is the offered cable guaranteed to safely withstand continuous conductor temperature of 90 ⁰ C and also to safely withstand temperature up to 130 ⁰ C for a duration of one hundred (100) hours per year	
2.25.00	<p>Are the offered 1 core cable guaranteed to perform satisfactorily under installation conditions specified in clause 1.3 (section –I)</p> <p>If yes, furnish relevant calculations in support including following data when both ends grounded with SVL and middle point solidly grounded for considering 5km of route length</p> <p>(a) Induced voltage in the armour when</p> <p>(1) Cable carrying rated load (Volts)</p> <p>(2) Cable carrying SC current of 1.0 KA (Per KM) (Volts)</p> <p>(b) Induced voltage in the copper screen when</p> <p>(1) Cable carrying rated load</p>	

	(Volts) (2) Cable carrying SC current of 1.0KA(Per KM) (Volts) (c) Whether calculation for the (a) & (b) are furnished ?	
2.26.00	Recommended minimum bending radius (mm)	
2.27.00	Safe pulling force (kg)	
2.28.00	Cable weight (kg / km)	
2.29.00	Length of cable per drum (mm)	
2.30.00	Cable drum	
2.30.01	Net weight (kg)	
2.30.02	Drum weight (kg)	
2.30.03	Shipping weight (kg)	
2.31.00	Marking on outer sheath	

Signature of the Bidder : _____

Name _____

Designation : _____

Date : _____

Authorised common rubber

Stamp / seal of the bidder : _____

NOTE : (1) Instead of giving reference of drawing no. / IS / Literature etc., actual values / figures must be furnished wherever required; otherwise it will be considered that the details in GTP are not furnished & technical Bid will be evaluated accordingly.

Techno Commercial condition

1. The bidder is shall be authorized dealer/manufacturer of POLYCAB/TORRENT/RPG ASIAN/HAVELLS/NICCO/GLOSTER/UNISTAR/ UNIVERSAL /RAVIN- PRIME CAB, HT cables. In case manufacture of any brand/make is submitting bid, the bid of authorized dealer will not be considered and opened.
2. **Supply period:** - 30 days from the date of issue of supply order. In case of any delay beyond 30 days, penalty at the rate of Rs. 5,000.00 per day and part thereof will be levied.
3. Transportation, transit insurance, loading & unloading at DPT site, store in the firm scope. DPT will not entrain.
4. Quoted Rate are inclusive all taxes, transportation, loading, unloading & incidental charges, insurance, **but Excluded GST.**
5. Cable length as per standard Drum length.
6. HT XLPE cable shall be confirmed to IS 7098, 1985 with latest amendments. In this regard, the contractor is required to test certificate. Routine test certificate submitted by the contractor at the time of process the Final Bill. At the time of supply of cable, the supplier is required to submit Guaranteed Technical Particulars.
7. 90% payments shall be released after material received at site in good condition. 10% will be released after guarantee period of 06 months.

**Signature & Seal of
Contractor**

**Executive Engineer (E)
Deendayal Port Authority**

Bill of Quantity

S/N	Description	Qty	Rate	Unit	Amount
1	Supply of 1C X 630 Sq.mm XLPE Power Cable as per DPT approved Make / Brand List i.e. POLYCAB/TORRENT/RPG ASIAN/HAVELLS/NICCO/GLOSTER/UNISTAR/ UNIVERSAL /RAVIN-PRIME CAB as per Tech. Spec. No:-01	1050		Mtr.	
Total Amount: Rs.					

Amount in Words: - In Rs_____

Note: - Quoted Rate are inclusive all taxes, transportation, loading, unloading & incidental charges, insurance, **but Excluded GST**.

**Signature & Seal of
Contractor**

**Executive Engineer (E)
Deendayal Port Authority**