
	<b>DAKSHIN GUJARAT VIJ COMPANY LIMITED</b> (CIN U40102GJ2003SGC042909) Redg. & Corporate Office:"Urja Sadan", Nana Varachhha Road . Kapodra Char Rasta, Surat-395006 (A Government of Gujarat Undertaking)	
	<b>KIM INDUSTRIAL DIVISION OFFICE (O&amp;M)</b> Near 220 kv Lindiyat Sub Station, Opp. Shahalon Textile Park, Kim-Mandvi Road, Lindiyat, Ta-Mangrol, Di-Surat. 394110 Website: www.dgvcl.com	

TENDER No.  
KIM/O&M/TECH/N-PROCURE/26-27/01/SR-37 DT:20-06-2026

ARC Work order for Erection & Maintenance work of HT/LT line & TC and OH XLPE, UG CABLE Work on ARC Basis for work under DISS and any scheme under Kosamba and any S/dn under Kim Division Through outsourced agency for existing DGVCL Network for SDN under Kim Division.

PART - II

TECHNICAL SPECIFICATIONS:

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GENERAL INFORMATION (TECHNICAL):

1.1. CODES, STANDARDS & REGULATIONS

The design, manufacture, erection, cable laying and testing of the equipments and material to be supplied shall comply with latest revisions of relevant Indian Standards or equivalent IEC standards. In addition, the Indian Electricity Rules, Electricity Act 2003, Statutory requirements of Central Govt., GERC and State Government of Gujarat( applicable codes), shall also be complied with. Any complications arising out of it will be set right by the bidder without any implication to DGVCL. The bidder shall submit his offer as per information given in submission of tender.

Drawings, Data and Documents

The bidder shall furnish following documents/ information along with offer in spiral bound volumes. General description of equipment offered specifying the important features, make, technical parameters, materials of construction etc. To enable DGVCL to have proper understanding of the material offered and its operation.

The drawings and documents shall be furnished to DGVCL by the successful bidder for approval of DGVCL, within the period stipulated in the draft contract/mutually agreed terms at the time of placement of order, the bidder shall submit a list of all such drawings and documents he proposes to submit. The list will be approved by DGVCL and may be modified, if necessary. Each drawing /document in the list shall be identified with a serial number, description and scheduled date of submission. This should be submitted in a spiral bound volumes.

1.2. FOR REFERENCE

- OEM's Complete and comprehensive instruction manuals with drawings for operation and maintenance of the equipments supplied by the bidder.
- Preventive maintenance schedule for each equipment.
- Procedure for shutdown and HT equipment.
- Safety procedures for safe operation of equipment and complete system.
- Test procedure for site tests.

1.3. AS- BUILT DRAWINGS

On completion of installation, testing and commissioning, the bidder shall in Corporate visions/ modification if any, in the reproducible and submit 'as built' drawing for DGVCL's record in spiral bound volumes and soft copy. The drawings shall be in AutoCAD DXF format.

1.4. TEST AND INSPECTION FOR INDIVIDUAL ITEM

Routine test/ Acceptance tests shall be carried out on all equipment at manufacture's works/ ERDA as per appropriate IS/IEC. The bidder shall make reasonable facilities, at his cost for inspection and testing of the equipment/material by DGVCL's Officials. No equipment/item shall be dispatched to site without provisional certificates of acceptance issued by DGVCL. Inspection and test shall be carried out at the place of manufacture as well as on receipt of the equipment at site if required. Inspection and tests do not relieve the bidder of his contractual obligations regarding performance of the equipment at site/in actual use.

The bidder shall submit the brief summary of all type test certificates for similar equipment supplied by him elsewhere and the actual type test certificates as and when asked. In case type test certificates for similar equipment is not available, the same shall be conducted in the presence of DGVCL's Authorized representative if DGVCL so desires, without any financial implications to the DGVCL. The type test report shall not be older than 5 year from the date of tender opening (Technical bid opening). The supplier of the equipment shall ensure that the equipment available at his works for routine test/type test/acceptance test are duly calibrated and necessary certificate shall be made available to the inspecting officer of DGVCL.

As far as possible, the supplier of equipment shall give a minimum of 15 days notice of readiness of material and give the inspection call accordingly. If on arrival of inspecting officer at the works, the material is not found to be ready, the concerned supplier of equipment shall be liable for additional expenditure DGVCL may incur on account of retention or re-deputation of the inspecting officer.

The officer deputed for inspecting for particular lot of material according to intimation from you may also like to check Quality Control Plan and for that purpose he may demand the Test Reports of raw material being procured.

1.5. FUNCTIONAL AND COMPOSITE TESTING

Following test shall be conducted on equipment after completion of erection in the presence of Engineer-in-charge from point of view of completeness in the presence of DGVCL's Authorized Representative.

- Visual inspection of total system.
- Checking of continuity of power and LT/HT cables.
- Checking of nameplate data of complete system.
- Verification and measurement of earthing resistance.
- Checking of cable terminations and laying, dressing etc. in the equipment kiosk.

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- Checking of safe accessibility of components.
- All the equipments and materials shall be passed through checks and test as per approved Field Quality Plan.
- The insulation resistance test shall be carried out
- HV installation above 11 KV- by 2500V Megger
- Power circuit of voltage up to 1KV- by 1000 V Megger

#### 1.6. BAR CHARTS

The Bidder shall furnish along with the bid, the bar charts in Project and project schedules indicating starting and completion dates of each activity, such as preparation & approval of drawings, manufacturing/supply/ delivery, civil works, Cable laying erection, testing, pre commissioning and commissioning etc. so that quarter wise completion activities suffice the purpose for releasing the connections.

#### 1.7 GENERAL

Identification labels shall be provided on all equipments as per client's approval. All labels shall be engraved on plastic (white letters with black background) and all text shall be in English language.

Any exclusion /deviation from specification shall be clearly spelt out and listed at one place only and bidder shall substantiate the same with appropriate reasons. In the absence of clearly spelt out and mutually agreed deviation, it shall be considered that the bidder has undertaken to comply with the technical specification totally, in letter and spirit.

It will be responsibility of the successful bidder to obtain necessary approval of statutory authority as per rules of Govt. of Gujarat before energizing/ charging the equipment/system. However bidder shall be extended all assistance by the DGVCL in regard to application for the same. For installation work at site, the bidder shall be fully responsible for arranging the supply of required tools and tackles, welding sets, cable crimping tools, labours, scaffolding, ladders, etc.

The power connection will be provided by DGVCL at one point only at the prevailing tariff, from where the bidder has to arrange for temporary connection and further distribution of supply at his own cost. The installation of energy meter, cut out, switches etc. for construction power shall be as per prevailing norms of DGVCL. The test report and Various requirement to release the connection shall be as per prevailing rules of DGVCL.

On completion of the installation but before energizing the system, all installation shall be physically checked and properly tested. These checks and tests shall be conducted by the bidder under the supervision of Engineer In-charge and bidder shall furnish the final status and test results shall be made good by the bidder free of cost within contract completion period.

All clamps, brackets, bolts, nuts, screws, markers, ferrules, lugs and glands and Various hardware necessary for erection work, shall include in the scope of work and shall be arranged by the bidder.

#### 1.8 APPROVED MAKES OF EQUIPMENTS /ITEMS OF SUPPLY.

Sr. No	Equipment	11KV
1	Packaged Sub Station (PSS)	ABB/Schneider/Siemens make or equivalent.
2	RMU	ABB/Schneider make or equivalent.
3	PVC Insulated Aluminium Conductor, armoured cable 650/ 1100 volt grade Power cable	Vaishali,Suyog,Chandresh,Ravi cable, NICCO,Uniflex or as approved by GUVNL
4	11 KV 3C, XLPE aluminum Cable.	Fort Gloster / Universal CCI/ RPG/ Nicco/ Torrent/ Uniflex./Polycab /Hindustan Vidhyut Registered vender & regular supplier of GUVNL

#### Notes

(i)The DGVCL reserves the right to make changes (add or delete names of Various makes) in the list during execution of contract.

(ii) If bidder wants to propose additional vendors for any of the items, same shall be stated along with the tender or within 30 days from the date of LOI & decision thereof will be conveyed within 30 days thereafter by DGVCL.

#### 2..0 INSPECTION AND TESTING OF EQUIPMENT

Manufacturing Progress reviews, inspection & testing of equipment covered under the technical specification shall be carried out by the DGVCL's Authorized Representative at the manufacturer's works/premises prior to dispatch, to ensure that their quality & workmanship are in conformity with the contract specifications and approved drawings.

#### 3..0 RESPONSIBILITY FOR INSPECTION

Any inspection by the DGVCL's Authorized Representative does not relieve the Bidder from his responsibility of quality assurance and quality control functions.

As such, any approval which the Inspecting Engineer of the DGVCL may have given in respect of equipment and Various particulars and the work or workmanship involved in the contract (whether with or without test carried out) shall not bind the DGVCL to accept the plant & equipment, should it on further tests at site be found not comply, with the requirements of the contract. If required, audit wing of DGVCL Inspection Department shall also be entrusted with inspection of particular item/equipment received at site. The bidder is to meet the inspection & testing

requirements for the equipment coming under the statutory regulations e.g. weights & measures, safety, IE rules, etc. and submit calibration certificates and documents from appropriate authority to the DGVCL Inspecting Engineer for the same, on demand.

#### 4..0 METHOD OF GIVING INSPECTION CALLS

Inspection calls shall be given by the Bidder to Chief Engineer DGVCL Surat in accordance with mutually agreed program with 15 days' clear time for all equipments. Four sets of relevant test certificates and inspection report of the Bidder/ Sub-bidder after satisfactory completion of internal inspection and test shall be submitted along with acceptance/routine test certificate of the tests witnessed by DGVCL Inspector.

The DGVCL reserves the right to visit at any stage of manufacture at plant and ask for additional inspection & tests if it is found necessary after completion of detailed design & engineering and approval of drawings. The DGVCL or his duly authorized representative shall on giving written instructions to the bidder, setting out any grounds of objection which he may have in respect of the work, be at liberty to reject all or any part of plant/equipment or workmanship which are not in conformity with the contract provisions.

#### 5..0 BIDDER'S RESPONSIBILITY

The Bidder shall provide all reasonable facilities to the Inspecting Engineer of the DGVCL to the Bidder's or their sub-bidder's premises at any time during

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contract period, to facilitate him to carryout inspection & testing of equipment during manufacture of equipment.

The Bidder shall delegate a representative/coordinator to deal with DGVCL on all inspection matters.

The Bidder shall comply with instructions of the DGVCL's Inspecting Engineer fully. The Bidder shall ensure that the equipment and materials once rejected by the Inspecting Engineer are not reused in the manufacturing of the equipment and materials. Where parts rejected by the Inspecting Engineer have been rectified as per agreed procedures laid down in advance, such parts shall be segregated for separate inspection and approval, before being used in the work.

#### 6..0 INSPECTION WAIVER

For certain standard bought-out items and the products of reputed firms where the DGVCL has earlier experience on the quality of their products, the DGVCL may consider allowing of inspection waiver for such items. The Chief Engineer DGVCL, Surat shall issue approval of inspection waiver certificate after scrutiny of bidder's internal inspection report, test certificates and Various documents. However, it is not binding upon DGVCL to give waiver on bidder's request. DGVCL may weigh the important issues like quantity of material, cost of material, importance of material, distance of travel & time of travel required to inspect before deciding the waiver of the inspection.

#### 7..0 AUDIT INSPECTION

From the lots inspected by the DGVCL, the Inspector of DGVCL may pick up samples from the lots supplied at stores of contractor at random for quality check only.

The samples picked up will be tested for acceptance test / type test or as decided by DGVCL at Government/ NABL approved laboratory or ERDA laboratory at DGVCL RSO, in presence of representatives of contractor and DGVCL as per relevant ISS/BIS/ DGVCL specifications. The test results will be binding on the suppliers and DGVCL, in general will not allow re-sampling. If the material fails in any of the acceptance tests carried out, the full lot of materials will be considered as rejected, and if replacement is not possible due to consumption of the materials then in that case for whole of the rejected lot, DGVCL will deduct maximum up to 30% (Thirty) of the contractual order cost of that item. If the same are not utilized / consumed, then DGVCL may ask for replacement at sole discretion of DGVCL or may accept with maximum deduction up to 30% (Thirty) of the contractual order cost of that item, and all these will be binding on the contractor.

In case if the materials does not confirm to specifications or fails at Government approved laboratory or Various laboratory decided by DGVCL for testing and if subsequent testing are to be carried out (which will solely at DGVCL discretion), then all Testing fees, expenses of the inspector and Various expenses incurred by DGVCL will be to contractor's account. The decision in this regard for acceptance as above of DGVCL shall be final and this will be binding on the contractor.

#### 8.0 VARIOUS CONDITIONS

Any clarification / amendment necessary, in any or more clauses incorporated in the present A/T, you will have to make a detailed reference to the DGVCL latest within ten days from the receipt of A/T. If you fail to do so, no request for any clarification / amendment shall be considered thereafter. Please also note that all the points which need clarification / amendment should be brought out at once. No piecemeal clarification/amendment will be entertained.

#### 9.0 PRE INSPECTION AND VERIFICATION OF SITE BY BIDDERS

Bidder, if desire, may visit and inspect proposed work site of Kosamba before bidding. Prospecting bidder may contact our Deputy Engineer (O&M) Kosamba sub division with prior appointment and confirmation.

#### Specification & General Conditions For Erection of H. T. & L.T line

##### 1. GENERAL:-

1. The work entrusted as per the contract should be soundly constructed in accordance with the best practice and should present a neat appearance when completed. All works have to be carried out according to the drawings & specifications and as per the instruction of engineer in charge. There should not be any damage or injury to material of Various property during transport to erection.

2. Before commencing erection of lines, the contractor will be provided, with the pole schedule and layout map with give type of the support number of guys, earthing etc at every one to the location marked in the layout map. The pole guy and earthing location will be available for the reference with the board's staff at site or at the Divisional office. Cutting of the tree or tree branches which come in the way of the line will be arranged by the board.

3. Marshy or water logged location must be avoided as far as possible if it becomes inevitable to locate poles at such points special pre-cautions about foundation will have to be taken and work carried out as per instruction of the engineer-in-charge.

4. The spans shall be as specified in the pole schedule and the minimum spacing between the power conductors and natural shall be shown in.

##### 2. SUPPLY OF MATERIAL:-

All material such as rails and R. S. joints pre stressed concrete or Various poles fabricated materials, copper, aluminum or A.C.S.R conductor V.I.R wire insulators, guy wire, cement and cement block etc. required for erection will be supplied at the company stores at only during working hours. PSC poles for the line support will be transported and stacked by the Board at one place near the side of the work for HT & LT line. The rates quoted should be inclusive of transportation and distribution to site from the above store and erection work. The line supports may be of Rail PSC wood or any Various type and be 28 to 42 feet in length and weight 40 to 100lbs/yd. The conductor will be either copper, aluminum or A.C.S.R and every in size from 0-075sq. in to 0.04 sq in copper, equivalent area. The conductors will be supplied in coils or in the drums as per standard packing received from supplier. The crates should be returned to the stores and stacked at the directed place.

3. POLE ERECTION:-The work includes shifting of supports particularly PSC poles from the stacking places as mentioned in clause2 to the site of actual work excavation of pit, erection pole with the base plate(where required) top insulator fitting, V-orc Flat cross arms, packing (where required) , clamps numbering etc. complete and inclusive of painting (where required) fixing of danger on caution plates putting and (ant climbing) Devices wherever required for terminal location, tapping river crossing or transformer structures etc. the work further includes fixing of flat cross arm packing and distance pieces cross bracing GI pipe fitting , mounting such as AB switches , D type fuse units transformer distribution boxes HT metering equipment's etc but inclusive of painting (where required) and numbering and fixing of danger plate and putting ant climbing devices. Where the poles are to be sent in goods hard earth the depth of the pits shall be one sixth, height of the pole and if soft depth of the pit shall be 6 inches more than the above poles must not be erected along the edge of cutting or embankments or where the sell is liable to be washed away unless special precautions are taken to ensure durable foundation when setting the pole, the point shall be of ample size to allow easy entrance of the pole and base plate without an damage to it extra payment is payable for hard soil or rock under this item which may be quoted in the tender after the pole is erected vertically the pit is to be refilled with the excavated earth and properly rammed with rammers and watered at intervals and extra earth should be packed around the pole and rammed the erection cost of single double or triple pale structures, stay sets and angle type and pipe type earthing and inclusive of excavation of pit, refilling of excavated earth and cost in earthing

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arrangements as specified.

## 2. PAINTING & NUMBERING :-

Rail poles RS joints and or all the steel mounting shall be given one coat of approved red oxide paint and two coats of approved aluminum paint. There should be sufficient interval between every coats of painting in order to allow for drying. The bolts and nuts shall be dipped in anticorrosive oil before insertion and all over lapping surface of steel should be given a time coat of red oxide paint before bolting for rails and RSJ the lower portion up to three ft. above the ground level shall be cleaned of rust, where concreting is not to be done this surface should be given coat of red oxide and an additional coat of black bit mastic paint which is to be extended above ground level or muffing before inserting in ground. the rest of the surface of the rails or RSJ to be cleaned of all rust and painted with with one coat of red oxide and two finished coats of approved aluminum paint. The paint should be with ISI marking should be got approved by the engineer in charge of works before using on works and will have to be arranged by the tender as painting is included in the offer, every pole after erection shall be numbered in the bold black figures both in English and Gujarati at a height of about 8ft. from the ground level as per instruction of the engineer in charge PSC poles need not be painted but they should be properly cleaned and all accumulations of earth dirt etc should be removed.

5. CONCRETING:-The proportion of concrete mixture and the quality of the sand, metal of bricks bat should be as below:

- (a) Cement concrete proportion for concreting of rail RSJ and stay rods should be cement one parts and 1-1/2" metal brunt bricks bat six parts (1:3:6)
- (b) The sand shall be clean grippy and composed of hard strong durable graints it shall be free from clay or organic matter if there is any trace of earthy should be got approved from engineer in charge
- (c) Metal should be of sound and durable stone to pass through a mesh of 2.5" as far as possible all metal must be perfectly clean , being washed if necessary and free from any surface size of metal must be got approved from the engineer in charge
- (d) Unless Various wise specified the concrete shall be mixed in the above proportion and should be thoroughly mixed at least three times in a dry state before water is added and as far as possible finely wet mixture must be used. All concrete must be mixed on a water tight platform in any case finishing work must be mixed be absolutely true in line and level and finished off smooth once finishing coat of cement plaster should be applied on an Various surface of muffing (as soon as the surface cannot be rubbed off by the figure catering of blocks must be commenced) the concrete block must be kept wet continuously for a period of seven days.
- (e) If the engineer in charge of the work or the supervisor finds that cement concrete is not of the above quality and as specified the same will be rejected.
- (f) The contractor will be supplied cement by the board and its cost will be recovered from the contractor at the rate decided by the board time to time. All the empty bag will have to be returned in good condition. Various wise, a recovery of Rs. 1 per bag will be made. The contractor should procure metal and sand himself as specified above. Only steel poles and stays along the roads and in the illage area are to be muffed and the size of the muffing for the steel pole should be 12" x 24" (12" above ground level and 12" below ground level) stay road should be provided with the cement concrete for muffing only metal is to be used and not bricks bats or gravel.

## 6. STRINGING OF CONDUCTOR ONE (I) STRINGING OF BARECONDUCTOR:

Stringing of standard and solid bare copper A.S.S.R of aluminum , conductor includes the erection of necessary H. T and L.T strain and pin insulator as per schedule, jumpering binding, with binding wire anchor , plate joining etc. complete inclusive of providing guard loops on L.T lines. The rate quoted should be per conductor route kilometer inclusive of this to be employed to protect again cuts, Scratches or kinds. The contractor should particularly follow the instruction of engineer in charge while marking jumpers, joints and binding and adoption of sag.

Stringing of V. I. R wires of different sizes wiring from 3/20 to 19/16 should be complete with G.I bearer wire and rell insulator (spaced 3ft) as supports.

## 7. ERECTION OF STAY SET:-

The Erection of stay set may be of A or B type, complete, with stay clamp binding GI wire at either and, turn buckle anchor plate with rod, binding of Guy insulator. The stay shall be erected suitable for local condition. The rate should be quoted for erection of complete set inclusive of excavation of pit and refilling of earth and painting, and using cement blocks supplied by the co.

## 8. EARTHING :-

The earthing device shall be of pipe type as indicated in the pole schedule. The work of earthing must be carried out as per drawing at the place selected by the field engineer. Coke & charcoal powder and salt will have to be produce by the contractor. Erection of earthing should be carried out under the supervision of the representative of the engineer in charge no amount will be paid if the work is not done in accordance with these instruction.

## 9. GUARDING:-

Guard cradle will be provided between HT & LT lines, carried on the same poles, guarding must also be provided when crossing any railway tracks telegraph lines, telephone line and licensees HT LT lines are passing below boards HT line. The for the above comprises fixing of guard cross arm eye bolt the guard cradle consisting of G I main bearer wire and GI binding wire etc complete. The work has to be carried out as per drawing specifically prepared for the purpose. The cradle guard consist of two no. of wire No.8 SWG GI main bearer wire no. 10SWG GI lacing wire inter spaced about 10ft ad art and no. 14 SWG GI wire for binding Guarding for Rly, Crossings is to be carried out as per instruction of Engineer in charge

## 10. Erection of Transformer Sub Station :-

Transformer substation will be of the outdoor type as shown in the drawing and will consist of the following erection

- (i) One 25 to 100 KVA transformer complete with its accessories. The transformer to be repainted with one coat of battleship gray paint of approved make with SIS marking.
- (ii) One Set : of HT Distribution type lighting Arrestors.
- (iii) One set : of LT distribution type lighting arrestors.
- (iv) One distribution box of MS sheet and suitable iron clad three no, LT taken of one no. incoming ironclad triple pole switch with fuse and neutral link fuse carriage and necessary wiring inclusive of 2" to dia GI pipe for incoming leads from transformer side to distribution box and 1" to dia GI pipes for LT take offs with suitable VIR cables.
- (v) Pipe earthing to be provided on either side of the sub station providing earth conductor for lightening arrestors , transformer tank and distribution box with 6S. WG copper conductor. The rate should quoted inclusive of painting (where required ) and transportation and distribution to side from relative stores to the site of erection.





11. Fixing of Street Light Fixtures :-

The street light fixtures of A or B type consist of ¾" GI pipe. This should be properly-fitted with clamps on the poles. The brass holder Brass nipple, reflector are also to be fitted properly, on one end fixture T. W. or synthetic material bush should be provided. The VIR wires should be kept in sufficient length to provide jumpers etc. The height of the fixtures from the ground level should be kept as per the instruction of engineer in charge. The aerial fuse or kit kat fuse should be fixed on the wooden co. which is to be fixed on the pole by clamp and bolts, these shall be supplied by the contractor.

12. Laying of 1 & 3 Service Lines:-

(1) This will consist of overhead VIR line with GI bears wire pipe wiring of batten wiring fixed of I.C. cut outs or switch i.e meter Bard earthing etc. The twin or single core wire available in existing stock should have to be utilized. The GI wire no. 8 or 10 would be provided at equal intervals of suitable size as per drawing. The aerial or kit kat fuse should be provide on the wooden board which is to be fixed on the pole by clamps and bolts and same would be supplied by the contractor sufficient VIR wire should be kept at terminal pole end for jumpering. The GI bearer wire should be connected with main earth wire to get the continuous earthing.

(2) There should not be any joint in service line.

(3) conduct pipe should be fixed in a decent way in the premises of the consumer. Any damage occurring to the premises due to fixing of pipe or taking the service line in to the premises shall be borne by the conductor.

(4) Meter cut outs, pipe should be earthed properly. Earthing clip for earth wire and TW or synthetic material, bush should be inserted in either end or pipe.

(5) The measurement would be taken not as per actual length of line but it will be taken on the projection of the line according ly the payment, would be made

(6) In case of 3 phase the service line would have to be laid up to metering point only and inner will be installed by department. The mental meter box should be fixed up as per directive of engineer in charge.

13. General condition of contract:-

(1) All single pole structure, special structures are fitting of cross arms earthing, etc should be carried out according to standard drawing available for reference in the Boards Divisional office.

(2) The Quantities mentioned in the accompanying schedule are only approximate. Actual quantities may increase decrease according to the local conditions. The Co. reserves the right of revising or deleting any of the quantities to be erected during the execution of the contract and the final quantities actually erected by the contractor will be calculated and paid for the rates given in the contract schedule of rates.

(3) Whenever there is excess work carried out by a contractor beyond the technically sanctioned amount against the work order, the approval for the excess quantity work done should be obtained from the competent authority as per Co. rules

(4) Dakshin Gujarat vij Company Ltd. Does not bind itself to accept the lowest or any lender

(5) Closing down and recommencement of works at all stages must be intimated by the contractor to engineer in charge or vice versa in writing with reasons if any failing which their clais for extension of time limit will not entertained.

(6) The work will have to be carried out as per program laid out by the co. and the contractor should employ proper and competent supervisors who should thoroughly supervises the execution of works by being present on the work site throughout.

(7) No tools will be supplied except jointing dies by the Co. and the contractor should make his own arrangements to get adequate quantities of all Various tools in free of charge order to complete the job within the prescribed period jointing dies will be supplied free of charge.

(8) The contractor shall be supplied except jointing dies by the co. and the contractor should make his own arrangements to get adequate quantities of all Various tools in free of charge order to complete the job within the prescribed period jointing dies will be supplied free of charge

(9) The contractor shall be responsible for breakage loss or theft of materials during transit or erection issued to him from stores till the time the work is handed over to and taken over by the co.

(10) Starting of work and commenced period : The erection work should be commenced within 7 days from the date specified in the order to commence work issued by the executive engineer and should be completed within the prescribed period for each work.

(11) Minimum period of guarantee if during 12 calendar months from the date of handling over charge after completion of work the erected lines are found defective in anyway, the same should be rectified by the contractor.

(12) All the general conditions of the contract to the co. will be applicable to this tender. An agreement is to be signed in the prescribed form.

(13) RA Bill : Bills will be prepared once a month looking to the progress of the work and payment will be made as under :

(a) Running bill may be paid on the work carried out after measurements are recorded upto 80% and on submission of material account by thru contractor.

(b) Final bill for contract will be paid after completion or works and recording measurement and after submission of material account by the contractor.

(14) No material of the co. should be left on thr lines without supervision.

(15) For stringing of aluminum or ACSR conductor aluminum or wooden pulley must be used for supporting the conductor on poles

(16) All conductor earth wire and stay set must be tight

(17) Stay rod must be as per instruction

(18) All the poles must be in plumb

(19) Fabrication fitting on pole must be tight

(20) Generally following span should be kept on HT line

28 ft long pole -300ft

33ft long pole -350ft

(21) All road crossing must be provided with binding arrangement and minimum 22 ft clearance must be kept between conductor and road level

(22) Which executing the stringing work the conductor will have to use proper device for rotating the conductor drum required for unwinding the conductor

(23) The payment through RA bill shall be made only to the extent of 80% of the total value of the work done. The amount so withheld will be released on furnishing by the contractor the material account statement of the relative RA bill

(24) The contractor shall on completion of work prepare & render the final detailed material account of the material received by him from the co. stores within one month from the date of completion of work. If however the contractor does not render the material account a registered AD notice will be issued to him if within ten days from the date of issue of such notice there is no reply from the contractor, the material account will be finalized and recoveries made as per co. account which shall have to be accepted by the contractor, disputes if any raised later shall not be entertained

(25) The contractor is bound to complete the work within the specified period for each work, given by the executive engineer

(26) Priority of work shall be decided by the Executive engineer and contractor shall carry out the work within stipulated period for the order issued by the

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(27) The contractor must have adequate resources and gang of unskilled and skilled persons to undertake the work at different place.

(28) The soil may be hard or normal the tenderer should fill in the rates after seeing the site

## 2.0 Earthing

### 1.0 INSTALLATION SPECIFICATION FOR EARTHING: GENERAL:

All the non-current metal parts of electrical installation (Cables terminals) shall be earthed properly. All metal conduits, trucking, cable sheaths, switchgear, distribution fuse boards, lighting fittings & fixtures and all Various parts made of metal shall be bonded together and connected by means of specified earthing system. All earthing will be conformed to Indian Standard Specifications IS: 3043 – 1987. The bidder shall measure the resistivity of various places in the proposed sub stations and design suitable earthing system and get it approved from DGVCL.

### EARTHING CONDUCTORS:

All earthing conductors shall be of high conductivity G.I./Aluminum/copper and shall be protected against mechanical injury or corrosion.

### CONNECTION OF EARTHING CONDUCTORS:

(i) Main earthing conductors shall be taken from the earth connections at the main switchboards to an earth electrode with which the connection is to be made. Sub- main earthing conductors shall run from the main switchboard to the sub- distribution boards. Final distribution boards earthing conductors shall run from sub- distribution boards.

(ii) Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor or its distribution boards or to an earth leakage circuit breaker. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switchboards at which they originate or Variouswise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of earthing conductor for earthing purposes, even though the run of metallic conduit is earthed.

(iii) All metal clad switches and Various equipment carrying single phase current shall be connected to earth by a single connection. All metal clad switches, carrying medium voltages and high voltage shall be connected with earth by two separate and distinct connections. The earthing conductors inside the building, wherever exposed, shall be properly protected from mechanical injury by running the same in GI pipe of adequate size.

(iv) Earthing conductors, outside the building, shall be laid as per IS motioned above below the finished ground level.

(v) In case of copper earthing strips, the cover lapping at joints (wherever required), shall be of minimum 75 mm. Sweated lugs of adequate capacity and size shall be used for all termination of wires above 6 sq. mm size and bare copper wire above 2.5 mm dia. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and Various oily substance and properly tinned.

(vi) Neutral conductor, sprinkler pipes or pipes conveying gas, water or flammable liquid, structural steel work, metallic enclosures for cables and conductors, metallic conduits and lightning protection stem conductors shall not be used as a means of earthing an installation or even as a link in an earthing system. The electrical resistance of metallic enclosures for cables and conductors measured between earth connections at the main switchboard shall be low enough to permit the passage of current necessary to operate fuse or circuit breakers and shall not exceed one ohm.

### PROTECTION FROM CORROSION:

Connections between copper and galvanized equipment shall be made on vertical face and protected with paint and grease. Galvanized fixing clamps shall be used for fixing earth conductors. When there is evidence that the soil is aggressive to copper, buried earthing conductors shall be protected by suitable serving and sheathing.

### PLATE ELECTRODE EARTHING:

Earthing electrode shall consist of plate, not less than 600 mm x 600 mm x 12 mm thick. The plate electrode shall be buried as far as practicable below permanent moisture level but, in any case, not less than 3 meters below ground level. Wherever possible, earth electrodes shall be located as near the water tap, water drain or near down take pipe. Earth electrodes shall not be installed in proximity to a metal fence. It shall be kept clear of the buildings foundations and in no case it shall be nearer than 2 meters from the outer face of the wall. The earth plate shall be set vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture. 20 mm GI pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a G.I. threaded cap for watering the earth through a pipe. The G.I. cap over the GI pipe shall be housed in a masonry chamber, approximately 300 mm x 300 mm x 300 mm deep. The masonry chamber shall be provided with a cast iron inspection cover resting over a GI frame, embedded in masonry.

### PIPE ELECTRODE EARTHING:

Earthing electrode shall consist of a GI pipe (class B of approved make), not less than 40 mm dia. and 3 meters long. G.I pipe electrode shall be cut tapered at the bottom and provided with holes of 12 mm dia. drilled at 75 mm interval upto 2.5 meters length from bottom. The electrode shall be buried vertically in the ground as far as practicable below permanent moisture level, but in any case not less than 3 mtr. below ground level. The electrode shall be in one piece and no joints shall be allowed in the electrode. Wherever possible, earth electrodes shall be located close to water tap, water drain or a down take pipe. Earth electrode shall not be located in proximity to a metal fence. It shall be kept clear of the building foundations and in no case; it shall be nearer than 2 meters from the outer face of the wall.

The pipe earth electrode shall be kept vertically and surrounded with 150mm thick layer of charcoal dust and salt mixture upto a height of 2.5 meters from the bottom. At the top of the electrode a G.I. threaded cap shall be provided for watering the earth. The main earth conductors shall be connected to the electrode just below the G.I. cap, with proper terminal lugs and check nuts. The G.I. cap over the CL pipe and earth connection shall be housed in a masonry chamber, approximately 300 mm length x 300 mm wide and 300 mm deep. The masonry chamber shall be provided with a cast iron inspection cover resting over a C.I. frame, embedded in masonry.

### COIL TYPE EARTHING:

In this method G.I. wire No.8 SWG is used in coil form instead of G.I.pipe. The pit for earthing may be only 1800mm deep and 600mm section. The G.I.

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earth wire is wound in the form of a coil of 50mm dia. and 450mm length (approx 115 turns) and placed at the bottom end of earth wire embedded in the P.S.C. pole. The surrounding space around the coil upto 350mm dia. is filled up by 300mm alternate layers of salt and coke/charcoal upto 1500mm from the bottom. The top and surrounding remaining space of the pit is filled up with loose earth.

#### EARTH RESISTANCE:

The earth resistivity result of the soil where the earthing stations are located shall be submitted to the engineer-in-charge before the earthing work starts. If the earth resistance is too high and multiple electrode earthing does not give adequate low resistance to earth, the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions as required.

#### RESISTANCE TO EARTH:

The resistance of each earth system shall not exceed 1 ohm in the case of M.V. system and 0.5 ohm in the case of H.V. system. The separate earthing shall be provided for incoming and outgoing cable.

#### v STORAGE AND HANDLING

##### 1) Storage

- (i) The cable drums shall be stored on a well-drained, hard surface, so that the Drums do not sink in the ground causing rot and damage to the cable drums. Paved Surface is preferred, particularly for long term storage.
- (ii) The drums shall always be stored on their flanges, and not on their flat sides.
- (iii) Both ends of the cables especially of PILCA cables should be properly sealed to prevent ingress/ absorption of moisture by the insulation during storage.
- (iv) Protection from rain and sun is preferable for long term storage for all types of cables. There should also ventilation between cable drums.
- (v) During storage, periodical rolling of drums once in, say, 3 months through 90 degrees shall be done, in the case of paper insulated cables. Rolling shall be done in the direction of the arrow marked on the drum.
- (vi) Damaged battens of drums etc. should be replaced as may be necessary.

##### 2) Handling

- (i) When the cable drums have to be moved over short distances, they should be rolled in the direction of the arrow marked on the drum.
- (ii) For manual transportation over long distances, the drum should be mounted on cable drum wheels, strong enough to carry the weight of the drum and pulled by means of ropes. Alternatively, they may be mounted on a trailer or on a suitable mechanical transport.
- (iii) For loading into and unloading from vehicles, a crane or a suitable lifting tackle should be used. Small sized cable drums can also be rolled down carefully on a suitable ramp or rails, for unloading, provided no damage is likely to be caused to the cable or to the drum.

##### 3) Charging of Cable.

It is mandatory for the bidder to test the Main and Spare cable for continuous 72 Hrs at maximum loading condition.

#### 11/22 KV XLPE Cable Jointing Kit & Laying of Cables

#### 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 all items including installation (civil work) 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 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. 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 DGVCL, in the event of an order, free of cost. The cost of logistics will be bear by DGVCL.
7. Please note that the evaluation will be carried out on the strength of content of bid only. No further correspondence will be made.
8. The bidder shall bring out all the technical deviation/s only at the specified annexure.

#### QUALIFYING REQUIREMENT DATA

(For Supply) Bidder to satisfy all the following requirements.

- 1) The major items offered equipment have to be designed, manufactured and tested as per relevant IS/IEC with latest amendments





- 2) The minimum requirement of manufacturing capacity of OEM for offered type, size and rating of equipment shall be 7 times tender / bid quantity. The bidder should indicate manufacturing capacity by submitting latest updated certificate of a Chartered Engineer (CE).
- 3) Equipment proposed shall be of similar or higher rating and in service for a minimum period of two (2) years and satisfactory performance certificate in respect of this is to be available and submitted.
- 4) The bidder should clearly indicate the quantity and Single Value Contract executed during last **five(5)** years, for the offered equipment. Bidder should have executed one single contract during last five years for the quantity equivalent to tender / bid.

The details are to be submitted in following format,

Sr. No	ITEMS SUPPLIED TO	ORDER REFERENCE No. & DATE	ITEMS	QUANTITY	ORDER FULLY EXECUTED. YES/NO	STATUS, IF ORDER UNDER EXECUTION	REMARK
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5) Equipment offered shall have Type Test Certificates from Govt approved/accredited laboratory (accredited based on ISO/IEC Guide 25 / 17025 or EN 45001 by the National accreditation body of the country where laboratory is located), as per IEC / IS / technical specification. All the required type tests should not be older than 5 (five) years from the date of opening of technical bid.

#### TECHNICAL SPECIFICATION

#### TERMINATION KIT

#### FOR 11/22 KV XLPE POWER CABLE

#### SECTION - I

##### 1.11 Termination:

The 11/22 kV cable termination/joints shall be done by skilled and experienced jointers duly approved by the Engineer in charge. Termination including supply of jointing kit is included in the contractor's scope unless specified otherwise.

Termination kits shall be suitable for termination of the cables to indoor switchgear or to weather proof cable end box of an outdoor mounted transformer an outdoor type for termination at poles. The terminating kits shall preferably be as of the following types.

Heat shrink type of approved make of DGVCL as mentioned in approved make list in section 5.0(Technical specification) using factory molded silicone rubber insulators. For outdoor installations weather shields, shielding ends and any other accessories required should form part of the kit.

Straight through jointing kits shall be suitable for underground installation with uncontrolled backfill and possibility of flooding by water. The jointing kit shall be preferably of PUSH ON/Heat shrink type of approved make of DGVCL as mentioned in approved make list in section 5.0(Technical specification)

Fixing of end termination & straight through joints.

- (i) Contractor should clarify the make of cable end termination and straight through joint. The heat & shrink type end termination & straight through joints shall be utilized for the job.
- (ii) Dual wall molded type should be available in straight through joint.
- (iii) After completing work of cable laying end termination straight through joints, following test shall be carried out jointly by engineer in charge of DGVCL and contractor.
- (iv) Insulation resistance test before & after with 5 KV insulation tester. (A) Hypo test
- (v) Contractor has to furnish Guaranteed Technical Parameters (GTP) type test certificate of various tests conducted at any Govt./ NABL approved laboratory for the joints they intend to supply for this job. The test certificate should not be prior to 5 years from the date of tender. The contractor shall have to submit the same with technical bid and failure in which technical bid will be disqualified & the price bid of that party will not be opened.
- (vi) One competent skilled supervisor shall have to co-ordinate the site authority and he has to do all communication with engineer in charge of DGVCL.
- (vii) It is essential to have suppliers certificate of training for cable jointing of cable jointer.
- (viii) Jointer has to ensure safety while making joints so that other nearby cables will not be damaged.
- (ix) Before using Termination Kit & Jointing Kit should be got verified at SUB-DIV level. The bidder has to get verification certificate from D.E. (O&M) for the works to be carried out in their jurisdiction.
- (x) Bidder shall offer guarantee for all part of Termination Kit & Jointing Kit for a period of 2 Years from the date of charging the Termination Kit. In the event of failure of Kit due to manufacturing defect during guarantee period, bidder shall have to replace it at no extra cost within 24 hrs on intimation.
- (xi) The bidder shall get each end termination kits & straight through joint kit verified before utilization of the same from the concern D.E. of s/dn office matching with original invoice submitted & sample approved by concern sub-division level and M.O.M. of verification to that effect shall be submitted while submitting the bills.

2 The Bidder shall have to supply cable end joint / straight joint kit as per IS 13573-1992 with latest amendment No. 2, 1998 IEEE 48-1990 and shall be Class -1, ESI-09-13 performance specification for high voltage cable accessories.

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**3** The work of laying of cable along the road / road crossing to be carried out by Horizontal Drilling Machine / Auger boring machine enclosed in HDPE Pipe only.

**CLASS OF TERMINATION:**

The XLPE 11/22 KV Link Line shall be class 1 termination as per appropriate ISI code nos. i.e. IEEE-48-1990.

**APPLICABLE STANDARDS:**

IS 13573-1992 with latest amendment – Latest amendment No. 2, 1998. IEEE 48-1990. The termination shall be Class 1. ESI-09-13 performance specification for high voltage cable accessories. The cable accessories being supplied in the form of kit which has different components to be assembled at site.

**MATERIALS:**

The term 11 KV / 22 KV XLPE Cable refers to extruded or Molded Polymeric. Polymeric material which are cross linked by gamma radiation to develop elastic memory and supplied in an expanded or otherwise deformed size and shape. Bidders should submit the proof that the tubes are cross linked by gamma radiations. However chemically cross linked, crotch seal and lug seals are permitted.

For straight joints, the insulation over the ferrules should be reinsulated by dual wall tubing. This should have an inner insulating layer vulcanized to an outer semi-conducting layer. This is required to ensure reconnection of cable insulation screen of the core from one end of the joint to the other. The dual wall tubing ensures that there is no entrapment of air pockets between the insulating and semi-conducting layers.

**FOR JOINTS:**

11 KV / 22 KV XLPE underground flexible polymeric tubing, preferably black colored pre coated with adhesive shall be provided for sealing the exposed metallic sheaths and sheath/earth connections.

**PROVISION OF ADDITIONAL CREEPAGE INDOOR / OUTDOOR TERMINATIONS:**

Single piece, 11/22 KV XLPE underground cable, weather sheds having non-tracking, erosion and weather resistant properties shall be supplied with the kits for application over non-tracking tubing. The quantity of sheds to be supplied shall depend on voltage grade and indoor/outdoor application and shall be indicated along with offer. Each shed shall give an additional creepage length of at least 100mm.

**INSULATION AND SCREEN REINSTATEMENT FOR JOINTS:**

The reinstatement of insulation shall be by means of heat shrinkable, flexible, polymeric tubing made from a discharge resistant polymer, preferably colored red. The tubing after complete recovery shall have a minimum wall thickness to ensure provisions of adequate insulation in step.

**EARTH & SCREEN CONTINUITY FOR TERMINATION & JOINTS:**

Screen continuity by using tinned copper mesh and earth continuity by using tinned copper braids of appropriate size shall be provided for transfer of screen/earth in straight through joints. In termination, tinned copper braids of appropriate size or equivalent current carrying capacity of cable conductor along with copper lugs of appropriate size shall be provided for continuity of screen to armour to the earth.

**LUGS & FERRULES:**

The requisite number and type of aluminum/ copper lugs/ferrules shall be provided for termination/joints. The Lugs and ferrules for XLPE cables shall be crimping type suitable for compacted circular conductor having two nos. of holes.

**TECHNICAL SPECIFICATION**

FOR Laying, testing & Commissioning of 11 KV underground cable (Cable to be supplied by DGVCL and jointing kits to be supplied by the Contractor) in Surat, Valsad & Bharuch Circles under jurisdiction of DGVCL.

**1.11.1 Tests:**

Before energizing the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground with 2.5/5 kV Megger both before and after backfilling.

D.C High voltage 18 kV for 11 KV & as per IS for 22KV test shall be conducted after installation on the following and test results to be recorded as per DGVCL format in presence of Engineer in charge.

a)

Type tests are to be carried out at manufacturer's works for quality approval of termination/jointing kits. Following tests confirming to the latest IS 13573 and or IEC 502.2, 466 and VDE 0278 and C 81 specifications. The report of last three years type tests result shall be submitted for approval of the Kits. Terminations shall be kept open so that switchgears, transformers etc are not subjected to test voltage.

Tests for termination/jointing kits:

Indoor & Joint IS 13573
1) Conductor Resistance Test

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2) Impact Test
3) AC High Voltage Test ( Dry )
4) Partial Discharge Test
5) Impulse with stand test
6) AC Voltage life test with cyclic current loading
7) Partial Discharge Test
8) AC Voltage life test with cyclic current loading
9) Thermal Short circuit test
10) AC Voltage life test with cyclic current loading
11) Conductor Resistance Test
12) Impulse with stand test
13) D.C.High Voltage test

Out Door IS 13573
1) Conductor Resistance Test
2) AC High Voltage Test ( Dry )
3) Wet Power frequency test
4) Partial Discharge Test
5) Impulse with stand test
6) AC Voltage life test with cyclic current loading
7) Partial Discharge Test
8) AC Voltage life test with cyclic current loading
9) Thermal Short circuit test
10) AC Voltage life test with cyclic current loading
11) Water Tightness Test for Out door
12) Conductor Resistance Test
13) Impulse with stand test
14) D.C.High Voltage test

Indoor as per VDE 0278
1) Partial Discharge Test
2) Partial Discharge Test
3) Conductor Resistance Test
4) Partial Discharge Test
5) AC High Voltage Test ( Dry )
6) Tan Delta as a Function of Voltage & Capacitance.
7) Tan Delta as a Function of temperature
8) Impulse with stand test



9) AC Voltage life test with cyclic current loading
10) Partial Discharge Test
11) Tan Delta as a Function of Voltage & Capacitance.
12) AC Voltage life test with cyclic current loading
13) Thermal Short circuit test
14) AC Voltage life test with cyclic current loading
15) Partial Discharge Test
16) Conductor Resistance Test
17) Impulse with stand test
18) D.C.High Voltage test

Outdoor Termination VDE 0278
1) Partial Discharge Test
2) Partial Discharge Test
3) Conductor Resistance Test
4) Impact Test
5) Wet power frequency AC High Voltage Test
6) Partial Discharge Test
7) Tan Delta as a Function of Voltage & Capacitance.
8) Tan Delta as a Function of temperature
9) Impulse with stand test
10) AC Voltage life test with cyclic current loading
11) Partial Discharge Test
12) Tan Delta as a Function of Voltage & Capacitance.
13) AC Voltage life test with cyclic current loading
14) Short circuit test
15) AC Voltage life test with cyclic current loading
16) Conductor Resistance Test
17) Impulse with stand test
18) D.C.High Voltage test
19) Dynamic short circuit
20) Impulse with stand test
21) D.C.High Voltage test

As per C - 81



1) Impact Test
2) Insulation Resistance Test
3) A.C High Voltage Test
4) Insulation Resistance Test
5) Heat shock Test
Test after Heat shock Test
6) Insulation Resistance Test
7) A.C High Voltage Test
8) Insulation Resistance Test
9) Electric Heat cycle Test
Evaluation after Electrical heat cycle Test
10) Insulation Resistance Test
11) A.C High Voltage Test
12) Insulation Resistance Test
After Sheath Damage Test
13) Electric Heat cycle Test
Evaluation after Electrical heat cycle Test & sheath damage
14) Insulation Resistance Test
15) A.C High Voltage Test
16) Insulation Resistance Test
17) Examination Of Joint

## 1.12 TECHNICAL AND GUARANTEED PARTICULARS:

The bidder shall furnish all Guaranteed Technical Particulars, as called for, in Appendix - I of this Specification. Particulars, which are subject to guarantee, shall be clearly identified. Offer not containing these in formations will not be considered for acceptance.

## 1.13 PERFORMANCE CERTIFICATE:

Bidders shall also submit performance reports for the specified size of cables supplied to other State Electricity Boards / reputed firms, with the clear indication of the period since when the cables performed satisfactory service.

## 1.14 LEGIBLE SUBMISSION:

Only required relevant, legible documents shall be submitted to avoid delay due to back reference.





## GUARANTEED TECHNICAL PARTICULARS

## HEAT SHRINK OUT DOOR TERMINATION ON 11KV (E) XLPE CABLE

Sr. No	Particulars	Unit	Guaranteed values.
1.0	MANUFACTURER		
2.0	APPLICABLE STANDARDS		As per IS:13573
3.0	GUARANTEED PARTICULARS		
3.1	For the nominal(phase to phase) System voltages Maximum system voltage	KV  KV	11KV  12KV
3.2	A.C. withstand voltage Dry (ph/ground) Time duration	KV Mins	35 KV  1 Min
	A.C. withstand voltage Wet(ph/ground) Time duration	KV Mins	28 KV  1 Min
3.3	Partial Discharge at 2 Vo	pC	<5pC
3.4	Impulse withstand,1.2/50/Us	kV	75KV
3.5	Load cycle Test  a)Each Cycle-Heating Duration Temperature Cooling Duration b)Number of Cycles c)Continuous phase to ground Voltage Withstand	Hrs  0C Hrs.  kV	5  100  3  117  2.5Uo
3.6	Leak Tightness		9 Cycles.

3.7	Thermal Withstand Short circuit current 1Sec.	ka	As per IS:13573
3.8	Dynamic short circuit Withstand	Ka peak	2.55 x Is As per IS:13573
3.9	DC Voltage	kV	48Kv for 30Mins.
4.0	KIT PARTICULARS		
4.1	Material of the tubing/molded parts		Polyolefin



4.2	Method of stress control		High permittivity Material.
4.3	Method of environmental seal		H.S. Anti-tracking Tubes.
4.4	Allowable Kit storage Temperature	0C	Normal Ambient Temperature.
4.5	Shelf life of H.S components	Years	More than 5 Years.
5.0	Cable Termination Instruction Manuals	Yes/No	Yes

## GUARANTEED TECHNICAL PARTICULARS

## HEAT SHRINK STRAIGHT THROUGH JOINT ON 11KV (E) XLPE CABLE

Sr. No.	Particulars	Unit	Guaranteed values.
1.0	MANUFACTURER		
2.0	APPLICABLE STANDARDS		As per IS:13573
3.0	GUARANTEED PARTICULARS  For the nominal(phase to phase) System voltages Maximum system voltage	KV	11KV
		KV	12KV
3.1	A.C. withstand voltage Dry (ph/ground) Time duration	KV Mins	35 KV 1 Min.
	A.C. withstand voltage Wet(ph/ground) Time duration	KV Mins	28 KV 1 Min.



3.2	Partial Discharge at 2 U <sub>0</sub>	pC	<5pC
3.3	Impulse withstand, 1.2/50/Us	kV	75KV
3.4	Load cycle Test a) Each Cycle-Heating Duration Temperature Cooling Duration b) Number of Cycles c) Continuous phase to ground Voltage Withstand	Hrs 0C Hrs.  kV	5 100 3 63 2.5U <sub>0</sub>
	Water tightness test	KV	60Nos.at 2.5 U <sub>0</sub> . as per above cycles.

3.5	Thermal Withstand Short circuit current 1Sec.	ka	As per IS:13573
3.6	Dynamic short circuit Withstand	Ka peak	2.55 x Is As per IS:13573
3.7	DC Voltage	kV	48Kv for 30Mins
4.0	KIT PARTICULARS		
4.1	Material of the tubing/molded parts		Polyolefin.
4.2	Method of stress control		High permittivity Material.
4.3	Method of environmental seal		H.S. Black Insulating Tubes.
4.4	List of items included in the Kit a) For Terminations b) Allowable kit storage temperature c) Kit shelf life	Yes/No  0C Years	Yes Normal Ambient Temperature More than 5 Years
5.0	Cable Termination Instruction Manuals	Yes/No	Yes



## GUARANTEED TECHNICAL PARTICULARS

## HEAT SHRINK OUT DOOR TERMINATION ON 22KV (E) XLPE CABLE

Sr. No	Particulars	Unit	Guaranteed values.
1.0	MANUFACTURER		
2.0	APPLICABLE STANDARDS		As per IS:13573
3.0	GUARANTEED PARTICULARS		
3.1	For the nominal(phase to phase) System voltages Maximum system voltage	KV	22 KV
		KV	24 KV
3.2	A.C. withstand voltage Dry (ph/ground) Time duration	KV Mins	55 KV 1 Min
	A.C. withstand voltage Wet(ph/ground) Time duration	KV Mins	50 KV 1 Min
3.3	Partial Discharge at 2 Vo	pC	<5pC
3.4	Impulse withstand,1.2/50/Us	kV	125KV
3.5	Load cycle Test a)Each Cycle-Heating Duration Temperature Cooling Duration b)Number of Cycles c)Continuous phase to ground Voltage Withstand	Hrs 0C Hrs. kV	5 100 3 117 2.5Uo
3.6	Leak Tightness		9 Cycles.

3.7	Thermal Withstand Short circuit current 1Sec.	ka	As per IS:13573
3.8	Dynamic short circuit Withstand	Ka peak	2.55 x Is As per IS:13573
3.9	DC Voltage	kV	96 Kv for 30Mins.



4.0	KIT PARTICULARS		
4.1	Material of the tubing/molded parts		Polyolefin
4.2	Method of stress control		High permittivity Material.
4.3	Method of environmental seal		H.S. Anti-tracking Tubes.
4.4	Allowable Kit storage Temperature	0C	Normal Ambient Temperature.
4.5	Shelf life of H.S components	Years	More than 5 Years.
5.0	Cable Termination Instruction Manuals	Yes/No	Yes

## GUARANTEED TECHNICAL PARTICULARS

## HEAT SHRINK STRAIGHT THROUGH JOINT ON 22KV (E) XLPE CABLE

Sr. No.	Particulars	Unit	Guaranteed values.
1.0	MANUFACTURER		
2.0	APPLICABLE STANDARDS		As per IS:13573
3.0	GUARANTEED PARTICULARS  For the nominal(phase to phase) System voltages Maximum system voltage	KV	22 KV
		KV	24 KV
3.1	A.C. withstand voltage Dry (ph/ground) Time duration	KV Mins	55 KV  1 Min.





	A.C. withstand voltage Wet(ph/ground) Time duration	KV Mins	55 KV 1 Min.
3.2	Partial Discharge at 2 U <sub>0</sub>	pC	<5pC
3.3	Impulse withstand,1.2/50/Us	kV	125KV
3.4	Load cycle Test a)Each Cycle-Heating Duration Temperature Cooling Duration b)Number of Cycles c)Continuous phase to ground Voltage Withstand	Hrs 0C Hrs.  kV	5 100 3 63 2.5U <sub>0</sub>
	Water tightness test	KV	60Nos.at 2.5 U <sub>0</sub> . as per above cycles.

3.5	Thermal Withstand Short circuit current 1Sec.	ka	As per IS:13573
3.6	Dynamic short circuit Withstand	Ka peak	2.55 x Is As per IS:13573
3.7	DC Voltage	kV	48Kv for 30Mins
4.0	KIT PARTICULARS		
4.1	Material of the tubing/molded parts		Polyolefin.
4.2	Method of stress control		High permittivity Material.
4.3	Method of environmental seal		H.S. Black Insulating Tubes.
4.4	List of items included in the Kit a)For Terminations b)Allowable kit storage temperature c)Kit shelf life	Yes/No  0C Years	Yes Normal Ambient Temperature More then 5 Years
5.0	Cable Termination Instruction Manuals	Yes/No	Yes

Signature of the Bidder:

Name:

Designation:

Date:

Authorized common rubber

Stamp / seal of the bidder:



### 3.0 Cable Trench

#### CABLE TRENCH:

##### TECHNICAL SPECIFICATION FOR 11/22 KV XLPE UNDERGROUND CABLE.

This specification lays down the material properties. Performance requirement of 11/22 KV XLPE Cable termination and jointing system for use on electrical systems operating at voltage 11/22KV (i.e. voltage at which the cable termination kit is meant for).

#### 3.2 Route

Before the cable laying work is undertaken, the route of the cable shall be decided by the Engineer-in-Charge considering the following.

- (i) While the shortest practicable route should be preferred, the cable route shall generally follow fixed developments such as roads, foot paths etc. with proper offsets so that future maintenance, identification etc. are rendered easy. Cross country run merely to shorten the route length shall not be adopted.
- (ii) Cable route shall be planned away from drains and near the property, especially in the case of LV/MV cables, subject to any special local requirements that may have to be necessarily complied with.
- (iii) As far as possible, the alignment of the cable route shall be decided after taking into consideration the present and likely future requirements of other services including cables enroute, possibility of widening of roads/lanes etc.
- (iv) Corrosive soils, ground surrounding sewage effluent etc. shall be avoided for the routes.

#### (v) Route of cables of different voltages.

- (a) Whenever cables are laid along well demarcated or established roads, the LV/MV cables shall be laid farther from the kerb line than HV cables.
- (b) Cables of different voltages, and also power and control cables shall be kept in different trenches with adequate separation. Where available space is restricted such that this requirement cannot be met, LV/MV cables shall be laid above HV cables.
- (c) Where cables cross one another, the cable of higher voltage shall be laid at a lower level than the cable of lower voltage.

#### 3.3 Proximity to communication cables

Power and communication cables shall as far as possible cross each other at right angles. The horizontal and vertical clearances between them shall not be less than 60cm.

#### 3.4 Railway crossing

Cables under railway tracks shall be laid in spun reinforced concrete, or cast iron or steel pipes at such depths as may be specified by the railway authorities, but not less than 1m, measured from the bottom of the sleepers to the top of the pipe. Inside railway station limits, pipes shall be laid upto the point of the railway station limits, pipes shall be laid upto a minimum distance of 3m from the centre of the nearest track on either side.

#### 3.5 Way Leave

Way leave for the cable route shall be obtained as necessary, from the appropriate authorities, such as, Municipal authorities, Department of telecommunication, Gas Works, Railways, Civil Aviation authorities, Owners of properties etc. In case of private property, Section 12/51 of the Indian Electricity Act shall be complied with.

#### 3.6 Methods of laying

The cables shall be laid direct in ground, pipe, closed or open ducts, cable trays or on surface of wall etc. The method(s) of laying required shall be specified in the tender schedule of work.

#### 3.7 Laying direct in ground

##### 3.7.1 General

This method shall be adopted where the cable route is through open ground, along roads/lanes, etc. and where no frequent excavations are likely to be encountered and where re-excavation is easily possible without affecting other services.

##### i. EXCAVATION OF TRENCH

The Contractor shall have to dig the trench for 1200 mm depth and 400 mm width (for single cable) & 600 mm width (for double cable) as per instruction of Engineer-in-charge. For 600 mm width, trench length will be considered as one & half (1½) times the length for 400 mm width and payment shall be made accordingly as per DGVCL Drawing. Cable trench must be excavate manually (without machine) as there is many utility. Bidder is responsible to excavate cable trench for any type of soil and any type of Pakka Road as per Scheduled-B specification.

##### li Laying of cable in trench

#### LAYING OF XLPE CABLE IN TRENCH AND REFILLING OF TRENCH:

In cable trench each sand layer shall be prepared for 100 mm thick & 11 kV / 22 kV XLPE Cable of size up to 185/240 mm<sup>2</sup>. to be laid on sand layer covering the cable with 150 mm Inner diameter x 25 mm thick, 200 mm outer dia. and 1.0 meter long RCC half round muffs (to be supplied by contractor) and refilling the same, as per Instruction of Engineer-in-charge.

#### 1.6 . Erection Specifications for Cable lying:

##### 1.6.1 Scope



Scope includes installation, testing and commissioning of the cable system.

1.6.2 Standards:

The work shall be carried out by the best workmen with confirmation with this specification, codes of practice of Indian Standards Institution, approved drawings and instructions of Engineer in charge or authorized representative. In case of any conflict between the standards, the instructions of Engineer in charge shall be binding.

1.6.3 Cable laying:

1.6.3.1 Cables as far as possible shall be laid in complete, uncut lengths from one termination to the other.

1.6.3.2 Cables shall be properly arranged in the cable tray such that cross crossing is avoided and final take off to the switchgear is facilitated. Contractors are responsible for arrangement of cables in cable trench.

1.6.3.3 Temporary ends if any shall be protected against dirt and moisture and prevents damage to the insulation. Proper PVC or rubber insulating tape shall be used. Use of friction type or fabric tape is not permitted. Lead sheathed cables shall be plumbed with lead alloy.

1.6.3.4 Cables shall be handled carefully during installation to prevent damage to the cables. Protective pipes shall be used as and when required as directed.

1.6.3.5 Insulation resistance test of all the cables shall be taken in presence of Engineer in charge. Defective cables shall be immediately replaced before laying of cables of other groups.

1.6.3.6 Suitable GI/HDPE/RCC hume pipes for protection as directed shall be provided as required. Cable ends shall be carefully drawn through such pipes to prevent damage to the cable. Radius at bending shall not be less than the recommended bending radius of the cables specified by the manufacturer. Standard gauge of pipe filling shall be used for sizing the pipe.

After installation and testing of cables, conduit ends shall be plugged with a suitable weather proof plastic compound/ putty for sealing purpose as directed. No extra payments shall be allowed for the laying.

1.6.3.7 Prior approvals for cutting holes for laying cable in existing structures and foundations shall be obtained from the Engineer in charge.

1.6.3.8 At road/railway/canal crossing where cable enters pipe sleeves adequate bed of sand shall be given so that the cable do not slack and get damaged by pipe ends.

1.6.3.9 Drum number shall be recorded for each cable in cable schedule. Cables shall be routed so that they are not subjected to heat from adjacent hot piping and vessels.

1.6.3.10 Appropriate support shall be provided to prevent sagging of cable as per cable trench drawing.

1.6.3.11 Supporting angles for cables shall be suitably clamped/tied by means of nylon cords.

1.6.3.12 The identification marker shall be placed on each cable at every 2 Mtrs intervals and at every cable joint locations, of adequate size fabricated from 3 mm thick, 25 mm wide aluminum strip. The marker shall be tied by nylon string with cable. The marker shall be embossed by letter as stated below as applicable.

DGVCL- 22/11 KV – Name of feeder, Depth of cable –mtr

**ERECTING XLPE CABLE ON D.P. STRUCTURE**

The XLPE cable shall be erected on DP structure in such a manner that cable should be 8 meters above ground level in 110mm O.D. and 6.11 kg/Cm<sup>2</sup>, Class-4, Green color with thickness of 8.5 mm conforms to the specification for HDPE pipes as per IS 4984 - 1987 (3rd revision) (110mm dia, 3000 mm in length) and HDPE should be erected 300 mm below ground level and 2700 mm above ground level.

I. The XLPE cable should be clamped on DP structure with proper polymer clits. The material shall be supplied by contractor.

**EARTHING OF CABLES ON D P STRUCTURE**

Pipe type earthing should be provided & fixed from 80 mm dia class-B GI pipe with pit to be filled with salt & coke and construction of chamber as per drawing attached and cable. All materials including joining of cable with earth pit pipe by providing 25mm width G.I. strip will be supplied by bidder.

The drawing is attached.

**(ii) Testing before laying**

All the time of issue of cables for laying, the cables shall be tested for continuity and insulation resistance

(iii) The cable drum shall be properly mounted on jacks, or on a cable wheel at a suitable location, making sure that the spindle, jack etc. are strong enough to carry the weight of the drum without failure, and that the spindle is horizontal in the bearings so as to prevent the drum creeping to one side while rotating.

(iv) The cable shall be pulled over on rollers in the trench steadily and uniformly without jerks and strain. The entire cable length shall as far as possible be laid off in one stretch

(v) After the cable has been so uncoiled, it shall be lifted slightly over the rollers beginning from one end and by helpers standing about 10m apart and drawn straight. The cable shall then be lifted off the rollers and laid in a reasonably straight line.

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(vi) Testing before covering

The cables shall be tested for continuity of cores and insulation resistance and the cable length shall be measured, before closing the trench.

(vii) Extra loop cable

(a) At the time of original installation, approximately 3m of surplus cable shall be left on each terminal end of the cable and on each side of the underground joints. The surplus cable shall be left in the form of a loop. Where there are long runs of cables such loose cable may be left at suitable intervals as specified by the Engineer-in-Charge.

(b) Where it may not be practically possible to provide separation between cables when forming loops of a number of cables as in the case of cables emanating from a substation, measurement shall be made only to the extent of actual volume of excavation, sand filling etc. and paid for accordingly.

(ix) Mechanical protection over the covering

(a) Mechanical protection to cables shall be laid over the covering as below to provide warning to future excavators of the presence of the cable and also to protect the cable against accidental mechanical damage by pick-axe blows etc.

(b) covering the cable with 150 mm inner dia, 25 mm thick 1.0 meter long RCC half round muffs & refilling same as per instruction of EIC .  
(Necessary material to be supplied by bidder)

3.9. Back filling

(i) The trenches shall be then back-filled with excavated earth, free from stones or other sharp ended debris and shall be rammed and watered, if necessary in successive layers

(iii) The temporary re-statements of roadways should be inspected at regular intervals, particularly during wet weather and settlements should be made good by further filling as may be required.

(iv) After the subsidence has ceased, trenches cut through roadways or other paved areas shall be restored to the same density and materials as the surrounding area and –re-paved in accordance with the relevant building specifications to the satisfaction of the Engineer-in-Charge.

(v) Where road beams or lawns have been cut out of necessity, or kerb stones displaced, the same shall be repaired and made good, except for turfing /asphalting, to the satisfaction of the Engineer-in-Charge and all the surplus earth or rock shall be removed to places as specified 3.10

CHARGING OF CABLE:

It is mandatory for the bidder to test the Main and Spare cable for continuous 72 Hrs. at maximum loading condition.

3.11 JOINTING

3.11.1 Joints pits

(i) Joint pits shall be of sufficient dimensions as to allow easy and comfortable working. The sides of the pit shall be well protected from loose earth falling into it. It shall also be covered by a tarpaulin to prevent dust and other foreign matter being blown on the exposed joints and jointing materials.

(ii) Sufficient ventilation shall be provided during jointing operation in order to disperse fumes given out by fluxing.

3.11.2 Safety precaution

(i) A caution board indicating "CAUTION – CABLE JOINTING WORK IN PROGRESS" shall be displayed to warn the public and traffic where necessary.

(ii) Before jointing is commenced, all safety precautions like isolation, discharging, earthing, display of caution board on the controlling switchgear etc. shall be taken to ensure that the cable would not be inadvertently charged from live supply. Metallic armour and external metallic bonding shall be connected to earth. Where "Permit to work" system is in vogue, safety procedures prescribed shall be complied with.

3.11.3 Jointing materials

(i) Jointing materials and accessories like conductor ferrules, solder, flux, insulating and protective tapes, filling compound, jointing boxes, heat shrinking joint kit etc. of right quality and correct sizes, conforming to relevant Indian Standards, wherever they exist, shall be used.

(ii) The design of the joint box and the composition of the filling compound shall be such as to provide an effective sealing against entry of moisture in addition to affording proper electrical characteristic to joints.

(iii) .The heat shrinkable straight joint of approved make is to be used. The storage as well as jointing instructions of the manufacturer of such materials shall be strictly followed.

3.11.4 Joints

Jointing work shall be carried out by a licensed/ experienced (where there is no licensing system for jointers) cable jointer.

3.11.5 Cable work with joints

(i) About 3m long surplus cable shall be left on each side of joints.

(ii) Insulation resistance of cables to be jointed shall be tested. Unless the insulation resistance values are satisfactory, jointing shall not be done.

(iii) Cores of the cables must be properly identified before jointing.

(iv) Where cable is to be jointed with the existing cable, the sequence should be so arranged as to avoid crossing of cores while jointing.

(v) Whenever the aluminium conductor is exposed to outside atmosphere, a highly tenacious oxide film is formed which makes the soldering of aluminium conductor difficult. This oxide film should be removed by using appropriate type of flux.

(vi) The clamps for the armour shall be clean and tight.

3.9.6 Jointing procedure

While it would be necessary to follow strictly the instructions for jointing furnished by the manufacturers of cables and joint kits.

3.12 TESTING

3.12.1 Testing before laying

All cables, before laying, shall be tested with a 2500/5000V megger for 11 KV/22 Cables .. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance from conductors to earth / armour and between conductors.

3.12.2 Testing after laying

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(ii) The cable is to be tested for one minute with 2500/5000 V megger for 11KV/22 KV cables.

#### HDPE PIPE

Bidder has to submit the type test reports/certificates of HDPE pipes from NABL approved laboratory or CIPET and same should be of size: 110mm O.D. and 6.11 KG/Cm<sup>2</sup> (0.6 Mpa), Class - 4, Green color with thickness of 8.5 mm confirms to the specification for HDPE pipes as per IS 4984 - 1987 (3rd revision) for laying of 11/22KV XLPE cable of size up to 185/240 mm<sup>2</sup> size on the erected DP structure for the mechanical protection of cable by inserting the cable inside HDPE pipe. The HDPE pipe shall be erected in such a way that 300mm shall be below the ground level and the rest 2700 mm shall be supported on the DP Structure Fixing with polymer clits.

The sample of HDPE pipe shall be get approved at concern (sub-division level prior to commence supply of HDPE pipe. The testing certificate & type test certificate of HDPE pipe shall be submitted at the time of passing of bills.

The lot wise inspection of sample randomly selected from the lot of HDPE pipe is to be carried out at NABL approved testing LAB/CIPET prior to supply of HDPE pipe and then work for HDPE vertical laying/HDD work is to be executed.

HDPE Pipe of 110mm O.D. and 6.11 kg/Cm<sup>2</sup> (0.6 Mpa), Class - 4, Green color with thickness of 8.5 mm confirms to the specification for HDPE pipes as per IS 4984 - 1987 (3rd revision) for laying of underground 11/22KV XLPE cable

#### LIST OF APPROVED MAKES OF EQUIPMENTS AND ACCESSORIES FOR PROPOSED TURNKEY PROJECT

Sr. No.	Particulars	Makes /Suppliers
1	Termination & Jointing Kit	Raychem, Bensons, Densons , M-seal (3M), and equivalent to ISI Mark
2	G.I. Pipes	Tisco, Sail, Damodar, Zenith & Shivdurg and equivalent to ISI Mark





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