



ODISHA POWER TRANSMISSION CORPORATION LIMITED

Name of the work :

Engineering, Supply, Erection and Commissioning of 2 No.s 33KV Outgoing Feeder bays at 220/33KV GIS Substation, Godisahi (IDCO Industrial Complex, Ramdashpur)

VOL-II-SECTION-I

SCOPE OF WORKS

NIT NO.CPC-44/2022-23
TENDER SPECIFICATION NO.
SR.GM-CPC-II-E-TENDER-BAY EXTN GODISAH-
44/2022-23

IMPORTANT NOTE

THE BIDDERS ARE ADVISED TO VISIT THE SITE BEFORE QUOTING THE BID. THEY SHALL ASCERTAIN ALL THE AVAILABLE DATA FOR TURNKEY COMPLETION OF THE SUBSTATION, BAY EXTENSION AND ASSOCIATED TRANSMISSION LINES SUCH AS:-

- 1. THE LOCATION OF THE PROPOSED SITE FOR SUB-STATION AND ROUTE FOR TRANSMISSION LINE**
- 2. SOIL BEARING CAPABILITY.**
- 3. BENCHING AND FILLING FOR SITE LEVELLING.**
- 4. TYPE OF STRUCTURES FOR BOTH LINE & SUBSTATION.**
- 5. QUANTITY OF MATERIALS/STRUCTURES/EQUIPMENT.**
- 6. TYPE OF FOUNDATIONS FOR LINE TOWERS & SUB STATION EQUIPMENT/STRUCTURES.**
- 7. LENGTH & TYPE OF THE BOUNDARY WALL, FENCING AND ROADS.**
- 8. ANY OTHER DATA REQUIRED FOR DESIGNING THE LINE & SUBSTATION.**
- 9. ANY VARIATION IN QUANTITY WITH RESPECT TO THE BPS/BOQ SHALL BE DEALT WITH AS PER CLAUSE 21.0 “DEVIATION TO THE SCOPE OF WORKS” IN SBD OF VOL-1 OF THE BID DOCUMENT.**

SCOPE OF WORK:-

1. General

The Employer OPTCL (M/S ODISHA POWER TRANSMISSION CORPORATION LIMITED) is strengthening their Transmission and Distribution systems by way of constructing the following bay extensions at Sub-station.

e- TENDER NOTICE No.: CPC-44/2022-23:

Engineering, Supply, Erection and Commissioning of 2 No.s 33KV Outgoing Feeder bays at 220/33KV GIS Substation, Godisahi (IDCO Industrial Complex, Ramdashpur) on “EPC/ Turnkey CONTRACT BASIS”

The State Capital Region Improvement of Power System (SCRIPS) Project is exclusively funded by Govt. of Odisha for Bhubaneswar and Cuttack twin cities. Therefore Construction of 2 No.s 33KV Outgoing Feeder bays at 220/33KV GIS Substation, Godisahi (IDCO Industrial Complex, Ramdashpur) have been proposed for a strong electrical network in and around smart city Bhubaneswar for a stable and quality power supply.

NOTE: The scope is exclusively pertaining to Bay extension work at GIS Grid Stations only & refer the price schedule (VIIA & VIIB) for the above projects. There is no transmission line work in the present scope of the projects..

The indicative layout diagram & SLD of the proposed sub-station are enclosed *in the drawing folder in Vol-II*. The works are to be carried out on **EPC/Turnkey CONTRACT BASIS** till final commissioning of substation and associated line, its testing, commissioning and handing over the same to the owner.

The scope of the work includes:-

- (i) Bidders are requested to visit the site before quoting the bid. The scope of work is not limiting to the respective bidding proposal sheet (BPS, Price schedule).
- (ii) In Case any work, which is not included in the BPS, but required for completion of project, to be decided as per the terms and conditions of the Standard Bid Document (SBD).
- (iii) Design, engineering, manufacture, supply, erection, testing & commissioning of all equipment for substation bay extension & associated system, as detailed in the specifications and schedule of quantities and in subsequent. An indicative SLD of the substation has been provided in the technical specification which may be followed as a basis for finalization of the substation structural layout in consultation with OPTCL.
- (v) Execution of all civil works as per schedule for erection of Tower column (S/S), equipment foundation(S/S), construction of earth mat, cable trench, drainage system, Fencing etc.
- (vi) Erection, testing, commissioning of all equipment and handing over of the substation bays complete in all respect as per approved scheme and to the satisfaction of the Employer including statutory inspection.
- (vii) The makes of the equipment/components/materials shall be from valid OPTCL approve vendor list indicated in this tender and to be approved by the employer before placement of the order on the vendor/manufacturer.
- (viii) The contractor(s) shall arrange power supply for construction of the project. The expenditure for such arrangement till completion of the project shall be to the contractor(s) account.
- (ix) The contractor(s) shall arrange clean water for construction and curing to the civil works.

- (x) The work as mentioned in the price schedule shall be considered for the evaluation of the bid.
- (xi) The contractor shall arrange for security of all the materials including owner supply materials (handed over to him) that are required for successful completion of the project till final handing over of the entire work to OPTCL.
- (xii) Contractor has to obtain Project License in respect of the projects from the Secretary, Electrical Licensing Board of Orissa at his own cost, prior to commencement of works.
- (xiii) The contractor shall supply one official copy of each **Standard** listed in the appropriate schedule.

The contractor shall be fully responsible for providing all equipment, material, systems and services which are required to complete the construction and successful commissioning of the works in all respects. The Contractor shall also refer to the Technical Specification (Vol.-II), for proper understanding of the works involved in respect of each substation.

2.0 BRIEF SCOPE OF WORK:-

The scope of work on EPC/Turnkey CONTRACT BASIS includes design, engineering, manufacture, type testing, (factory testing) supply on FOR destination site basis, transportation, handling, storage at site, erection, site testing, commissioning complete in all respects and maintenance of plant and equipment until handing over of works in accordance with Conditions of Contract and the stipulations under various chapters of this specification at the prices stated in the Price Schedule for the following.

e- TENDER NOTICE No.: CPC-44/2022-23:

Engineering, Supply, Erection and Commissioning of 2 No.s 33KV Outgoing Feeder bays at 220/33KV GIS Substation, Godisahi (IDCO Industrial Complex, Ramdashpur) on “EPC/ Turnkey CONTRACT BASIS”

i)	Supply of equipment & materials for the Gas Insulated Substation bay extension work including all equipment & materials.
ii)	Detailed design and automation of the substation 33KV line feeder bays.
iii)	Providing engineering data and drawings, as per specified format, for employer’s review, approval and records.
iv)	Complete Manufacturing including Type, Acceptance & Routine testing, as specified.
v)	Packing and transportation from the manufacturer’s works to the site including transit insurance & customs clearance/ port clearance (if required), port handling, clearance for imported goods and further loading (if applicable)” As delivered at site basis”.
vi)	Receipt, Unloading, Storage, Insurance and Preservation of Sub-station & Transmission Line equipment, material & accessories at site.
vii)	Execution of civil works as per schedule for equipment foundation(S/S), construction of earth mat, cable trench, drainage system, Boundary, Land Scaping, approach roads, inside roads etc.

viii)	Erection, testing, commissioning of all equipment and handing over of the substation bays in complete in all respect as per approved scheme and to the satisfaction of the Employer including statutory inspection.
ix)	<p>Name of the work : Engineering, Supply, Erection and Commissioning of 2 No.s 33KV Outgoing Feeder bays at 220/33KV GIS Substation, Godisahi (IDCO Industrial Complex, Ramdashpur) on “EPC/ Turnkey CONTRACT BASIS”</p> <p><u>Details of Provisions to be kept in the Substation are as follows:</u></p> <p><u>Scope of work for GIS substations Feeder bays:</u></p> <p><u>33KV Side equipment as per technical spec:-</u></p> <p>➤33KV Feeder Bay:-02 nos.</p> <p>C. Supply, Installation, testing & commissioning of 2 No.s 33KV Outgoing Feeder bays at 220/33KV GIS Substation, Godisahi Engineering. Supply, Installation, testing & commissioning of different sizes of 33 KV HT XLPE cable & termination kits for the GIS stations GIS bay extension.</p> <p>F. Supply, Installation, testing & commissioning of Sub-station automation system as per specification. The SAS architecture shall be on PRP (Parallel Redundancy Port) based, therefore accordingly all the IED’s (IEC 61850) shall be selected for both bays of the GIS stations.</p> <p>G. Supply, Installation, testing & commissioning of Protection panels for 33KV GIS sub-stations.</p> <p>H. Supply, Installation, testing & commissioning of other equipment like 33 KV Isolators, CVT’s, SA’s, & 33 Isolators, SA’s etc. as indicated in the price schedule for both the GIS stations.</p> <p>I. Supply, Installation, testing & commissioning of Control & power cables as indicated in the price schedule.</p> <p>J. Supply, Installation, testing & commissioning of Fire-fighting equipment and Smoke detection system for both the GIS stations.</p> <p>K. Supply, Installation, testing & commissioning of structures pertaining to 33 KV both bays of the the GIS stations.</p> <p>L. Supply, Installation, testing & commissioning of Illumination in the switchyard, GIS bays, street lighting etc..</p> <p>M. Supply, Installation, testing & commissioning of OPGW / PLCC related equipment and materials as per specification & price schedule. The link shall be as per the SLD enclosed for both the GIS stations.</p> <p>N. Any other equipment & materials, which are not mentioned above and required/indicated in the price schedule for completion of the project are also to be considered for both the GIS stations.</p> <p>Other requirement as indicated below for both Feeder bays of the GIS Substation :</p> <p>1. Provision of equipment foundations, erection of structures & equipment, Store shed, Boundary wall & its painting, earth mat & earth pits & provision of water to the earth pits, fencing, roads, drains, gates, for water arrangement, provision of PHED system, Lighting cum Lightning Mast, Switchyard illumination, street</p>

	<p>lighting, and all other civil works etc as per specification.</p> <p>2. Testing and commissioning of Substation equipment & accessories of Feeder bays..</p> <p>3. Supply of spares.</p> <p>4. Contractor is advised to procure the equipment & materials sequentially as per the requirement at field, to avoid unnecessary dumping at the site. Therefore, prioritization of such procurement shall be carried out in consultation with the Engineer in Charge.</p> <p>5. Handing over of the completed system to the Owner.</p>
x)	Materials reconciliation & Satisfactory conclusion of the Contract.

Note:

- i. The aforesaid scope of work is only indicative.
- ii. The detailed scope of package(s) / works is given in Volume-II
- iii. The detailed BOQ (Bill of Quantity) is given in the Price schedule.

2.1. Substation

2.1.1. Electrical

The scope includes but is not limited to

i) Supply erection, testing & commissioning of the following equipments:

- a) Circuit breakers
- b) Isolators
- c) Current transformers.
- d) Voltage transformers (capacitive and inductive)
- e) CT, IVT console boxes with aluminium alloy having minimum three mm thickness.
- f) All out door kiosks/boxes, shall be GI sheet of minimum 2mm thickness with aluminium alloy *canopy* (rain hood) of 3mm thickness.
- g) Surge arresters
- h) Post insulators
- i) Protection, control, and metering systems
- j) Insulator strings with hardware
- k) Bus-bar, circuit conductor and all conductor accessories. Other interconnection shall be through Moose ACSR.
- l) Power and control cables, cabling accessories, cable trays etc. Proper sealing of the cable entry (control & Power) at Control Room building, to prevent water entering from switch yard/outside to CR Building, preventing entry of rats and reptiles, Fire proof etc.
- m) AC/DC systems including all distribution boards, battery and charger systems, auxiliary transformers.

- n) Air conditioning plant and systems for control room
 - o) Fire fighting systems and equipment
 - p) Steel structures for switchyard gantries and portals (lattice type); and equipment (pipe or lattice type) including those for lightning protection.
 - q) Earthing system and earthing conductors.
 - r) Testing and maintenance equipment.
 - s) Lighting of substation area and substation buildings. Illumination and emergency lighting system at different locations.
 - t) Control and relay panels as proposed.
 - u) Event logger panel. (For 220/132/33 KV Sub-station): NA in this Package.
 - v) AC and DC distribution boards as per requirement and as proposed.
 - w) Bus bar protection scheme (for 220kV bus only).
 - x) Disturbance recorder with Time synchronization. (GPS)
 - y) Sub station level PC/Lap top provision for Relay configuration with their software.
 - z) Any other items required for completion of the project are also in the scope of this contract in order to complete the sub-station in all respect.
- aa) Supply of all clamps, connectors and hardware required for commissioning of the substation. The quantity and rating of the connectors and clamps are dependent on the layout and requirement of the substation.
 - bb) Supply and putting of sub-station illumination system. All the light fittings shall be LED type & these fittings shall be mounted on switch yard portal structures such as columns & beams. No separate lighting mast is required. Entire substation lighting system in the switch yard & colony shall be designed using underground cables only. No overhead conductors are permitted for this purpose. For street lighting one outdoor lighting kiosk with two incomers of 200A rating switch fuse units (SFU) & with six feeders of 32A rating fitted with MCB shall be considered. Similar type of outdoor kiosk shall be considered for colony power supply with 200A SFU & ten out-going feeder of 32A rating fitted with MCB shall be considered.

ii) Supply, Erection, testing & commissioning of the following equipment:

1. Power transformers /auto transformers

iii) Supply of the following equipments:

1. Mandatory spares for substation equipment being supplied under this contract as per Bid proposal Sheet (BPS) **schedule-VIIA**.
2. Maintenance & testing equipment etc as per the list provided in relevant chapter of technical specifications.

2.1.2. Civil works

The design, engineering, supply of all materials including cement and steel, consumables, as per specification and approved drawings for civil works of the substation including but not limited to the following:

1. Designing, fabrication, galvanizing and erection of structures on respective foundations detailed in specification for civil works. Supply of all structural materials (columns & beams, hardware & fasteners etc) as per requirement. The contractor shall preferably adopt OPTCL designed standard structures for use in various substation, the details of which are given at “**Clause no 12**” of this chapter.
2. Soil testing for soil resistivity and soil bearing capacity before designing.
3. Site development including leveling, filling & compacting of the sub-station area to the desired height.
4. Wherever pile foundations are required for Control room building, switch yard tower columns, Equipment foundation and transmission line towers etc., these are to be constructed as per the guideline indicated in the specification elsewhere. The type of pile foundations can be ascertained only after soil investigation and approval of the same by OPTCL.
5. Construction of sub-station retaining wall with brick masonry and fencing by GI heavy-duty goat mesh fencing as per site requirement.
6. Construction of boundary wall along the property line of the substation with Main gate, security shed and two nos. switch yard gates in the sub-station. Provisions of a security shed near the main gate. The structure shall be RCC framed structure. There shall be provision of electrical illumination facilities.
7. Fencing of switch yard area and other areas like station transformer area.
8. There shall be provision of plantations of fruit bearing plants and water tap provision for watering the plants in the sub-stations.
9. Construction of all foundations for columns, all switchgear such as circuit breakers and isolators, CT's, CVT's and other substation equipment such as line traps, post insulator, etc.
10. Construction of foundation of transformer including supply and putting of rail from the service bay to the transformer plinth, all foundations of columns, equipment structures. Separate foundations for the marshaling boxes of the isolators are to be considered.
11. Anti-termite treatment of switch yard and colony buildings.
12. Switch yard buildings such as control room, DG set room and. There shall be provision of a water cooler including water purifier inside the control room building. Provision of split type air conditioners inside the control room & PLCC room of Control Room building and conference area.

13. There shall be provision of store shed, one Ramp with winch for lifting the materials and lowering the materials up to 5 MT and open yard platform to store the materials like transformer bushing, CT, CVT and other equipment.
14. Supply and spreading of uniform 20mm nominal size HG metal of 160mm thick inside the switch yard area of the Sub- Stations. The spreading will be done above a finished level of switchyard land by plain cement concrete of thickness 75 mm (ratio 1:4:8). Anti weed treatment of the switch yard area to be made as per prevailing practice before spreading of PCC.
15. Construction of drainage system of the sub-stations and the newly constructed quarters & flood water discharge systems. Miscellaneous works like manholes soak pits, RCC trench, fencing, etc. in the switch yard.
16. Construction of rainwater harvesting arrangements in the substation.
17. Construction of cable trenches with trays & covers & sump pit with pump, as per requirement.
18. Construction of approach road to the new sub-station as per requirement. Construction of periphery roads inside the fencing. The roads inside the switch yard, at the periphery shall be of 3.75 mtrs wide & shall be of concrete road as per technical specification. The other roads main and approach road shall be 7 mtrs wide and the Main Road shall be of concrete & the approach road shall be of bitumen. Road in front of transformer shall be 7.0 mtrs wide concrete road.
19. Designing and providing the earth mat and earthing of the sub-station lighting protection, equipment earthing etc. Earth mat shall be designed using 75X10mm GI flat. For lightning protection individual earth spike (**GI pipe 50mm dia, heavy gauge**) of 9 mtrs long for 220 KV ,7 Mtrs long for 132 KV & 5 Mtrs long for 33 KV shall be provided on each column of the switch yard. Water tap provision shall be provided for pouring water into the earth pits constructed inside & around the periphery fence the switch yard. The earthing shall be extended beyond 2 mtrs from the fencing and the fencing earthing are also to be taken care.
20. 400 KV system shall have 40 mm dia MS rod for laying of earth mat & earth riser shall be with 75X10 mm HDG flat.
21. Civic amenities for the township including drainage and sewerage systems.
22. All other materials, which the contractor feels to be required for completion of the sub-station.
23. Plantation of fruit bearing and flower bearing plants and gardens in and around the sub-station.
24. Modular Multi-diameter flexible Cable sealing system consisting of frames, blocks and accessories to be installed wherever the electrical / control / communication cables over-ground enter or leave from control room building. Cable sealing to be done with Multi-diameter type flexible modular based sealing blocks of different sizes (size 20: 4mm to 14.5 mm ,size 30 : 10mm to 25 mm ,size 40: 21.5mm to 34.5mm , size 60: 28mm to 54 mm , size 90: 48mm to 71 mm , size 120 : 67.5mm to 99 mm **or any convenient size**) to be provided for simple, easy and quick to assemble & re-assemble. some spare blocks on the frame to be provided with usable Multi-diameter blocks with center plug, so that these spare blocks can be used for expansion in future for wide range of cables, solid blocks should not be used on

frame. Cable sealing system should have been type tested for fire / water / smoke tightness and supplier shall have local presence by way of full infrastructure having service support, training support and stocks support and also have necessary sales support for any change / extension in future. Frames & stay-plate material should be galvanized steel and for compression single piece wedge with galvanized steel bolts should be used.

2.2. Transmission lines.

i) Survey & ROW issues

- 1) Detailed line Survey works as per specification.
- 2) The contractor shall have to solve the entire right of way problem at his own cost. Contractor shall also resolve the issues related to the tree cutting in the transmission line and sub-station at his own cost. However the details of ROW issues have been indicated in Special Condition of Contract (SCC) –Vol.-1A.

ii) Design & Manufacturing (as applicable), supply, storage, erection, testing & commissioning of following materials

1. Galvanized Structural materials of towers as per requirement. OPTCL adopted standard towers shall preferably be used for the transmission line, the details of which is given at “Clause no.-13” in this chapter.
2. Insulators, hard wares.
3. ACSR conductors, GI earth wire with accessories etc and their stringing.
4. Commissioning of transmission lines.
5. Any other items required are also in the scope of this contract in order to complete the proposed transmission lines in all respect.

iii) Civil works

The design, engineering, supply of all materials including cement and steel, consumables, as per specification and approved drawings for civil works of the Transmission line including all foundation and piling works but not limited to the following:

(a) Designing, fabrication, galvanizing and erection of structures on respective foundations detailed in specification for civil works. The contractor shall preferably adopt OPTCL designed standard tower structures for use in various transmission lines, the details of which are given elsewhere in this chapter.

(b) Soil testing for soil resistivity, type of soil and soil bearing capacity before designing.

3. Electrical System Data of 400/220/132/33

1. Nominal System Voltage (KV)400/220/132/33
2. Highest System Voltage (kV)420/245/145/36
3. System Neutral Earthing:Effectively earthed

4. Basic Insulation Level (kVP)
 - i) Bus1425/1050/650/170
 - ii) Equipment other than Transformer:1425/1050/650/170
 - iii)Transformer: 1050/650/170
5. Power Frequency withstand voltage (KV rms):520/460/275/80
6. System fault level KA: **50or63/50 or40/40 or 31.5//31.5 or 25**
7. Creepage distance for insulators (mm):10500/6125/3625/900
8. Min. recommended clearance in air (mm) as per CBIP
 - i) Phase-to-phase:3900/2160/1300/320
 - ii) Phase-to-earth:3400/2160/1300/320
 - iii)Sectional clearance:6500/5000/4000/3000
9. Min. ground clearance (as per IE Rules):8000/5500/5000/4000
10. Bus configuration for: 400/220/132/33 kV

400 KV: One & half CB in I shape **or** in II shape/**220 KV:** Two main Bus **or** two main bus with one transfer bus/**132 KV:** Two main bus **or** one main bus with one transfer bus/**33 KV:** Two main bus **or** one main bus with one transfer bus.

Conductors for Bus bar: Sub-station side: ACSR Moose

Transmission line: Selection of ACSR conductor shall be Chosen from Moose, Zebra and panther as per requirement and decision of employer.

11. Phase-to-phase distance:
 - i) Along the bay (mm):7000/4500//3000/1500
 - ii) Strung bus (mm): 7000/4500/3000/1500
12. Reference design temperature 50 Deg. Centigrade.

Detailed technical particulars of different equipment have been specified in the respective specifications in the subsequent section. If any technical particulars are missed from this volume the same may please be referred from relevant IS: specification for bidding purpose.

4. Design work

The Bidder shall furnish detailed design of the substation & transmission lines. The design work shall include but not limited to technical calculations, preparation of drawings and bill of materials and specifying equipment not specified in the specification but necessary for the completion of the substation & transmission lines on the turnkey basis. The technical calculation design drawings, etc. shall be submitted to the Employer for approval. However the layout drawing furnished by OPTCL shall be taken as a guide line.

5. Standards

All materials and equipments shall generally comply in all respects with the latest edition of the relevant Indian Standards. International Electro-Technical Commission (IEC) or any other internationally accepted Standard equivalent or better than relevant Indian Standard. Equipment complying with all other authoritative standards such as British, ASA, VDE,

etc. will also be considered if performance equivalent or superior to Indian Standard is ensured.

In the event of supply of equipment confirming to any International or internationally recognized Standard other than the Standard listed in the Specification. The salient features of comparison shall be brought out and furnished along with the bid.

In case of adopting any standard other than that IS or IEC, a complete set of adopted standard shall be supplied by the bidder. However it is desirable and preferred that the equipment offered shall comply with one consistent set of standard unless other than exceptional cases.

The equipment shall also comply with the latest revision of Indian Electricity Act and Indian Electricity Rules and any other Electrical Statutory Provision, Rules and Regulations.

6. Reference Drawings

Drawings showing indicating scope of work are enclosed. Drawings are complementary to specifications and shall be referred to for better understanding as well as for estimation of quantities and bill of materials for arising at lump sum bid price on turnkey basis.

The bidder shall submit with the tender, plan of the substation showing broadly the scope of work incorporated as per technical specification. All the drawings shall be submitted in quadruplicate, enumerated in conformity with relevant clause stipulated in the Technical Section.

These drawings shall show proposed layout plan with section. Drawings showing overall dimension, clearance etc. required for assembling and dismantling and space requirements of all the apparatus are to be supplied to enable the Employer to examine the design and layout at the installation.

7. Packing and Marking

The bidder shall include and provide for securely protecting and packing the plant so as to avoid damage in transit under proper condition and shall be responsible for all loss or damage caused by any defect in packing.

Large and heavy items such as 400kV, 220 kV, 132 kV and 33 KV equipment and structural steel shall be packed and shipped as per standard international practice.

Container/Carbons, boxes, trunks and other packages shall be strong and sturdy in construction to withstand Ocean shipping, loading and unloading, transport on rough roads, and storage in tropical area and hauling and handling during erection etc. Boxes and packages shall also be protected by suitable packing with the help of wooden planks/MS frame or galvanized steel strips.

A layer of waterproof material shall be provided inside the cartoon/boxes/packages to protect the equipment from water seepage and to avoid rust.

The following information shall be marked on the container/boxes/packages etc.

- a.** Contractor's/manufacturer's name, project title and contract reference.

- b. Plant/accessory identification No. and title.
- c. Net/gross weight.
- d. Employer's name with other dispatch particulars such as destination.

The employer shall take no responsibility for any damage done to the plant on route to the site of work or place of delivery whichever is applicable.

8. Tests

- i) Unless otherwise specified in respective section, all equipment shall be subjected routine, acceptance and type test as covered and specified in any standard in presence of the authorized representative of the employer.
- ii) Bidder shall submit type test report from a recognized laboratory along with the bid.
- iii) At least 15 days advance notice shall be given by the contractor to the employer for witness the tests.

9. Compliance to IE rule 1956

- i) The construction agency shall possess a safety manual duly approved by competent authority in the Govt. of his State Governing the safety in work by the personnel and staff.
- ii) The agency shall possess valid contractor's license issued by the Electrical Licensing Board of Odisha (ELBO) failing which he will not be allowed to start the work.
- iii) Supervisors of works shall possess appropriate valid supervisory certificate of competency issued ELBO, Odisha.
- iv) At least 50% of electrical workmen employed in the project shall possess valid workmen permit by ELBO.

10. The Contractor has to follow submission of drawings, data, and document as per the format given below.

SL No.	Description	With Bids	Post Order		Final Document		
			For Review	For Records	Transparency	Prints (Photostat)	Electronic
FOR SUB-STATION							
1.	Switchyard single line diagram						
2.	Switchyard layout, plan, section & placement of various equipment						
3.	Switchyard earthing and lightning protection calculations.						
4.	Battery, battery charger, DCDB sizing calculations.						
5.	Switchyard lighting calculations						
6.	Switchyard earthing and lightning layout.						
7.	Switchyard lighting layout.						
8.	Switchyard ,control room equipment						

SL No.	Description	With Bids	Post Order		Final Document		
			For Review	For Records	Transparency	Prints (Photostat)	Electronic
	and cable layout.						
9.	Switchyard clamps and connector details.						
10.	Relay, metering and control panel block logic diagram.						
11.	Control panel schematic drawings.						
12.	Logic for castle key interlock between Breaker and isolator.						
13.	Relay, metering & Control panel and ACDB,DCDB GA drawings.						
14.	Switchyard equipment GA drawings and control schematics.						
15.	Cable schedule.						
16.	Interconnection diagrams.						
17.	Relay setting calculations and Coordination drawings.						
18.	SLDs of ACDB and DCDB.						
19.	Soak pit and waste oil pit layout and sizing calculation.						
20.	Structural design calculations super structures.						
21.	Civil drawings for foundation and cable trenches.						
22.	Structural fabrication drawings of equipments gantries etc.						
23.	Filled in equipment data sheets as per enclosed format.						
24.	Complete literature, leaflets for all equipments.						
25.	Operational/maintenance manual.						
26.	Deviation schedule w.r.t. a) Specification b) Document/ attachments.						
27.	List of spare parts for each major equipment.						
28.	List of special tools and tackles.						
29.	List of sub-vendors.						
30.	QA plan of vendor						
31.	Installation operating and maintenance instruction.						
32.	Inspection Plan and Testing Procedure.						
33.	Test Records.						
34.	List of commissioning/maintenance spares.						
35.	Data Book/Manual a)Installation Manual b) Operating/Maintenance. c)Catalogues/ Brochures.						
	FOR TRANSMISSION LINE						

SL No.	Description	With Bids	Post Order		Final Document		
			For Review	For Records	Transparency	Prints (Photostat)	Electronic
36	Route map, Line Survey report (preliminary & Final) as per the BPS.						
37	Soil Investigation report of the locations						
38	Civil drawings for foundation of Tower & Foundation design						
39	Structural design calculations super structure for Tower and detail drawings.						
40	Structural fabrication drawings of different type of towers.						
41	Tower clamps & connector, insulator and other hardware materials details.						
42	Deviation schedule w.r.t. a) Specification b) Document/ attachments.						
43	List of special tools and tackles.						
44	List of sub-vendors.						
45	QA plan of vendor						
46	Installation operating and maintenance instruction.						
47	Inspection Plan and Testing Procedure.						
48	Test Records.						
49	List of commissioning/maintenance spares.						
50	Data Book/Manual a) Installation Manual b) Operating/Maintenance. c) Catalogues/ Brochures.						

11. Minimum clearance for substation (AIS) design shall be as per details given in the table below.

Highest system voltage (kV)	Insulation level (kVP)	Switching Impulse Voltage (KVP)	Sectional Clearance (mm)	Minimum clearance		Ground Clearance (mm)
				Between phase & Ground	Between phases	
36KV	170	-	3000	320	320	3700
145KV	650	-	4000	1300	1300	4600
245KV	1050	-	5000	2160	2160	5500
420KV	1425		7000	3400	3900	8000

**TABLE 1 MINIMUM ELECTRICAL CLEARANCE
FOR OUTDOOR SWITCHGEAR**

(Clause 2.1.9)

VOLTAGE RATING (HIGHEST SYSTEM VOLTAGE)	IMPULSE WITHSTAND LEVEL*	MINIMUM CLEARANCE TO EARTH†	MINIMUM CLEARANCE BETWEEN PHASES	MINIMUM CLEARANCE FROM ANY POINT WHERE THE MAN MAY BE REQUIRED TO STAND TO THE NEAREST UNSCREENED CONDUCTOR IN AIR (SECTIONAL CLEARANCE)
(1)	(2)	(3)	(4)	(5)
kV (rms)	kV (peak)	mm	mm	mm
12	60 (List I)	90	90	2 600
	75 (List II)	120	120	2 600
36	145 (List I)	—	270	2 750
	170 (List II)	320	320	3 000
72.5	325	630	630	3 500
123	450	900	900	3 500
	550	1 100	1 100	4 000
145	450	900	900	3 500
	550	1 100	1 100	4 000
	650	1 300	1 300	4 000
245	650	1 300	1 300	4 000
	750	1 500	1 500	—
	850	1 600	1 700	4 500
	950	1 900	1 900	4 500
	1 050	2 400	2 100	5 000

*The impulse withstand levels are as given in IS : 2165-1977 Insulation coordination.. (second revision). For guidance regarding choice between List I and List II (as in col 2) for rated voltages 12 kV and 36 kV and between levels against higher rated voltages, see IS : 2165-1977.

†The values of minimum clearance to earth are based on Table 6A of IS : 3716-1978 Application guide for insulation coordination.

12. OPTCL adopted standard switch yard structure:

The bidders may adopt their own type tested design for switchyard structures with approval from OPTCL. However the standard switch yard structures adopted in OPTCL switch yards system in different voltage levels are given below. The height & weight are indicative only.

A	400 KV SIDE:
1	COLUMN: 4TA,4TB,4TC,4TD TYPE,- HEIGHT-29 (Additional Peak 5 Mtrs) MTRS, WEIGHT-10 MT
2	BEAM:4GA,4GB TYPE,-LENGTH- 27 MTRS, WEIGHT-4 MT
B	220 KV SIDE:
1.	COLUMN: P1S TYPE,- HEIGHT-21.5 MTRS,WEIGHT-4.464MT
2.	BEAM:Q1 TYPE,-LENGTH-18 MTRS, WEIGHT-1.473MT
C	132 KV SIDE:
1.	COLUMN: T1S TYPE,- HEIGHT-15 MTRS,-WEIGHT-1.193 MT
2.	COLUMN: T4S TYPE,-HEIGHT-11 MTRS,-WEIGHT-0.924 MT
3.	BEAM:G1 TYPE,-LENGTH-10.4 MTRS,-WEIGHT-0.613 MT
4.	BEAM:G2 TYPE,-LENGTH-14.9875 MTRS,-WEIGHT-0.906 MT
5.	BEAM:G1X TYPE,-LENGTH-10.4 MTRS,-WEIGHT-1.370 MT
6.	BEAM:G1,2 TYPE,-LENGTH-10.4 MTRS,-WEIGHT-1.25 MT
D	33 KV SIDE:
1.	COLUMN: T8S TYPE,- HEIGHT-10.5 MTRS,WEIGHT- 0.777 MT
2.	COLUMN: T9S TYPE,-HEIGHT-7.5 MTRS,WEIGHT - 0.592 MT
3.	BEAM:G4 TYPE,-LENGTH-5.5 MTRS,WEIGHT-0.306 MT
4.	BEAM:G4X TYPE,-LENGTH-5.5 MTRS,WEIGHT-0.306 MT
5.	BEAM:G6 TYPE,-LENGTH- MTRS,WEIGHT-7.25 MT
E	THE BAY WIDTH OF DIFFERENT VOLTAGE LEVEL ARE AS BELOW
1.	400 KV SYSTEM SHALL BE 27 MTRS.
2.	220 KV SYSTEM SHALL BE 18 MTRS
3.	132 KV SYSTEM SHALL BE 10.4/13.1MTRS.
4.	33 KV SYSTEM SHALL BE 5.5 MTRS

13. OPTCL adopted standard Tower structure for transmission line:

The contractor may adopt their own type tested design for transmission line structures/towers with approval from OPTCL. However the standard tower structures adopted in OPTCL for different voltage levels are given below. The height & weight are indicative only.

A. 132 KV Transmission line.(Height 29 Mtrs) (MS Galvanised)

- (i) "PA" type: Unit weight: 3.430 MT.
- (ii) + 3 mtrs: Unit weight: 0.537 MT.
- (iii) + 6 mtrs: Unit weight: 1.349MT.
- (iv) "PB" type: Unit weight: 4.973 MT.
- (v) + 3 mtrs: Unit weight: 1.018 MT.

- (vi) + 6 mtrs: Unit weight: 2.104 MT.
- (vii) “PC” type: Unit weight: 6.214 MT.
- (viii) + 3 mtrs: Unit weight: 1.119 MT.
- (ix) + 6 mtrs: Unit weight: 2.342 MT.
- (x) Templates for PA- Unit weight: 0.665 MT
- (xi) Templates for PB- Unit weight: 0.602 MT
- (xii) Templates for PC- Unit weight: 1.904 MT

B. 220 KV Transmission line.(Height 35.5 Mtrs) (MS Galvanised)

- (i) “OA” type: Unit weight: 4.351 MT.
- (ii) + 3 mtrs: Unit weight: 0.727 MT.
- (iii) + 6 mtrs: Unit weight: 1.448 MT.
- (iv) “OB” type: Unit weight: 7.574 MT.
- (v) + 3 mtrs: Unit weight: 1.305 MT.
- (vi) + 6 mtrs: Unit weight: 2.242 MT.
- (vii) “OC” type: Unit weight: 9.839 MT.
- (viii) + 3 mtrs: Unit weight: 1.436 MT.
- (ix) + 6 mtrs: Unit weight: 2.599 MT.
- (x) +15 mtrs: Unit weight: 6.670 MT
- (xi) “UR” : Unit weight: 13.585 MT.
- (xii) “UR” + 3 mtrs type: Unit weight: 17.316 MT.
- (xiii) “UR” + 6 mtrs type: Unit weight: 4.249 MT.
- (xiv) Templates for OA- Unit weight: 0.597 MT
- (xv) Templates for OB- Unit weight: 0.815 MT
- (xvi) Templates for OC- Unit weight: 1.172 MT
- (xvii) Templates for UR- Unit weight: 1.509 MT

C. 400 KV Transmission line Tower.(Height 46 Mtrs) (HT Steel in Leg Section,Cross Arm & Main Bracing and other Section MS)

- (I) DA (Normal) Type:(0 to 2 deg): 7.54869 MT
 - DA(+3 Mtr extn): +1.93856 MT
 - DA(+6 Mtr Extn): +2.74532 MT
 - DA(+9 Mtr Extn): +4.62562 MT
- (ii) DB Type:(2 to 15 deg): 13.96342 MT
 - DB(+3 Mtr extn): + 2.44864 MT
 - DB(+6 Mtr Extn): +4.82572 MT

DB(+9 Mtr Extn): +9.34636 MT
 (iii) DC Type:(15 to 30 deg): 15.78074 MT
 DC(+3 Mtr extn): +2.90732 MT
 DC(+6 Mtr Extn): +5.4436 MT
 DC (+9 Mtr Extn): +9.94816 MT
 (iv) DD Type:(30 to 60 deg): 22.29494 MT.
 DD(+3 Mtr extn): +4.11758 MT
 DD(+6 Mtr Extn): +5.25294 MT
 DD (+9 Mtr Extn): +7.2021 MT

D. No. of Bolts & Nuts used in each of the Tower

Type of Tower	Normal	+3 mtrs	+6 mtrs	+9 mtrs
PA	1602	142	276	
PB	1097	273	542	
PC	1654	313	592	
OA	1147	180	228	
OB	1299	236	372	
OC	1877	254	402	
UR	2283	357	588	
DA	1980	524	722	1214
DB	3668	656	1284	2464
DC	4140	786	1442	2608
DD	5844	1080	1388	1912

14. Approved Make of Equipment & Materials to be used in the Sub-station and Transmission lines.

The following make of the equipment & materials shall be supplied as per valid approved vendor list.

Breaker (33KV)	M/s. Megauin Switchgear Pvt. Ltd./ M/s. Schneider Electric Infrastructure Ltd., / M/s Toshiba Transmission & Distribution Systems(India) Pvt. Ltd./ M/s Shreem Electric Ltd. / M/s Stelmec Ltd./
BREAKER UP TO 400KV	M/s. Crompton Greaves Ltd./ M/s GE T & D India Ltd, / M/s ABB India Ltd/ M/s SIEMENS Ltd
CT(33KV)	M/s. Vishal Transformers. & Switchgears Pvt.Ltd./ M/s. Transfield Electric / M/s Toshiba Transmission & Distribution Systems(India) Pvt. Ltd.
CT UP TO 400KV	M/s GE T & D India Ltd,/ M/s ABB India Ltd/ M/s. Crompton Greaves Ltd/ M/s SIEMENS LTD.
CT UP TO 220KV	M/s. Mehru Elect. & Mech. Engg Pvt. Ltd./ M/s. Vishal Transformers. & Switchgears Pvt.Ltd./ M/s. Vidyuth Control Systems Pvt. Ltd./ M/s. Victrans Engineers,/ M/s Toshiba Transmission & Distribution Systems(India) Pvt. / M/s SCT Limited,/ M/s HIVOLTRANS ELECTRICALS PVT LTD/ M/s Heptacare Power Industries Pvt. Limited
CT UP TO 132KV	M/s. Pragati Electrical Pvt. Ltd./ , M/s. Kapco Electric Pvt. Ltd
IVT (33KV)	M/s. Vishal Transformers. & Switchgears Pvt.Ltd.,
IVT UP TO 400KV	M/s. Crompton Greaves Ltd./ M/s SIEMENS LTD.
IVT UP TO 220KV	M/s. Mehru Elect. & Mech. Engg Pvt. Ltd./ M/s. Vidyuth Control Systems Pvt. Ltd./ M/s Heptacare Power Industries Pvt. Limited,/ M/s HIVOLTRANS ELECTRICALS PVT LTD/ M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. / M/s SCT LIMITED
IVT UP TO 132KV	M/s. Pragati Electrical Pvt. Ltd./ M/s Toshiba Transmission & Distribution Systems(India) Pvt. Ltd./ M/s SCT LIMITED
CVT (400/220/132KV)	M/s GE T & D India Ltd,/ M/s ABB India Ltd,/ M/s. Crompton Greaves Ltd./ M/s SIEMENS LTD.
CONVENTIONAL CONTROL & RELAY PANEL, EVENT LOGGER, DISTURBANCE RECORDER (Up to 400 KV)	M/s GE T & D India Ltd,/ M/s ABB India Ltd, / M/s SIEMENS LTD,/ M/s. Schneider Electric Infrastructure Ltd., / M/s GE India Industrial Pvt. Ltd./ M/s Crompton Greaves Ltd
CONVENTIONAL CONTROL & RELAY PANEL, EVENT LOGGER, DISTURBANCE RECORDER (Up to 220 KV)	CG-ZIV Power Automation Solution Ltd M/s Toshiba T&D Systems (India) Pvt Ltd,
CONVENTIONAL CONTROL & RELAY PANEL, (Up to 132 KV)	M/s SCOPE T&M Pvt. Ltd./ M/s DANISH PVT. LTD/ M/s AMARA RAJA POWER SYSTEM LIMITED./ M/s Voltech Manufacturing Company Ltd

NUMERICAL RELAYS, IEC-61850 (400 KV, 220 KV, 132 KV & 33 KV) & AUXILIARY RELAYS		M/s GE T & D India Ltd, M/s ABB India Ltd, M/s SIEMENS LTD, M/s. Schneider Electric Infrastructure Ltd., M/s GE India Industrial Pvt. Ltd., M/s Schweitzer Engineering Laboratories Pvt. Ltd, M/s Toshiba T&D Systems (India) Pvt Ltd, M/s Crompton Greaves Ltd,
NUMERICAL RELAYS, IEC-61850 (Limited to back-up Relay up to 132kV system)		M/s. Toshiba Corporation./ CG-ZIV Power Automation Solution Ltd
SUB-STATION AUTOMATION PANELS (Up to 400 KV)		M/s GE T & D India Ltd, M/s ABB India Ltd, 1st Floor, City Centre, M/s SIEMENS LTD, M/s Toshiba T&D Systems (India) Pvt Ltd,
ISOLATOR (UP TO 400KV)		M/s GE T & D India Ltd, M/s. Crompton Greaves Ltd., M/s. G.R. Power Switchgear Ltd, Kotamma Bhavani, M/s. Elektrolites (Power) Pvt. Ltd., M/s Switchgear & Structural (India) Private Limited M/s SIEMENS Ltd..
ISOLATOR (UP TO 220KV)	01	M/s Switchgear Manufacturing Company (P) Ltd.
SURGE ARRESTOR (400/220/132/33Kv)		M/s Oblum Electrical Ind. Pvt Ltd. M/s. Crompton Greaves Ltd., M/s LAMCO Industries Pvt. Ltd.
SURGE ARRESTOR (220/132/33Kv)	01	M/s ELEKTROLITES (POWER) PVT.LTD.
SURGE ARRESTOR (33Kv)	01	M/s Shreem Electric Ltd.
DISC INSULATOR (UP TO 90KN, Antifog & Normal type)	01	M/s Hindustan Chemicals,
DISC INSULATOR (UP TO 120KN)		M/s Bikaner Ceramics Pvt Ltd, M/s Imperial Ceramics Pvt. Ltd.
DISC INSULATOR (UP TO 160KN)		M/s W.S. Industries (India) Limited, M/s Aditya Birla Insulators
COMPOSITE POLYMER INSULATOR		M/s G.K. XIANGHE ELECTRICALS PVT. LTD. M/s Phoenix Electrical Insulating Materials Co.Pvt.Ltd, M/s Yamuna Power & Infrastructure Ltd. M/s Deccan Enterprises Limited. M/s Shree Radhe Industries, Plot No.-86, GIDC, Alindra, M/s Spark Insulators Private Limited M/s Goldstone Infratech Ltd,
SOLID CORE POST INSULATOR		M/s W.S. Industries (India) Limited, M/s CJI PORCELAIN(P) LIMITED M/s SARAVANA GLOBAL ENERGY LIMITED.

HARDWARE FITTINGS (Up to 400KV)		M/s TRANSMISSION LINE PRODUCTS, M/s SWAMIJI TRANSMISSION PVT LTD, M/s KSE Electricals Pvt Ltd, M/s Industrial spare products, M/s MOSDORFER INDIA PVT. LTD, M/s Electromech & Transtech Pvt. Ltd., M/s IAC Electricals Pvt. Ltd, 701 Central Plaza, 2/6 Sarat M/s KRSNA Transmission Hardware Mfg Pvt Ltd,
HARDWARE FITTINGS (Up to 220KV)		M/s RAMELEX PVT LTD, M/s Aarpee Associates, M/s Legion Energy, M/s S.K.INDUSTRIAL CORPORATION
CLAMPS & CONNECTORS (UP TO 400kV)		M/s Swamiji Transmission Pvt Ltd, M/s KSE Electricals Pvt Ltd, M/s Industrial spare products, M/s Exalt Engineering Industries, M/s Premier Power Products (Calcutta) Private Limited M/s IAC Electricals Pvt. Ltd,
CLAMPS & CONNECTORS (UP TO 220KV)		M/s RAMELEX PVT LTD, M/s Premier Power Products(Calcutta) Pvt Ltd., M/s Legion Energy, M/s Aarpee Associates, M/s RAJASTAN TRANSMAT PVT. LTD. M/s Krsna Transmission Hardware Mfg Pvt Ltd
GI BOLTS & NUTS		M/s GARG FASTENERS, M/s Pioneer Nuts & Bolts Ltd, M/s ASP Pvt. Ltd, M/s Perfect Industries (India), M/s Royal Balaji Engineering Pvt. Ltd.,
220V VRLA BATTERY		Hoppecke India Pvt. Ltd,
Battery Charger for VRLA & Plante	01	M/s AMARA RAJA POWER SYSTEM LIMITED.
Battery Charger for 220 V	02	M/s Statcon Power controls Ltd.,
CONDUCTOR (ACSR & AAAC) <u>ACSR- MOOSE</u> (54/3.53/7/3.53) & AAAC <u>ACSR- ZEBRA</u> (54/3.18/7/3.18) & AAAC <u>ACSR- PANTHER</u> (30/3.0/7/3.0) & AAAC		M/s. Gupta Power Infrastructure Ltd., M/s Hindusthan Vidyut Products Ltd. M/s Apar Industries Ltd. M/s. Teracom Ltd. M/s. Traco Cable Company Ltd. M/s. Cabcon India Pvt. Ltd., M/s Gammon India Ltd., M/s Mahavir Transmission Udyog Pvt. Ltd, M/s Dynamic Cables Pvt. Ltd,
EARTH WIRE		M/s GEEKAY WIRES PVT LTD. M/s APAR Industries Limited M/s. Cabcon India Pvt. Ltd., M/s KRITIKA WIRES PVT. LTD, M/s BEDMUTHA INDUSTRIES LTD., M/s Nirmal Wires (P) Ltd., M/s UIC UDYOG LTD,

EHV GRADE XLPE CABLE (33Kv)		M/s Sterlite Technologies Ltd M/s GEMSCAB INDUSTRIES LTD., M/s Torrent Cables Ltd., M/s CRYSTAL CABLE INDUSTRIES LIMITED
HT XLPE (33 KV)	01	M/s Mescab India Pvt. Ltd
EHV GRADE XLPE CABLE (33KV) Both Cu & Al	01	M/s Paramount Communications Limited,
EHV GRADE XLPE CABLE (up to 132kV voltage class)		M/s. KEC International Ltd., M/s TBEA, LS CABLES INDIA PVT LTD, M/s Polycab wires Pvt. Ltd, M/s Universal Cables Ltd, M/s Finolex J Power systemsPvt Ltd, M/s KEI Industries Ltd,
STATION TRANSFORMER (33/0.433KV), 1000KVA / 630KVA / 250 KVA		M/s ABB India LTD, M/s. Crompton Greaves Ltd., M/s ESENNAR Transformers (P) Ltd. M/s. Indo Tech Transformers Ltd., M/s. Voltech manufacturing Company M/s Orissa Transformers Pvt. Ltd., (Up to 250 KVA)
48V VRLA BATTERY		M/S NED Energy Limited M/s Energy Leader Batteries India Pvt Ltd. M/s Chhabi Electricals Pvt. Ltd.
48V DC VRLA Battery Charger		M/s AMARA RAJA POWER SYSTEMS LIMITED. M/s Statcon Power controls Ltd.,
220 V DC VRLA Battery Charger	01	M/s Voltech Manufacturing Company Ltd,
75Ω/125Ω HF COAXIAL CABLES	01	M/s ALPHA COMMUNICATION LTD,
DIGITAL PLCC, PROTECTION COUPLER, FSK MODEM FOR VFT		M/s SIEMENS LTD, M/s GE T & D India Ltd, M/s ABB India Ltd
RTU CONFORMING TO IEC PROTOCOLS IN USE		M/s GE T & D India Ltd, M/s Advantech Industrial Computing India Pvt. Ltd. M/s M.B.Control & System Pvt. Ltd. M/s Applitech Infotech Pvt. Ltd, M/s Phoenix Contact India (P) Ltd., M/s Chemtrols Industries Ltd., M/s Synergy Systems & Solutions
EPABX COMPATIBLE FOR PLCC, MUX, AND OPTIC FIBRE COMMUNICATION EQUIPMENT	01	M/s Matrix Comsec PVT Ltd,
Mux, Optical Line Terminal Equipment(Olte), Digital Access Cross Connect (Dacs) & Optical Power Amplifier Compatible		M/s ABB India Ltd, M/s GE T & D India Ltd
LINE TRAP FOR 132 KV, 220KV & 400KV SYSTEM		M/s GE T & D India Ltd, Quality Power Electrical Equipment Pvt Ltd
LINE MATCHING UNIT		M/s GE T & D India Ltd M/s CG-ZIV Power Automation Solution Ltd M/s ABB India Ltd,

LIGHTING FIXTURE		M/s Pyrotech Electronics Pvt. Ltd. Unit-1 M/s Surya Roshni Ltd,
Fire Fighting Equipment	01	M/s Kanadia Fyr Fyter Pvt. Ltd,
TOWER & STRUCTURES FOR LINE AND SUBSTATION AND FOUNDATION BOLT		M/s Jyoti Structure Limited, 6 th floor, M/s New Modern Technomech (P) Ltd, M/S Utkal Galvanizers Limited M/s. Sawaria Pipes Pvt Ltd., 5-2-196/2/A M/s Utkarsh Tubes & Pipes Ltd. 23A, NetajiSubhas M/s SUPREME & CO PVT LTD, M/s Steel Products Limited, M/s KAVCON ENGINEERS PVT.LTD. M/s BABA STRIP & TUBES LTD. M/s IVRCL TLT PVT. LTD. M/s RABI ENGINEERING WORKS PVT.LTD M/s Solux Galfab Private Limited M/s RELIABLE SPONGE PVT. LTD M/s G.S.ENGINEER M/s Bajaj Electricals Limited M/s Nandan Steels and Power Ltd M/s Ratan Projects & Engineering Co. Pvt. Ltd M/s Shri Ashutosh Engineering Industries., Hirapur (Jarway), M/s R R ISPAT, M/s Vijay Transmission Pvt. Ltd M/s SKIPPER Limited, M/s BMW InduatRIES Limited, M/s Premier Power Products (Calcutta) Private Limited M/s Smitvin Engineers Pvt. Ltd, M/s Ratna Engineering Works, M/s Vishal Pipes Limited, (for Galvanised Pipe Type Sub- station Structure)
PVC INSULATED POWER AND CONTRAL CABLES(With type C insulation)		M/s. Ravin Cables Ltd., M/s. Crystal Cable Industries Ltd., M/s. Gupta Power Infrastructure Ltd., M/S Daksha Cable Industries Pvt. Ltd. (DCI) M/S GEMSCAB INDUSTRIES LTD., M/s. KEC International Ltd., M/s. Grid India Power Cable Pvt. Ltd., M/s. Thermo Cables Ltd., M/s Prime Cable Industries(A Unit of R.C. Cable Pvt. Ltd) M/s. Tirupati Plastomatics Pvt. Ltd., M/s. Govind Cable Industries, M/s SPM Power & Telecom Pvt. Ltd. M/s SPM Wires & Cables Pvt. Ltd., M/s AZURE Switchgear Pvt. Ltd., M/s Genus electrotech Ltd., M/s KEI Industries Ltd, M/s Zenium Cables Limited., M/s Dynamic Cables Pvt Ltd, M/s Vishal Cables Pvt. Ltd, M/s Polycab wires Pvt. Ltd, M/s Universal Cables Ltd,

XLPE Power & Control cable	01	M/s Govind Cable Industries,
PVC Insulated Power and Control cable (with type-C insulation) & XLPE Power & Control Cables	01	M/s Paramount Communications Limited,
LT XLPE Cable	01	M/s Himachal Aluminium & Conductors
LT XLPE, Power & Control cable with type C insulation	01	M/s Mescab India Pvt. Ltd
ACDB /DCDB / BMK / CONSOLE BOX (ACDB up to 430V AC, DCDB up to 220V DC and other LT distribution Board)		M/s SCHNEIDER Electric Infrastructure Ltd M/s. Ape Power Pvt. Ltd, Necon Electrical & Electronics, Plot: 3673, M/s Matrushakti Electrical Industries, M/s SWASTIK ENERGY SYSTEM PVT. LTD. M/s AIM ENGINEERING INDUSTRIES M/s S.R. AUTOMATION (P) LTD.. M/s United Engineers Pvt. Ltd. M/s S.K.Engineers India Pvt. Ltd. M/s Victor Switchgear Pvt. Ltd, M/s ALFA AUTOMATION (P) Ltd, M/s MAKTEL CONTROL & SYSTEMS PVT. LTD., M/s Bose Engineering (India) Pvt. Ltd M/s Technocrat Enterprisers, M/s AMARA RAJA POWER SYSTEM LIMITED. M/s Nitya Electrocontrols Pvt. Ltd,
220/132/33 KV Auto Transformer & 220/33 KV Power transformer		a) M/s GE T & D India Ltd, Bhubaneswar b) M/s BHEL., Bhubaneswar c) M/s Transformers And Electricals Kerala Limited, Kerala d) M/s Toshiba T&D Systems (India) Pvt Ltd, Rudraram, AP. e) M/S Emco Ltd,Thane Note: Any other manufacturer, who has been recently techno commercially qualified in OPTCL tender & it's price bid has been opened is also to be considered for vendor.
132/33kV Power Transformers		a) M/s ABB India Ltd, Bhubaneswar b) M/S BHEL., Bhubaneswar c) M/s Bharat Bijlee Ltd, Kolkata. d) M/s Transformers And Electricals Kerala Limited, Kerala e) M/s Transformer & Rectifiers India Ltd, Ahmedabad f) M/s GE T & D India Ltd, Bhubaneswar g) M/s Toshiba T&D Systems (India) Pvt Ltd, Rudraram, AP. h) M/S Emco Ltd, Thane Note: Any other manufacturer, who has been recently techno commercially qualified in OPTCL tender & it's price bid has been opened is also to be considered for vendor.

220,132&33 KV GIS equipment as per IEC	a) M/S Siemens Limited. b) M/S ABB Limited c) M/S GE T&D Limited d) M/S Toshiba T&D Limited. Note: Any other manufacturer, who is meeting the qualifying requirement as mentioned specifically in QR in the respective tender document for GIS equipment are also to be considered.
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15. Portable Fire Extinguisher: (ANNEXURE-I)

Portable fire extinguishers of the following types shall be supplied to each sub-station.

Sl No	Description of Items	Unit	capacity	Quantity Required		
				At each 132/33 S/S kV	At each 220/132/33 kV S/S	At each 220/33 kV S/S
1	Foam Type	Nos	9 ltrs	2	4	4
2	Dry chemical Powder Type (Trolley mounted)	Nos	22.5 Kgs	2	4	2
3	Dry Powder Type	Nos	5 Kgs	2	4	2
4	Carbon Dioxide (CO ₂)	Nos	4.5Kgs	5	10	5
5	Carbon dioxide (CO ₂)Trolley mounted	Nos	22.5 Kgs	2	4	2
6	Fire bucket with (a set comprises of six nos Bucket in each stand & one stand)	Set		3	5	3
7	9 litre water type	Nos	9 litre	4	4	4
8	50 Litres Mechanical Foam type	Nos	50 Litres	2	2	2

The quantities are indicative. Bidders are advised to design as per the requirement.

16. Maintenance & Testing Equipment:**(ANNEXURE-II)**

Maintenance & testing equipment shall be supplied & installed for each substation as per the list given below.

Sl. No	Description of Items	Unit	Quantity Required			
			At each 400/220 KV S/S	At each 220/132/33 KV S/S	At each 220/33 KV S/S	At each 132/33 KV S/S
1.	160 kv transformer oil breakdown voltage test set	Nos	1	1	1	1
2.	Insulation resistance tester (megger)	Nos	1	1	1	1
3.	Oil sampling bottle	Nos	4	4	4	4
4.	SF6 gas leak detector	Nos	1	1	1	1
5.	LCD, digital multimeter	Nos	2	2	2	2
6.	Analogue Multimeter(features same as digital multimeter)	Nos	1	2	1	1
7.	LCD, clamp on meter	Nos	2	2	2	2
8.	Digital earth tester	Nos	1	1	1	1
9.	Discharge rod as per standard for carrying out the switch yard maintenance work	Nos	6	6	6	6
10.	Rubber gloves of operation of isolators and earth switch	Pairs	2	2	2	2
11.	Relay tools kit	Sets	1	1	1	1
12.	Portable emergency light	Nos	4	4	4	4
13.	Latest version desktop PC of reputed make with all its accessories including CPU, Monitor, UPS and having all latest loaded software and also its back up in shape of CD and separate pen drive . Suitable for loading of software as recommended by the relay manufacturer. It includes supply of one no portable laser printer of reputed make. Make of PC and printer: HP/DELL	Set	1	1	1	1

** The multi meters (both digital and analogue), clamp on meters, shall of “Fluke/Megger/Motwane” make. Prior approvals of OPTCL for all the testing equipments are to be taken.

*** Earth tester & Insulation resistance tester shall of M/S Megger.

**** The oil BDV tester shall be of microprocessor based having printing facility

17. Other Tools and Plants (T&P's) Requirement:(ANNEXURE-III)

Following T&P's of reputed make shall be supplied & installed at each substation.

SI No	Description of Items	unit	Quantity Required			
			At each 400/220 KV S/S	At each 220/132/33 KV S/S	At each 220/33 S/S	At each KV 132/33 KV S/S
1	Set of "D" spanner(6mm – 42mm)	Set	1	1	1	1
2	Set of "Ring" spanner(6mm – 42mm)	Set	1	1	1	1
3	Socket wrench with sockets, handles, and other attachment(6mm-42mm)	Set	1	1	1	1
4	Insulated cutting plier	Nos	2	2	2	2
5	Insulated nose plier	Nos	2	2	2	2
6	Monkey plier	Nos	1	1	1	1
7	Circlip plier	Nos	1	1	1	1
8	Pipe wrench a)12 inch – 1 no b)18 inch – 1 no	Set	1	1	1	1
9	Sly wrench a)12inch – 2 nos b)18inch – 1 no	Set	1	1	1	1
	Insulated handle screw drivers of different sizes as per required a)12inch plain head – 2 nos b)8inch plain head – 2 nos c) 12inch star head – 1 no d) small size6inch plain and star head – 2 each e)Complete set of different head in one box/set -1set	Set	1	1	1	1
11	"L"-N keys set of different sizes in one box/set	Set	1	1	1	1
12	M.S Files(12inch and 6inch sizes) Round files and flat files-one each of different sizes)	set	1	1	1	1
13	Hammar with handle a)1 lb – 2 nos b)1/2 lb-2 nos c)2 lb-1 no	Set	1	1	1	1
14	Crow bar a)5 ft – 2nos b)3ft-2 nos	set	1	1	1	1
15	Steel scale(12inch)	Nos	2	2	2	2
16	Steel tape a)5 mtrs-2 nos b)30mtrs-1 no	Set	1	1	1	1
17	Oil cane	Nos	2	2	2	2
18	Spirit level (8inch)	No	2	2	2	2
19	Plumb head with string and attachment	No	1	1	1	1
20	Maintenance safety belt with all attachment and helmets(complete one set)	Set	3	4	3	3
21	Hand drill machine with different bits and key.(Wolf make)	No	1	1	1	1
22	Vacuum cleaner having hot blower provision with all attachments (Eureka	No	1	1	1	1

SI No	Description of Items	unit	Quantity Required			
			At each 400/220 KV S/S	At each 220/132/33 KV S/S	At each 220/33 S/S	KV 132/33 KV S/S
	Forbes make)					
23	230-250VAC,80W,450mm sweep,1400 rpm stand(rugged) FAN Make: Almonard,CGL	No	4	4	2	2

** T&P's shall be of Taparia/Geodre make. The hand drill and vacuum cleaner shall be wolf and Eureka Forbes make.

18. Office Furniture:**(ANNEXURE-IV)**

Office furniture shall be supplied & installed at each substation as per the list given below. All the furniture shall be of Godrej make. Before supply of the furniture to the sub-station, approval from OPTCL is required. Details of the scope of supply are as indicated below.

SI No	Description of Items	unit	Quantity Required		
			At each 132/33 KV S/S	At each 220/132/33 KV S/S	At each 220/33 KV S/S
1	5ftX3ft executive table with drawer both sides	Nos	5	6	5
2	3ftX2&1/2ft Table with one side drawer	Nos	7	8	7
3	Computer table suitable keeping monitor, CPU,UPS and printer with two nos revolving arm chair suitable for computer use.	Set	1	1	1
4	Executive revolving ,adjustable (height) chairs with arm	Nos	5	6	5
5	Cushion fixed type steel chairs with arm	Nos	18	24	18
6	6ftX3ft conference table	Nos	1	1	1
7	Cushion arm steel chairs for conference table purpose.	Nos	6	8	6
8	6ft height steel almirah (only with selves) for keeping records and other valuable items.	Nos	4	6	4
9	6ft height steel almirah with glass doors for library purpose	Nos	2	2	2
10	6ft height (having minimum 6 lockers facility) steel cupboard with locking arrangement.	Nos	2	2	2
11	4ft steel rack (minimum three selves) for keeping the files and other items.	Nos	8	10	8

Note: The selection of the above furniture shall be based on the latest models of Godrej make. The firm to obtain approval on the models to be supplied prior to finalization from the Engineer in Charge.

19. PORTABLE ALUMINIUM LADDER EXTENDABLE TYPE OF 3m+ 3m TO BE USED FOR MAINTENANCE OF EQUIPMENT INSIDE SWITCH YARD.

Heavy duty Two fold with sliding feature aluminum ladder to be used for the maintenance work equipment in the switch yard (400 KV, 220 KV, 132 KV & 33 KV: Breaker, CT, CVT, Isolators etc) & also street lighting maintenance. Each fold will be of minimum height of 3 Mtrs and should have better locking arrangement between each folds for better rigidity.

20. PEDESTAL MOUNTED WHEEL FITTED DERRICK FOR LIFTING/ LOWERING OF MATERIALS UP TO 1.5 TON CAPACITY.

Heavy duty Pedestal mounted wheel fitted derrick for lifting/ lowering of materials up to 1.5 ton capacity to be used for the maintenance work equipment in the switch yard (400 KV, 220 KV, 132 KV & 33 KV: Breaker, CT, CVT, Isolators etc) & also other maintenance works. The height of the derrick/platform will be suitable for lowering of the top pole of the circuit breaker up to 400 KV and other equipment upto 400 KV.

END OF VOLUME-II –SECTION-I (SCOPE OF WORK)