ଓଡିଶା ବିଦ୍ୟୁତ୍ ଶକ୍ତି ସଂଚାରଣ ନିଗମ ଲିଃ.

**ODISHA POWER TRANSMISSION CORPORATION LIMITED**

**PACKAGE -26/2021-22:**

**Engineering, Supply, Erection and Commissioning of "Construction of 02 nos. of 33kV Bays along with 01 no. of 33kV Bay swapping at 220/33kV Grid Sub-station Govindpalli for evacuation of Power from 18 MW SHEP of Sri Avantika Power Project Pvt. Ltd. under EHT (C) Division, Jaypore on "Turnkey CONTRACT BASIS"**

# VOL-II-SECTION-I

## SCOPE OF WORKS

**NOTICE INVITING TENDER-NIT NO. CPC-26/2021-22**
**TENDER SPECIFICATION NO:**
**Sr. G.M- CPC-TENDER- PACKAGE- 26/2021-22**

# 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 CORPOTATION LIMITED) is strengthening their Transmission and Distribution systems by way of constructing the following sub-station & bay extensions at Sub-station, Transmission line & associated system at different location in Odisha.

**PACKAGE -26/2021-22:**

**Engineering, Supply, Erection and Commissioning of "Construction of 02 nos. of 33kV Bays along with 01 no. of 33kV Bay swapping at 220/33kV Grid Sub-station Govindpalli for evacuation of Power from 18 MW SHEP of Sri Avantika Power Project Pvt. Ltd. under EHT (C) Division, Jaypore on "Turnkey CONTRACT BASIS**"..

The indicative layout diagram & SLD of the proposed sub-station & associated transmission line 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 bay extension 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, construction of Transmission line & associated system, as detailed in the specifications and schedule of quantities and in subsequent. An indicative SLD of the substation/ bay extension 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), Tower (Line), equipment foundation(S/S), construction of earth mat, cable trench, drainage system, Fencing etc (if required).

**(vi)** Erection, testing, commissioning of all equipment & accessories **including the existing equipment & accessories** and handing over of the substation/ bay extension and transmission line 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**:-

**PACKAGE- 26/2021-22: Engineering, Supply, Erection and Commissioning of "Construction of 02 nos. of 33kV Bays along with 01 no. of 33kV Bay swapping at 220/33kV Grid Sub-station Govindpalli for evacuation of Power from 18 MW SHEP of Sri Avantika Power Project Pvt. Ltd. under EHT (C) Division, Jaypore on "Turnkey CONTRACT BASIS**".

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.

| | |
|---|---|
| i) | Supply of all equipment & materials for the bay works of the sub-station. |
| ii) | Detailed design of the balance work of sub-station. |
| 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 balance 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 |
| viii) | Erection, testing, commissioning of all equipment & accessories **including the existing equipment & accessories** and handing over of the substation in complete in all respect as per approved scheme and to the satisfaction of the Employer including statutory inspection. |
| ix) | **Name of the work**: **Construction of 02 nos. of 33kV Bays along with 01 no. of 33kV Bay swapping at 220/33kV Grid Sub-station Govindpalli for evacuation of Power** |

| | |
|---|---|
| | **from 18 MW SHEP of Sri Avantika Power Project Pvt. Ltd .**<br><br>**Details of Sub-station are as follows:**<br>**(1) 05** Nos 220 KV Bays (Feeder bay- 02, Transformer bay-02, B/C Bay-01) .<br>**(2) 07** Nos 33 KV Bays (Feeder bay- 04, Transformer bay-02, B/C Bay-01).<br>***(3) 02 nos of Unequipped bays are to be equipped for utilization of power evacuation of Avantika Power Project Pvt. Ltd.***<br><br>**Details of Provisions to be kept in the Sub-station are as follows:**<br><br>***(1)*** *Supply and installation of equipment & materials including station transformer as per BPS (including all civil works).*<br>***(2)*** ~~*Construction of balance work of Control Room building & other system like illumination of building, ventilation, firefighting & smoke detection facility etc as per BPS and specification.*~~<br>***(3)*** ~~*Construction of Colony Quarters & other system as per BPS and specification.*~~<br>***(4)*** *Provision of store shed, earthing, fencing, roads, drains, gates, security shed, water arrangement, Lighting cum Lightning Masts, Switchyard illumination and all other civil works etc as per BPS & specification.*<br>***(5)*** *Settlement of all issues related to right of Way & responsibilities of acquiring Right of Way (ROW) lies with contractor at his risk and cost.*<br>*(6) Responsibilities of getting clearance from Railway (if applicable), NHAI (if applicable), Forest (if applicable), Water and other Statutory/Govt. bodies lie with the contractor at his risk and cost (except payment of statutory fees).*<br>*(7) Testing and commissioning of Substation equipment & accessories.*<br>**(8)** Handing over of the completed system to the Owner including materials reconciliation with closure proposal. |
| x) | ~~**(1)** Supply, Installation, testing & commissioning of OPGW related equipment and materials as per specification & price schedule. The link shall be as per the SLD enclosed.~~ **~~(if required)~~**<br>~~**(2)** Testing and commissioning of Substation.~~<br>~~**(3)** Handing over of the completed system to the Owner~~ |
| xi) | **Following scope of activities against obtaining Forest Clearances are highlighted-**<br>**Not Applicable** |
| xii) | **Time is the essence of the contract. All the work as indicated in the Price Schedule shall be in the PERT Chart for approval by the authority at the beginning of contract.**<br>Satisfactory conclusion of the Contract. |

*** BUS CONFIGURATION FOR 220KV SYSTEM IS TWO MAIN BUS & ONE TRANSFER BUS ARRANGEMENT AND 132 KV & 33 KV SYSTEM IS SINGLE MAIN BUS & ONE TRANSFER BUS ARRANGEMENT. MAIN BUSES SHALL BE WITH TWIN ACSR MOOSE CONDUCTOR. (220kV, 132 KV & 33 KV MAIN BUS)**

****RESERVE/TRANSFER BUS SHALL BE WITH SINGLE ACSR MOOSE CONDUCTOR.**

**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.

*** Important Instruction: Wherever, bay extension works are involved the bidder should take care to match with the existing system for aesthetic view. Bidder should visit the site before participating in the tender.

2.1 The scope of work is not limited to the respective bidding proposal (Price Schedule) submitted by the bidder. Any work which is not included in the Price Schedule, but specified in the Technical Specification (Volume-II), is deemed to be included in the Scope of Works without any financial implication to the OPTCL. However, if the same is not specified either in the Technical Specification and Price Schedule, it shall be executed by the Contractor for completion of package(s)/works. The price of such works shall be decided mutually between the Contractor and OPTCL.

2.2 In case there is any discrepancy in the item description between the BOQ of the Price Schedule and the Technical Specification, the Technical specification shall prevail and the Bidder(s) should quote accordingly.

2.3 If the Unit of Measurement in the BOQ as per the Price Schedule is given in lot(s) or set(s) or lump-sum basis, the Unit(s) of parts constituting the lot(s) or set(s) or lump-sum should be quoted based on the technical specification.

### 2.4. Substation

#### 2.4.1. Electrical

The scope includes but is not limited to

**i) Supply erection, testing & commissioning of the all the equipments and accessories to complete the sub-station (as per BPS) including testing and commissioning of all equipments and accessories including the existing (i.e. owner supply items):**

a) Circuit breakers (if required)

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) Busbar, 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) SAS, Bus Bar Protection & Control and relay panels as proposed.

u) Event logger panel. (132/33 KV Sub-station): (if required).

v) AC and DC distribution boards as per requirement and as proposed.

w) Bus bar protection scheme (for 132 KV & 33kV bus).

x) ~~Disturbance recorder with Time synchronization. (GPS)~~

y) Sub-station level PC/Lap top provision for Relay configuration with their software. (if required).

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) Erection, testing & commissioning of the following equipment**

~~Power transformers /auto transformers~~/ Station Transformer

**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.~~

**2.4.2. Civil works (as per site requirement to complete the Sub-station)**

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. Ant 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~~ bays 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 lightening 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.

**2.5. Transmission lines. (NOT APPLICABLE)**

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 (For Sub-station & Transmission Line): (Transmission line is not applicable)**

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 Transformer1425/1050/650/170
   iii)Transformer 1050/650/170
5. Power Frequency withstand voltage (KV rms)520/460/275/80
6. System fault level KA 63/40/40/25
7. Creepage distance for insulators (mm)10500/6125/3625/900
8. Min. recommended clearance in air (mm) as per CBIP
   i) Phase-to-phase3900/2160/1300/320
   ii) Phase-to-earth3400/2160/1300/320
   iii)Sectional clearance6500/5000/4000/3000
9. Min. ground clearance (as per IE Rules)8000/5500/5000/4000
10. Bus configuration for 400/220/132/33 kV
    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/Cartoons, 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 posses 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 posses appropriate valid supervisory certificate of competency issued ELBO, Odisha.

iv) At least 50% of electrical workmen employed in the project shall posses 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 | | | | | | |

| SL No. | Description | With Bids | Post Order | | Final Document | | |
|---|---|---|---|---|---|---|---|
| | | | For Review | For Records | Transparency | Prints (Photostat) | Electronic |
| 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 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.<br>a) Specification<br>b) Document/ attachments. | | | | | | |
| 27. | List of spare parts foreach major equipment. | | | | | | |
| 28. | List of special tools and tackles. | | | | | | |
| 29. | List of sub-vendors. | | | | | | |
| 30. | QA plan of vendor | | | | | | |

| SL No. | Description | With Bids | Post Order | | Final Document | | |
|---|---|---|---|---|---|---|---|
| | | | For Review | For Records | Transparency | Prints (Photostat) | Electronic |
| 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<br>a)Installation Manual<br>b) Operating/Maintenance.<br>c)Catalogues/ Brochures. | | | | | | |
| | **FOR TRANSMISSION LINE (Not Applicable)** | | | | | | |
| 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.<br>a) Specification<br>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<br>a)Installation Manual<br>b) Operating/Maintenance.<br>c) Catalogues/ Brochures. | | | | | | |

**11. Minimum clearance for substation 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 coordinatio.. ( *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: **(NOT APPLICABLE)**

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 (NB:- The validity of Approved vendors may be ascertained before placing order).

| | | |
|---|---|---|
| **Breaker** | | |
| Breaker ( up to 400 KV Spring-Spring,SF-6) | | M/s ABB India Ltd, Bengaluru |
| | | M/s CG Power and Industrial Solutions Ltd, Kolkata |
| | | M/s GE T&D India Limited, Bhubaneswar |
| | | M/s. Siemens Limited, Kolkata |
| **VCB** | | |
| 33 KV Spring-Vacuum, 1600A, 25 kA | | M/s Shreem Electric Ltd., Maharastra, |
| | | M/s. Stelmec Limited, Mumbai |
| | | M/s BHEL |
| **CT** | | |
| CT of 0.2S Accuracy class up to 400 KV | 1 | M/s CG Power and Industrial Solutions Ltd, (Kolkata |
| | | M/s GE T&D India Limited, Bhubaneswar |
| | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, 21st Floor, World Trade Centre, Bengaluru |
| CT of 0.2S Accuracy class up to 220 KV | 1 | M/s CG Power and Industrial Solutions Ltd, (Kolkata |
| | | M/s GE T&D India Limited, Bhubaneswar |
| | | M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. Telengana |
| | | M/s Hivoltrans Electricals Pvt Ltt, Gujarat |
| | | M/s Mehru Electrical & Mechanical Engineers (P) Ltd, Bhiwadi |
| | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, 21st Floor, World Trade Centre, Bengaluru |
| CT of 0.2S Accuracy class up to 132 KV | | M/s Pragati Electricals Pvt Ltd, Navi Mumbai |
| | | M/s Kapco Electric Pvt. Ltd, Noida |
| | | M/s.Vishal Transformers & Switchgears Pvt. Limited, Meerut |
| | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, 21st Floor, World Trade Centre, |

| | | |
|---|---|---|
| | | Bengaluru |
| **PT (IVT)** | | |
| PT/ IVT of 0.2S Accuracy class up to 400 KV | | M/s CG Power and Industrial Solutions Ltd, Kolkata<br>M/s GE T&D India Limited, Bhubaneswar |
| PT/ IVT of 0.2S Accuracy class up to 220 KV | | M/s GE T&D India Limited, Bhubaneswar |
| | | M/s Mehru Electrical & Mechanical Engineers (P) Ltd, Bhiwadi |
| | | M/s Vidyuth Control Systems Pvt. Ltd, Secunderabad |
| | | M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. Telengana |
| | | M/s Hivoltrans Electricals Pvt Ltt, Gujarat |
| | | |
| PT/ IVT of 0.2S Accuracy class up to 132 KV | | M/s Pragati Electricals Pvt Ltd, Navi Mumbai |
| PT of 0.2 Accuracy class up to 33 KV | | M/s. Straton Electricals Pvt. Limited, Hyderabad |
| | | M/s.Vishal Transformers & Switchgears Pvt. Limited, Meerut |
| **Surge Arrestor/ LA** | | |
| Surge Arrestor up to 400 KV | | M/s CG Power and Industrial Solutions Ltd, Kolkata |
| | | M/s Lamco Industries Pvt Ltd, Hyderabad |
| | | M/s Oblum Electrical Industries Hyderabad |
| Surge Arrestor up to 220 KV | | M/s Electrolites (Power) Pvt. Ltd, Jaipur |
| | | M/s Shreem Electric Ltd., Jaysingpur |
| **CVT** | | |
| CVT of 0.2 accuracy class up to 400 KV | | M/s ABB India Ltd, Bengaluru |
| | | M/s CG Power and Industrial Solutions Ltd, Kolkata |
| | | M/s GE T&D India Limited, Bhubaneswar |
| | | M/s. Siemens Limited, Kolkata |
| CVT of 0.2 accuracy class up to 132 KV | | M/s Mehru Electrical & Mechanical Engineers (P) Ltd, Bhiwadi |
| **Hardware fitting** | | |
| Hardware fitting up to 400KV | 1 | M/s Supreme & Company Pvt. Ltd., Kolkata |
| | | M/s Electromech & Transtech Pvt. Ltd., Kolkata |
| | | M/s KSE Electricals Pvt. Ltd, Kolkata |
| | | M/s Krsna Transmission Hardware Mfg. Pvt. Ltd,Vadodara |
| | | M/s IAC Electricals Pvt. Ltd, Kolkata |
| | | M/s Transmission Line Products, Kolkata |
| | | M/s Swamiji Transmission Pvt Ltd, Kolkata |
| | | M/s Legion Energy, Bangaluru |
| | | |
| | | |
| Hardware fitting up to 220KV | | M/s. Jainco Transmission Limited, |
| | | M/s Aumni Transmission Industry Pvt. Ltd, Vadodra, |

| | | |
|---|---|---|
| | | M/s Nike Energy Manufacturing Pvt Ltd, Varanasi |
| **Clamp & Connectors** | | |
| Clamp and Connector | 1 | M/s Supreme & Company Pvt. Ltd., Kolkata |
| | 2 | M/s Electromech & Transtech Pvt. Ltd., Kolkata |
| Clamp and Connector up to 400 KV | | M/s KSE Electricals Pvt. Ltd, Kolkata |
| | | M/s Swamiji Transmission Pvt Ltd, Kolkata |
| | | M/s Legion Energy, Bangaluru |
| | | M/s Industrial Spare Products, |
| | | M/s Exalt Enginering Industries, Mumbai |
| | | M/s Premier Power Products (Cal) Pvt. Ltd, Kolkata |
| Clamp and Connector up to 220 KV | | M/s Krsna Transmission Hardware Mfg. Pvt. Ltd,Vadodara |
| | | M/s. Jainco Transmission Limited, Kolkata |
| | | M/s Aumni Transmission Industry Pvt. Ltd, Vadodra, |
| **Conductor** | | |
| Conductor (ACSR & AAAC) | 1 | M/s Anvil Cable Pvt. Ltd, Kolkata |
| | 2 | M/s Lumino Industries Ltd, Kolkata |
| | 3 | M/s Mahavir Transmission Limited, Noida |
| | | M/s Dynamic Cables Private Ltd, Jaipur |
| Conductor (ACSR & AAAC) | | M/s Gupta Power Infrastructure Limited, Bhubaneswar |
| | | M/s Sterlite Power Transmission ltd, New Delhi |
| | | M/s Shashi Cables ltd, Lucknow |
| | | M/s Cabcon India Limited, Kolkata |
| | | M/s Polycab Wires Pvt. Ltd, Mumbai |
| | | M/s Hindusthan Urban Infrastructure Ltd, New Delhi |
| | | M/s Galaxy Transmissions Privale Limited, Sangli |
| | | M/s JSK Industries Pvt. Ltd, Silvassa |
| | | M/s Tirupati Conductors Pvt Ltd, Bhubaneswar |
| ACSR (Moose, Zebra and Panther | | M/s PRATEEK WIRES PVT LTD, Kolkata |
| **GI Earthwire** | | |
| GI Earthwire (7/3.15 mm & 7/3.66 mm) | | M/s Nirmal Wires Pvt. Ltd, Kolkata |
| | | M/s Cabcon India Limited, Kolkata |
| | | M/s Geekay Wires Ltd, Hyderabad |
| **OPGW Cable with Hardware Accessories** | | |
| OPGW Cable Hardware Accessories | | M/s Krsna Transmission Hardware Mfg. Pvt. Ltd, Vadodara |
| | | M/s Aumni Transmission Industry Pvt. Ltd, Vadodra, |
| OPGW Cable with Hardware Accessories | | M/s Sterlite Power Transmission ltd, New Delhi |
| | | M/s TG ADVAIT INDIA PVT LTD, Ahmedabad |
| | | M/s ZTT india Private Limited, A.P |
| **INSULATORS** | | |
| Porcelain Long rod Insulators & Solid core Post Insulators | | M/s Modern Insulators Limited, Rajstan |

| | | |
|---|---|---|
| Porcelain solid core post Insulator/ Porcelain Bus Post Insulator) up to 400 KV | | M/s SARAVANA GLOBAL ENERGY LIMITED. Chennai |
| Solid core Post Insulators | | M/s CJI Porcelain Pvt. Ltd, New Delhi |
| Composite Polymer Insulator & Composite Polymer Bus Post Insulator up to 400 KV | | M/s Deccan Enterprises Ltd, Hyderabad |
| Composite Polymer Insulator & Silicon Rubber Composite Polymer Insulator (up to 220KV-160KN) | | M/s Spark Insulators Pvt. Ltd., Hyderabad |
| DISC INSULATOR (160KN, 120KN, 90KN), ANTIFOG & NORMAL TYPE | | M/s Imperial Ceramics Pvt. Ltd., Bikaner |
| | | M/s Bikaner Ceramics Private Limited, Bikaner |
| | | M/s Allied Ceramics Pvt. Ltd, Kolkata |
| | | M/s Grasim Industries Limited, , West Bengal |
| DISC INSULATOR (120KN, 90KN), ANTIFOG & NORMAL TYPE | | M/s Hindustan Chemicals, Khurja |
| Porcelain Disc Insulator/ Porcelain Bus Post Insulator | | M/s Insulators& Electricals Company, New delhi |
| Composite polymer Insulator (up to 400 KV-160 KN)" | | M/s Shree Radhe Industries, Vadodara |
| | | M/s TRP Sealing Systems (India) Pvt. Ltd. Medchal |
| Composite Polymer Insulator (up to 220KV-120KN)" | | M/s Yamuna Power & Infrastructure Limited, Jagadhri |
| **ISOLATORS** | | |
| ISOLATOR up to 400KV | | M/s. Switchgears & Structurals (India) Pvt. Ltd, Hyderabad |
| | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, 21st Floor, World Trade Centre, Bengaluru |
| | | M/s GR Power Switchgear Ltd, Hyderabad |
| | | M/s. Switchgears Manufacturing Company Pvt Ltd, Hyderabad |
| 220 V Battery Charger for VRLA & Plante Type | | M/s Amara Raja Power Systems Ltd, Tirupati |
| | | M/s Statcon Energiaa Pvt Ltd, Noida |
| | | M/s Voltech Manufacturing Company Ltd, Chennai |
| | | M/s. Chloride Power Systems and Solutions Ltd., Kolkata |
| **EHV Grade XLPE Cable (both Al & Cu)** | | |
| EHV Grade XLPE Cable (both Al & Cu) up to 220KV | 1 | M/s KEI Industries Limited, Kolkata |
| | 2 | M/s UNIVERSAL CABLES LIMITED, Kolkata |
| | | M/s KEC International Limited, Mumbai |

| | | |
|---|---|---|
| | | M/s Cable Corporation of India Ltd, Mumbai |
| EHV Grade XLPE Cable (both Al & Cu) up to 132KV | | M/s LS Cable India Pvt Ltd, |
| | | M/s Finolex J-Power Systems Pvt. Ltd, Pune |
| EHV Grade XLPE Cable (Both Al & Cu) up to 33 KV | | M/s Dynamic Cables Private Ltd, Jaipur |
| | | M/s Polycab Wires Pvt. Ltd, Mumbai |
| | | M/s Crystal Cable Industries Ltd, Kolkata |
| | | M/s Havells India Ltd, Bhubaneswar |
| | | M/s Gemcab Industries ltd, New delhi |
| **Cable End termination Kit for 220kV/132kV/33kV** | | |
| Cable End termination Kit up to 400 kV | | M/s Pfistere<br>M/S NYK<br>M/S ABB |
| | | |
| Cable end termination Kit up to 220 KV | | M/s Pfistere<br>M/S NYK<br>M/S ABB<br>M/s Raychem RPG (P) Ltd. Kolkata |
| Cable end termination Kit up to 132 KV | | M/S 3M |
| **Fire Fighting Equipment (Portable type & Trolley mounted Mobile type)** | | |
| Fire Fighting Equipment (Portable type & Trolley mounted Mobile type) | | M/s Laxmi Fabricators, Mumbai |
| | | **M/s Kanadia Fyr Fyter Pvt. Ltd**, Sihor |
| **Station Transformer** | | |
| Station Transformer (33/ 0.433 KV) up to 500 KVA | | M/s Orissa Transformers Pvt. Ltd., Bhubaneswar |
| Station Transformer (33/ 0.433 KV) up to 250 KVA | | M/s Esennar Transformers (P) Ltd, Telengana |
| | | M/s Guru Teg Bahadur Metal Works, Punjab |
| Station Transformer (33/0.433 KV) up to 1000 KVA | | M/s Toshiba Transmission & Distribution Systems(India) Pvt.Ltd. Telengana |
| | | M/s Voltech Manufacturing Company Ltd, Chennai |
| **Lighting Fixture** | | |
| | | M/S Philips |
| | | M/S CG |
| | | M/S Bajaj |
| | | M/S Havels |
| | | M/S Surya |
| | | M/S SYSKA |
| | | |
| **CONTROL, PROTECTION & SAS SYSTEM** | | |
| Conventional Control & | | M/s GE T&D India Limited, Bhubaneswar |

| | | |
|---|---|---|
| Relay Panel, , Event Logger, Disturbance Recorder (up to 400 KV) | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, Bengaluru |
| | | M/s Schneider Electric Infrastructure Ltd |
| | | M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Medak, |
| **NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS** | | |
| NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS up to 400 KV | | M/s GE T&D India Limited |
| | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, Bengaluru |
| | | |
| NUMERICAL RELAYS, IEC-61850 & AUXLIARY RELAYS up to 220 KV | | M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Medak, |
| AUXLIARY RELAYS, IEC-61850 up to 132 kV | | M/S GE,M/S ABB,M/S Siemens |
| **SUB-STATION AUTOMATION PANELS** | | |
| SUB-STATION AUTOMATION PANELS up to 400 kV | | M/s GE T&D India Limited, Bhubaneswar |
| | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, Bengaluru |
| | | M/s GE T&D India Limited |
| SUB-STATION AUTOMATION PANELS up to 220 kV | | M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Telengana |
| 132/33kV S/S (132 kV & 33 kV) BCU based CR panel with SAS | | M/s Schneider Electric Infrastructure Ltd, Bhubaneswar |
| **GIS Equipments for indoor sub station** | | |
| GIS Equipments for Indoor GIS Sub Station up to 400,220,132 KV | | M/s. Siemens Limited, Kolkata |
| | | M/s ABB India Ltd, 21st Floor, Bengaluru<br>M/s Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Medak,<br>M/S GE T&D Ltd<br>M/S Hyosun |
| GIS Equipments for indoor sub station up to 33 KV | | M/s. Siemens Limited, Kolkata<br>M/s ABB India Ltd, 21st Floor, Bengaluru<br>M**/s Schneider Electric infrastructure Ltd** |
| **GI Nuts & Bolts** | | |
| GI Nuts & Bolts | 1 | M/s Supreme & Company Pvt. Ltd., Kolkata |
| | 2 | M/s Shivam Auto Forge, LUDHIANA |
| | | M/s ASP Pvt. Ltd, Howrah |
| | | M/s PIONEER NUTS & BOLTS PVT LTD, LUDHIANA |

| | | |
|---|---|---|
| | | M/s. Perfect Industries Ltd, Ludhiana |
| | | M/s Garg Fasteners, Ludhiana |
| | | M/s Shree Ambey Metal Industries Ltd, Ludhiana |
| | | M/s Sterling Bolts pvt ltd, Kolkata |
| | | M/s Remax (India), Ludhiana |
| | | M/s A.V.Forgings, Punjab |
| | | M/s Remax Fastners Industries, Punjab |
| **STEEL** | | |
| STEEL (Including TMT Bars)" | 1 | SAIL |
| | 2 | TATA |
| | | RINL |
| | | JINDAL |
| | | |
| **Galvanized Earthing Pipe** | | |
| Galvanized Earthing Pipe | | M/s J.D. FABRICATION, Balasore |
| **Galvanized Earthing Flat & Foundation Bolts** | | |
| Galvanized Earthing Flat & Foundation Bolts | | M/s J.D. FABRICATION, Balasore |
| **ACDB /DCDB / BMK / CONSOLE BOX** | | |
| ACDB /DCDB / BMK / CONSOLE BOX | | M/s UNITED ENGINEERS PVT LTD, BHUBANESWAR |
| | | M/s Amara Raja Power Systems Ltd, Tirupati |
| | | M/s. Bose Engineering (India) Pvt. Ltd, Kolkata |
| | | M/s S R Automation Pvt. Ltd, Kolkata-700103 |
| | | M/s AIM Engineering Industries, Kolkata |
| | | M/s Control Devices, Kolkata- |
| | | M/s Electro Allied Products, Kolkata |
| | | M/s. S.K .Engineers India Pvt. Limited, Bhubaneswar |
| | | M/s Technocrat Enterprises, Cuttack |
| | | M/s. Ultima Switchgears Limited, New delhi |
| | | M/s Nitya Electrocontrols Pvt Ltd, Noida |
| | | M/s Baid Power Services Pvt. Ltd, Kolkata |
| **LT XLPE Cable of 1100 V** | | |
| LT XLPE Cable of 1100 V | | M/s Dynamic Cables Private Ltd, Jaipur |
| | | M/s Vishal Cables Pvt. Ltd, Mumbai- |
| | | M/s Zenium Cables Ltd, Mumbai- |
| | | M/s Paramount Communications Ltd, New Delhi |
| | | M/s Havells India Ltd, Bhubaneswar |
| | | M/s Prime Cable Industries Pvt Ltd, Delhi |
| | | M/s Ravin cable Ltd, 302, Mumbai |
| | | M/s Alpha Communication Ltd, Delhi |
| | | M/s Gupta Power Infrastructure Limited, Bhubaneswar |
| | | M/s CMI Energy India Pvt. Ltd, New Delhi |

| | | |
|---|---|---|
| **PVC INSULATED POWER & CONTROL CABLES ( with Type-C Insulation )** | | |
| PVC INSULATED POWER & CONTROL CABLES ( with Type-C Insulation ) | | M/s Grid India Power Cables Pvt. Ltd, Haryana |
| | | M/s Dynamic Cables Private Ltd, Jaipur-302013, |
| | | M/s Prime Cable Industries Delhi |
| | | M/s Genus Electrotech Ltd, Gujarat |
| | | M/s KEI Industries Ltd, Kolkata |
| | | M/s Universal cables Ltd, Kolkata |
| | | M/s Paramount Communications Ltd, New Delhi |
| | | M/s Zenium Cables Ltd, Mumbai |
| | | M/s Vishal Cables Pvt. Ltd, Mumbai |
| | | M/s Polycab Wires Pvt. Ltd, Mumbai- |
| | | M/s CMI Energy India Pvt. Ltd, New Delhi |
| | | M/s Cabcon India Limited, Kolkata |
| | | M/s Crystal Cable Industries Ltd, Kolkata |
| | | M/s Volts Energy Incorporation, Himachal Pradesh, |
| | | M/s. Gloster Cables Ltd, Secunderabad |
| | | M/s. Ashoka Industries, Jajpur |
| | | M/s Ravin cable Ltd, 302, Mumbai |
| | | M/s Alpha Communication Ltd, Delhi |
| | | M/s Gupta Power Infrastructure Limited, Bhubaneswar |
| | | M/s Gemcab Industries ltd, New delhi |
| TELECOMMUNICATION ITEMS | | |
| **48 V Battery Charger** | | |
| 48 V DC Battery Charger for VRLA | | M/s Amara Raja Power Systems Ltd, Tirupati |
| | | M/s. Chloride Power Systems and Solutions Ltd., Kolkata |
| **Digital PLCC, Protection Coupler, FSK Modem for VFT** | | |
| Digital PLCC, Protection Coupler, FSK Modem for VFT up to 400 KV | | **M/s GE T&D India Limited,** Bhubaneswar, Mail: |
| | | **M/s ZIV Automation India Ltd**, Bangalore |
| | | **M/s. Siemens Limited**, Kolkata |
| | | **M/s ABB India Ltd**, Bengaluru |
| **MUX, OLTE, DACs & OPTICAL POWER AMPLIFIER** | | |
| MUX,OPTICAL LINE TERMINAL EQUIPMENT (OLTE),DIGITAL ACCESS CROSS CONNECT (DACs) & OPTCAL POWER AMPLIFIER COMPATIBLE TO OPTCL SCADA SYSTEM | 1 | **M/s Commtel Networks Pvt Ltd** , Nabvi Mumbai |
| | | **M/s ABB India Ltd**, Bengaluru |
| **RTU Conforming to IEC Protocols in Use** | | |
| RTU Conforming to IEC Protocols in Use | | **M/s Chemtrols Industries Pvt. Ltd**, Mumbai |
| | | **M/s GE T&D India Limited**, Bhubaneswar |
| | | **M/s ABB India Ltd**, Bengaluru |
| | | **M/s ZIV Automation India Ltd**, Bangalore |

| | | |
|---|---|---|
| | | M/s. Siemens Limited, Kolkata |
| **Wave Trap** | | |
| Wave trap up to 220 KV | | **M/s Quality Power Electrical Equipment Pvt Ltd**, Maharastra, |
| **Line Matching Unit** | | |
| Line Matching unit up to 400 kV | | **M/s. Siemens Limited**, Kolkata |
| | | M/s ZIV Automation India Ltd, Bangalore |
| | | M/s ABB India Ltd, Bengaluru |
| **75Ω/125Ω HF COAXIAL CABLES** | | |
| 75Ω/125Ω HF COAXIAL CABLES | | M/s Alpha Communication Ltd, Delhi |
| **TOWER & STRUCTURES FOR LINE AND SUBSTATION AND FOUNDATION BOLT** | | |
| TOWER & STRUCTURES FOR LINE AND SUBSTATION AND FOUNDATION BOLT | | M/s Shri Ashutosh Engineering Industries |
| | | M/s Vijay Transmission Pvt. Ltd, |
| | | M/s R R ISPAT, (A unit of Godawari Power & Ispat Ltd.), Raipur |
| | | M/s Reliable Sponge Pvt. Ltd, Rourkela |
| | | M/s New Modern Technomech (P) Ltd, Baripada |

## 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 kV S/S | 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. PORTABLE ALUMINIUM LADDER EXTENDABLE TYPE OF 3m+ 3mTO 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.

## 17. 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)