

TENDER SPECIFICATION BHEL PSSR SCT 2081

for

Package 1: Erection, Testing & Commissioning including Handling of materials at site BHEL stores / storage yard, transporting to site of erection and supply & application of final painting of HT Electrical works for Unit-1 & identified BOP areas

Package-2: Erection, Testing & Commissioning including Handling of materials at site BHEL stores / storage yard, transporting to site of erection and supply & application of final painting of HT Electrical works for Unit-2

Of 2 x 660 MW Udangudi Super Critical Thermal Power Project at Tuticorin District, Tamil Nadu

VOLUME –II PRICE BID



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)

Power Sector – Southern Region

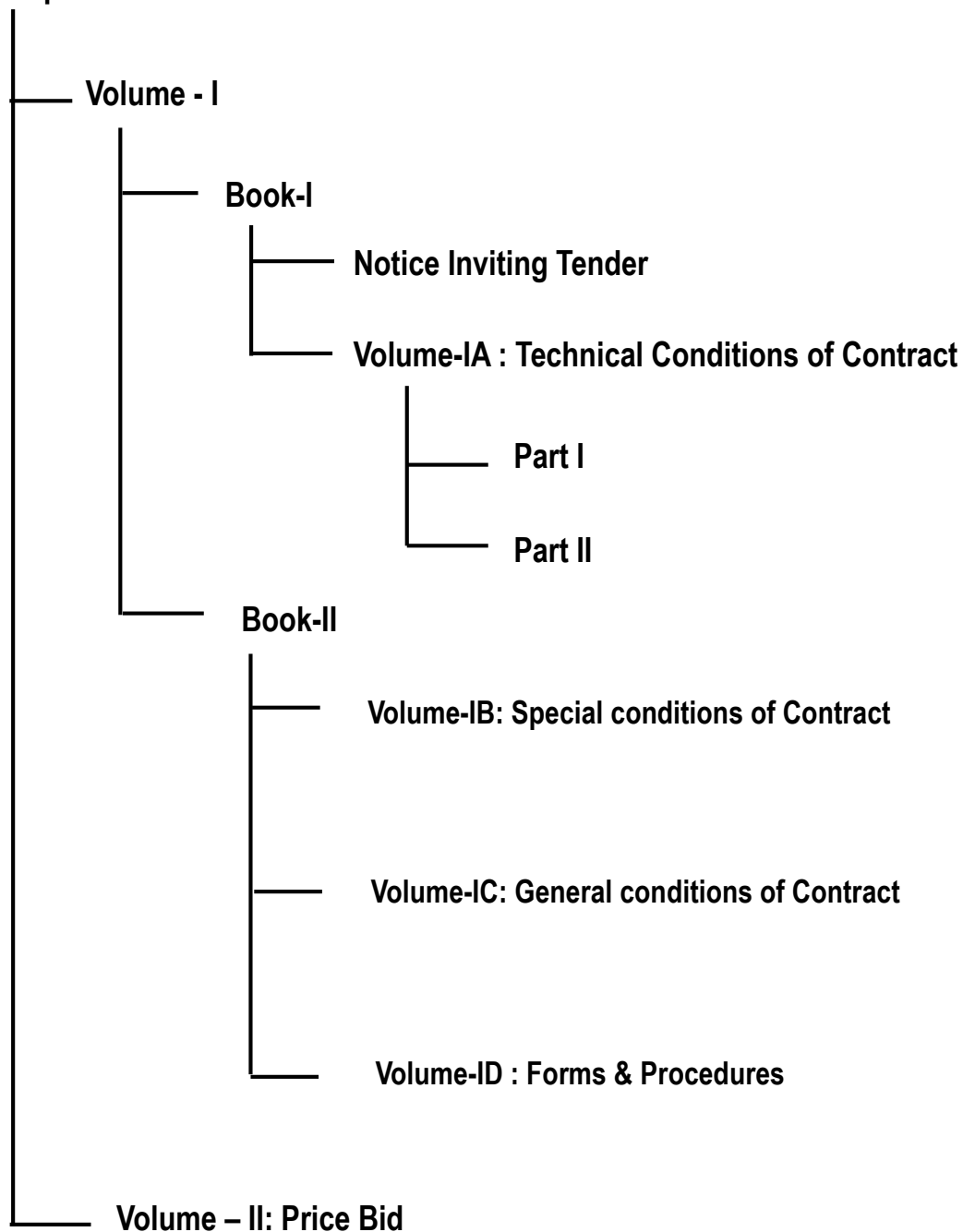
BHEL Integrated Office Complex,

TNEB Road, Pallikaranai,

Chennai - 600100

TENDER SPECIFICATION CONSISTS OF

Tender Specification



PRICE BID

| CONTENTS | |
|--|-----------------------|
| Description | No. of pages |
| Part A of Price Bid: Instructions to the Bidders | 01 |
| Part B: Format for total amount for Package-1 & Package-2 combined. (Enclosed as a separate Excel File in BHEL NIC e-Procurement portal for the subject tender) | (Separate Excel File) |
| Part C: Bill of quantities with weightage for amount of each items with respect to the total quoted price. | 19 |

PART A

Instruction to Bidders:

1. The quantity indicated in the BOQ in Part C of Price Bid is approximate only and is liable for variation. Payment will be as per actual quantity executed and as certified by BHEL Engineer.
2. Tenderers are requested to affix their company seal and authorized signature in all pages.
3. Bidders shall quote 'Total Amount for Package -1 & Package -2 combined' (**Please refer Clause 35.0 "Mode of Award" of NIT**) in the format enclosed as a separate Excel File in BHEL NIC e-Procurement portal for the subject tender and upload the same under 'Packet details - > Tender covers -> Finance '(Cover Type Description – Price Bid)" and same shall be taken into account for evaluation and awarding and hence, shall be complete in all respect for the full scope of work defined in specification and in accordance with terms & conditions of the tender. Any other entry elsewhere in the price bid shall be treated as Null and Void. Quoting of rates in any other form/formats will not be entertained.
4. The above mentioned 'Total amount' is for the entire Bill of Quantity (BOQ) given in Part -C of the Price Bid.
5. BHEL has pre-fixed the weightages for the amount of individual items of Bill of Quantity with respect to the 'Total Amount' in Part C of Price Bid.
6. Based on the pre-fixed weightages, the amount for the individual items of the Bill of Quantity shall be arrived at. This amount shall be rounded off to the nearest rupee.
7. Based on the quantities of individual item and the amount arrived in Sl. No: 6 above, unit rate of individual items shall be derived. This unit rate shall be rounded off to four decimal places.
8. Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed as certified by BHEL Engineer.

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2081 for Package 1: Erection, Testing & Commissioning including Handling of materials at site BHEL stores / storage yard, transporting to site of erection and supply & application of final painting of HT Electrical works for Unit-1 & identified BOP areas of 2 x 660MW Udangudi Super Critical Thermal Power Project at Tuticorin Dt., TamilNadu

at Udangudi Thermal Power Station

| Ref.No. | Description | Unit of Measurement | Qty. | Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount |
|-------------------------------------|---|---------------------|------|--|
| I | ERECTION AND COMMISSIONING OF TRANSFORMERS | -- | | |
| A.1.1 | Generator Transformer (GT#1) 275/220/165 MVA,(420/sq.root(3))/21 kV, 1 phase, ONAN/ONAF/OFAF cooled,YNd11 | SET | 4 | .0896744 |
| B.1.1 | Standby Maintenance Transformer (SBT) 110/55/55 MVA, 400/11.5 -11.5 KV, 3 Phase, with ONAN/ONAF/OFAF cooled,YNyn0yn0 | SET | 1 | .0167922 |
| B.1.2, B.1.3 | Station Transformer (ST#1) & Unit Transformer (UT#1A & 1B) 56/70 MVA, 21 KV/11.5KV, 3 Phase, ONAN/ONAF cooled, Dyn1 | SET | 3 | .0192133 |
| B.2.1 | Sea Water Auxiliary Transformer, 28/35 MVA, 11/6.9 kV, 3 phase, ONAN/ONAF/Dyn1 | SET | 2 | .0170355 |
| B.2.2 | External CHP Transformer 20/25 MVA, 11/36 kV, 3 phase, ONAN/ONAF/Ynd11 | SET | 2 | .0160516 |
| B.2.3 | AHP Auxiliary Transformer 16 MVA, 11/6.9 kV, 3 phase, ONAN/Dyn1 | SET | 2 | .0134528 |
| B.2.4 | Unit Auxiliary Transformer 12.5 MVA, 11/6.9 kV, 3 phase, ONAN/Dyn1 | SET | 2 | .0134528 |
| D.10.1 | RO-DM AUXILIARY TRANSFORMER-6.3 MVA, 11/6.9 kV, 3 phase, ONAN/DyN1 | SET | 2 | .0123838 |
| D.10.2 | STATION AUXILIARY TRANSFORMER- 5 MVA, 11/6.9 kV, 3 phase, ONAN/DyN1 | SET | 2 | .0123838 |
| B.2.5, B.2.6, B.2.7, B.2.8 | 2.5 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 8000 kg approx each. | SET | 8 | .0193983 |

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|---|---|---------------------|------|--|
| B.2.9 | 2 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 7000 kg approx each. | SET | 2 | .0042434 |
| B.2.10 , B.2.11 , B.2.12 , B.2.13 | 1.6 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 6600 kg approx each. | SET | 11 | .0220049 |
| B.2.14 | 0.63 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 3600 kg approx each. | SET | 2 | .0021823 |
| II | ERECTION AND COMMISSIONING OF HT BUSDUCT | -- | | |
| II-A | IPBD | -- | | |
| C.1.1 | 27 kV IP Busduct (Maximum Voltage - 36kV) along with support structures | SET | 1 | .054679 |
| II-B | SPBD | -- | | |
| II-B-(i) | 11 kV-4000/3150 A SPBD BUSDUCT, includes seal off bushing, rubber bellows, support steel structure, space heaters, grounding. | -- | | |

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|---|--|---------------------|------|--|
| A.5.13 , A.5.14 , B.1.2, B.1.3, B.2.1, B.2.3 | 11 kV-4000/3150 Amp | Mtrs | 497 | .0238967 |
| II-B-(ii) | 6.6 kV-3150/1600/1250/630 A SPBD BUSDUCT includes Seal-off Bushing, Rubber Bellows, Aluminium Splice Plate & Flexibles, Copper Flexibles, Support Steel Structure, Space Heater arrangemnt, Grounding. | -- | | |
| C.2.3.1, C.2.3.2, C.2.4, C.2.5, C.2.6, C.2.7 | 6.6 kV-3150/1600/1250/630 Amp | Mtrs | 240 | .0109183 |
| III | ERECTION AND COMMISSIONING OF HT SWITCHGEAR | -- | | |
| III-A | 33 kV Switchgear | -- | | |
| A.2.1 | ECHS Switchboard 0AA - 33KV, 630 A, 11 panels, 6 shipping sections. Over all panel sizes- 14300 (L) x 3248 (D) x2600(H) Weight of shipping for 1 panel - 1800 Kg(1300mm wide) aprox. for shipping two panel - 3600 Kg aprox.(1300mm + 1300mm wide) | SET | 1 | .0036391 |

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| III-B | 11 kV Switchgear | -- | | |
| A.3.1 | Unit Switchboard 1BA - 11KV, 4000 A, 22 panels, 12 shipping sections . Over all panel sizes- 18220 (L) x 2927(D)X2805 (H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox. for shipping two panel - 2600 Kg aprox.(820mm + 820mm wide) | SET | 1 | .0039092 |
| A.3.2, A.3.5 | Unit Switchboard 1BB/Standby Switchboard 0BC - 11KV,4000 A/3150 A, 21 panels, 11 shipping sections . Over all panel sizes- 17400/17720 (L) x 2887/2873 (D) x2805(H) Weight of shipping for 1 panel - 1300/1250 Kg(820mm wide) aprox.& for two panel - 2600/2500 kg (820mm + 820mm). | SET | 2 | .0075642 |
| A.3.3, A.3.4 | Station Switchboard 0BA/0BB - 11KV, 4000 A, 17 panels, 9 shipping sections . Over all panel sizes- 14120 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1250/1300 Kg(820mm wide) aprox.for shipping two panel - 2600/2500 Kg aprox.(820 + 820mm wide) | SET | 2 | .0060067 |
| A.3.6 | Standby Switchboard 0BD - 11KV, 3150 A, 19 panels, 10 shipping sections . Over all panel sizes- 15580 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1250 Kg(820mm wide) aprox.for shipping two panel - 2500 Kg aprox.(820 + 820mm wide) | SET | 1 | .0032925 |
| III-C | 6.6 kV Switchgear | -- | | |
| A.4.1 | Unit Auxiliary Switchboard 1CA - 6.6 KV, 1250 A, 27 panels, 15 shipping sections . Over all panel sizes- 21920 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1250 Kg(820mm wide) aprox.for shipping two panel - 2500 Kg aprox.(820 + 820mm wide) | SET | 1 | .0046703 |
| A.4.2 | Station Auxiliary Switchboard 0CA - 6.6 KV, 630 A, 20 panels, 11 shipping sections . Over all panel sizes- 16180 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox.for shipping two panel - 2600 Kg aprox.(820 + 820mm wide) | SET | 1 | .0034461 |

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| A.4.3, A.4.8 | CHP Auxiliary Switchboard 0CB/ Sea Water intake Switchboard 0CG, - 6.6 KV, 1600 A/630 A, 28 panels of suitable 15 shipping sections . Over all panel sizes- 22960 (L) x 2349 (D) x2805(H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox.for shipping two panel - 2600 Kg aprox.(820 + 820mm wide) | SET | 2 | .0097778 |
| A.4.4 | AHP Auxiliary Switchboard 0CC - 6.6 KV, 1250 A, 36 panels, 9 shipping sections . Over all panel sizes- 29300 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1250 Kg(820mm wide) aprox.for shipping two panel - 2500 Kg aprox.(820 + 820mm wide) | SET | 1 | .0062447 |
| A.4.5 | RODM Auxiliary Switchboard 0CD - 6.6 KV, 3500 A, 30 panels, 16 shipping sections . Over all panel sizes- 25580 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox.for shipping two panel - 2600 Kg aprox.(820 + 820mm wide) | SET | 1 | .0054519 |
| A.4.6 | CHP Bunker Switchboard 0CE - 6.6 KV, 630 A, 21 panels, 11 shipping sections . Over all panel sizes- 17000 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox.for shipping two panel - 2600 Kg aprox.(820 + 820mm wide) | SET | 1 | .0036207 |
| A.4.7 | Ext.CHP Auxiliary Switchboard 0CF - 6.6 KV, 1250 A, 22 panels, 11 shipping sections . Over all panel sizes- 17820 (L) x 2349 (D) x2805(H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox.for shipping two panel - 2600 Kg aprox.(820 + 820mm wide) | SET | 1 | .0037392 |
| IV | ERECTION AND COMMISSIONING OF CONTROL PANEL SYSTEM | -- | | |
| A.5.1 | Fast Bus Transfer System Panels for 11 KV SWGR size 800 (w) x 800 (d) x 2295 (h) weight 300 kg aprox, along with accessories computers, printers,table, checking of pre assembled LIUs, communication cables etc. | SET | 2 | .0011446 |

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|---|--|---------------------|------|--|
| A.5.2 | Protection panel for Generator/GT/UT/ST with associated loose supplied items such as Laptop, PC, Printer, UPS, interconnecting cables, RJ45 cables etc. Size of the Panel: 800 (W) x800 (D) x 2295 (H) mm Approximate weight of the panel : 450 kg. Lump sum rate to be quoted. | SET | 8 | .0040249 |
| A.5.3, A.5.4, A.5.5, A.5.6, A.5.7 | Data concentrator panels along with loose items size 800mm(W) x800mm(D) x 2000mm(H) aprox weight 200kg along with Loose items of Data concentrator system - HMI OWS computer with monitor - 3 nos, console table 75 KG (1000mm x 750mm x 574 mm) - 1 no, A4 color printer - 1 no, UPS 1 KVA - 1 no, Ethernet switch - 12 nos, LIU - 10 nos, Laptop computer - 1 nos, Patch cards & RJ45 conecters reqd qty, GPS antanna alongwith cable, GPS receiver, GPS clock etc. Assembling of loose supply computer table, printer table, chairs etc | SET | 4 | .0032437 |
| A.5.8, A.5.9, A.5.10, A.5.11 | Earthing Trucks (feeders and busbars) 33 kV/ 11 kV/ 6.6 kV | SET | 22 | .0017871 |
| D.7.8 | 11 kV Neutral Ground Resistor (NGR) with NGR Cubicle of size 1200x1350x950 of weight app. 495 kg and with Supporting Structures | SET | 4 | .0022805 |
| D.7.9 | 6.6 kV Neutral Ground Resistor (NGR) with NGR Cubicle of size 1000x900x800 of weight app. 290 kg and with Supporting Structures. | SET | 6 | .0034207 |
| D.8.1 | Generator circuit breaker (GCB) below generator Rating 27000 A, 21 kV size app. 6751mm x 4000 mm x 3535 mm along with centralizing cubicle and overall weight - 10288 kg. | SET | 1 | .0023301 |
| E.6 | Unit Control Panel(UCP)- approx panel size 2216(L) x1000(W) x 2355(H) approx weight 900 kg | No. | 1 | .0005701 |

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at Udangudi Thermal Power Station

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|-------------------------------|--|---------------------|--------|--|
| E.7 | Unit Electrical Control Panel(UECP)- approx panel size 2792 (L)x 1000(W) x 2355(H) , approx weight 900 kg | No. | 1 | .0005701 |
| E.8, E.9, E.11, E.12 | EDMS/IEMS (CYJ-01,CYJ-02 & CYJ03) electrical interface system panel size 750(L) x750(W) x 2067(H) approx weight 400 kg each along with HMI items i.e Server,OWS,EOWS,Printer,Cable ,etc. | SET | 2 | .0011494 |
| E.1 | Digital AVR consisting of 2No. Regulation cubicle, 1 No. Thyristor cubicle & 1 No. Field suppression cubicle, and associated loose supplied items including laying & termination of loose supplied power & control cables for DAVR system.DAVR Overall dimension: 4053 (L)x 800 (Wx 2465(H) mm Aproximate wt. : 3000 Kg. * Lump sum rate to be quoted. | SET | 1 | .0018104 |
| V | LAYING OF HT CABLES | -- | | |
| V-A | LAYING OF HT CABLES 19/33KV (UE) ARMoured; ALUMINIUM CONDUCTOR ,XLPE INSULATED PVC/FRLS OUTER SHEATHED CABLE. | -- | | |
| G.1 | 1CX400 SQMM (AL) | Mtrs | 700 | .0008199 |
| V-B | LAYING OF HT CABLES 11KV (UE) ARMoured; ALUMINIUM CONDUCTOR ,XLPE INSULATED PVC/FRLS OUTER SHEATHED CABLE. | -- | | |
| D.1.1 | 1C x 630 sqmm (AL) | Mtrs | 34,500 | .0404072 |
| D.1.2 | 1C x 300 sqmm (AL) | Mtrs | 15,000 | .0106335 |
| D.1.3 | 3C x 240 sqmm (AL) | Mtrs | 7,750 | .0105102 |
| VI | LAYING OF HT CABLES 6.6 KV (UE) ARMoured; ALUMINIUM CONDUCTOR ,XLPE INSULATED PVC/FRLS OUTER SHEATHED CABLE. | -- | | |

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|-----------------|---|---------------------|--------|--|
| D.2.1 | 1C x 630 sqmm (AL) | Mtrs | 14,500 | .0167593 |
| D.2.2 | 3C x 150 sqmm (AL) | Mtrs | 10,750 | .0135847 |
| VII | Installation of Cable termination and joint kits | -- | | |
| VII-A | Installation of Cable termination and joint kits for 33/33 KV (UE) GRADE, XLPE Insulated aluminium conductor armoured cables for the following sizes. | -- | | |
| G.2 | Termination Kit for 1C x 400 Sq. mm., 19/33kV(E) , Stranded Circular and compacted Aluminium Conductor, XLPE insulated, Armoured, FRLS PVC outer sheath Power Cable | Nos. | 28 | .0018826 |
| VII-B | Installation of Cable termination and joint kits for 11/11 KV (UE) GRADE, XLPE Insulated aluminium conductor armoured cables for the following sizes. | -- | | |
| D.3.1, D.4.1 | Termination/Joint KIT 11KV 1C-630 sqmm AL ARM (indoor) AL LUG | Nos. | 94 | .0063203 |
| D.3.2, D.4.2 | Termination/Joint KIT 11KV 1C-300 sqmm AL ARM (indoor) AL LUG | Nos. | 143 | .0058443 |
| D.3.3, D.4.3 | Termination/ Joint KIT 11KV 3C-240 sqmm AL ARM (indoor) AL LUG | Nos. | 48 | .0034412 |
| VII-C | Installation of Cable termination kits and joint kit for 6.6 KV (UE) GRADE, XLPE Insulated aluminium conductor armoured cables for the following sizes. | -- | | |
| D.5.1 | Termination KIT 6.6 KV 1C-630 sqmm AL ARM (indoor) AL LUG | Nos. | 22 | .0013782 |
| D.5.2, D.6.1 | Termination /Joint KIT 6.6 KV 3C-150 sqmm AL ARM (indoor) AL LUG | Nos. | 85 | .0058134 |

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|---------|---|---------------------|-------|--|
| VIII | INSTALLATION OF HOT DIP GALVANIZED STEEL FLATS | -- | | |
| D.7.1 | GS FLAT 65 X 8 mm | Mtrs | 3,300 | .006001 |
| D.7.2 | GS FLAT 50 X 6 mm | Mtrs | 2,750 | .0033056 |
| D.7.3 | GS FLAT 25 X 6 mm | Mtrs | 1,125 | .0012136 |
| D.7.4 | GS FLAT 25 X 3 mm | Mtrs | 330 | .000356 |
| D.7.5 | GI WIRE 14 SWG | Mtrs | 1,700 | .000131 |
| IX | FABRICATION & ERECTION OF STRUCTURAL STEEL | -- | | |
| D.11.1 | Structural Steel (ISMC, ISMB, ISA, etc) | MT | 47 | .0127862 |
| D.11.2 | | | | |
| D.11.3 | | | | |
| D.11.4 | | | | |
| X | COMMISSIONING OF THE FOLLOWING ERECTED BY MECHANICAL CONTRACTOR | -- | | |
| D.9.1 | Generator Circuit Breaker and accessories | SET | 1 | .0027908 |
| D.9.2 | Generator circuit breaker (GCB) below generator Rating 27000 A, 21 kV size app. 6751mm x 4000 mm x 3535 mm along with centralizing cubicle and overall weight - 10288 kg. | No. | 1 | .0000528 |

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| D.9.3 | Commissioning of the following erected by Mechanical contractor | No. | 1 | .0000528 |
| D.9.4 | Generator 660 MW - H.V. testing, meggering of Bushings & Accessories, resistance measurement, meggering including dry out of Generator and as per field quality plan. | No. | 1 | .0000446 |
| D.9.5 | Exciter dryer / heater | No. | 1 | .0000446 |
| D.9.6 | 11 KV HT drives | Nos. | 10 | .001859 |
| D.9.7, D.9.8 | 6.6 KV HT Drives | Nos. | 56 | .0054309 |
| XI | LAYING OF LT POWER / CONTROL CABLES 1.1KV, XLPE INSULATED, GALVANISED STEEL ARMOURED SINGLE/MULTICORE CABLES FRLS PVC. (AL/CU CABLES) | -- | | |
| E.2 | 3C x 50 sqmm copper (Excitation + power input) | Mtrs | 800 | .0002219 |
| E.4 | 1Cx 70 sqmm copper (earthing) | Mtrs | 100 | .0000277 |
| XII | END TERMINATION OF LT POWER / CONTROL CABLES -1.1KV PVC/FRLS ARMOURED AL/CU CONDUCTOR PVC INSULATED, FRLS OUTER SHEATHED. | -- | | |
| E.3 | 3C x 50 sqmm copper (Excitation + power input) | Nos. | 16 | .0000722 |
| E.5 | 1Cx 70 sqmm copper (earthing) | Nos. | 4 | .0000039 |
| XIII | LAYING AND TERMINATION OF INSTRUMENTATION CABLES | -- | | |
| A.5.12 | OFC cable includes fixing of fibre optic components and termination kits LIU, face plates,cabinets,SC coupler,grounding etc | Mtrs | 11,000 | .0038989 |

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| A.5.13 | OFC Cable splicing | Nos. | 75 | .0001422 |
| A.5.14 | D link 4 pair PVC, CAT 5 Lan cable | Mtrs | 6,000 | .0006473 |
| XIV | ERECTION OF MISCELLANEOUS ITEMS | -- | | |
| D.7.6, F.1 | Flexible braided copper conductor with copper clamp for gate earthing & Earthing with MS earth rod 40 mm (Below ground earthing system) | Nos. | 18 | .0000211 |
| D.7.7 | Treated Earth pit of CI pipe 3000 m long with funnel and accessories including all civil works, filling of earth pit with alternate layer of chrcoal & salt as per IE specification and making of brick chamber, with both side plastering, supply and fising of manhole CI cover plate/RCC Slab etc. complete as per IS 3043 (only 100 mm CI pipe shall be supplied by BHEL) | SET | 56 | .0077075 |

Part C : Bill of Quantities

Tender Specification BHEL:PSSR:SCT:2081 for Package-2: Erection, Testing & Commissioning including Handling of materials at site BHEL stores / storage yard, transporting to site of erection and supply & application of final painting of HT Electrical works for Unit-2 of 2 x 660MW Udangudi Super Critical Thermal Power Project at Tuticorin Dt., TamilNadu

at Udangudi Thermal Power Station

| Ref.No. | Description | Unit of Measurement | Qty. | Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount |
|-----------------|---|---------------------|------|--|
| I | ERECTION AND COMMISSIONING OF TRANSFORMERS | -- | | |
| Sl.No. | Generator Transformer (GT#2) 275/220/165 MVA,(420/Sq.root(3))/21 kV, 1 phase, ONAN/ONAF/OFAF cooled,YNd11 | SET | 3 | .0672737 |
| 0J | Station Transformer (ST#2) & Unit Transformer (UT#2A & 2B) 56/70 MVA, 21 KV/11.5KV, 3 Phase, ONAN/ONAF cooled, Dyn1 | SET | 3 | .0192133 |
| J.1.1 | Unit Auxiliary Transformer 12.5 MVA, 11/6.9 kV, 3 phase, ONAN/Dyn1 | SET | 2 | .0134528 |
| J.1.2, J.2.0 | 2.5 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 8000 kg approx each. | SET | 4 | .0096991 |
| J.2.1, J.2.2 | 2 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 7000 kg approx each. | SET | 4 | .0084867 |
| J.2.3 | 1.6 MVA Cast Resin Dry Type Station Service Transformer Weight of Shipment: 6600 kg approx each. | SET | 5 | .0100022 |
| II | ERECTION AND COMMISSIONING OF HT BUSDUCT | -- | | |
| II-A | IPBD | -- | | |
| J.2.6 | 27 kV IP Busduct (Maximum Voltage - 36kV) along with support structures | SET | 1 | .054679 |
| II-B | SPBD | -- | | |
| II-B-(i) | 11 kV-4000/3150 A SPBD BUSDUCT, includes seal off bushing, rubber bellows, support steel structure, space heaters, grounding. | -- | | |

Part C : Bill of Quantities

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at Udangudi Thermal Power Station

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|--|---|---------------------|------|--|
| K.1.1, 00K.2.1.2, K.2.1.3, 00K.2.2.1, K.2.2.2, K.2.2.3 | 11 kV-4000/3150 Amp | Mtrs | 531 | .0255314 |
| II-B-(ii) | 6.6 kV-1600 A SPBD BUSDUCT includes Seal-off Bushing, Rubber Bellows, Aluminium Splice Plate & Flexibles, Copper Flexibles, Support Steel Structure, Space Heater arrangemnt, Grounding. | -- | | |
| K.2.2.5, K.2.2.6 | 6.6 kV-1600 Amp | Mtrs | 118 | .0053681 |
| III | ERECTION AND COMMISSIONING OF HT SWITCHGEAR | -- | | |
| III-A | 11 kV Switchgear | -- | | |
| H.1 | Unit Switchboard 2BA - 11KV, 4000 A, 22 panels, 12 shipping sections . Over all panel sizes- 18220 (L) x 2927(D)X2805 (H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox. for shipping two panel - 2600 Kg aprox.(820mm + 820mm wide) | SET | 1 | .0039092 |

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at Udangudi Thermal Power Station

| Ref.No. | Description | Unit of Measurement | Qty. | Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount |
|---------------------------|--|---------------------|------|--|
| H.1.1 | Unit Switchboard 2BB- 11KV,4000 A, 21 panels, 11 shipping sections . Over all panel sizes- 17400(L) x 2887(D) x2805(H) Weight of shipping for 1 panel - 1300 Kg(820mm wide) aprox.& for two panel - 2600 kg (820mm + 820mm). | SET | 1 | .0037358 |
| III-B | 6.6 kV Switchgear | -- | | |
| H.2.1 | Unit Auxiliary Switchboard 1CA - 6.6 KV, 1250 A, 27 panels, 15 shipping sections . Over all panel sizes- 21920 (L) x 2873 (D) x2805(H) Weight of shipping for 1 panel - 1250 Kg(820mm wide) aprox.for shipping two panel - 2500 Kg aprox.(820 + 820mm wide) | SET | 1 | .0046718 |
| IV | ERECTION AND COMMISSIONING OF CONTROL PANEL SYSTEM | -- | | |
| H.3 | Fast Bus Transfer System Panels for 11 KV SWGR size 800 (w) x 800 (d) x 2295 (h) weight 300 kg aprox, along with accessories computers, printers,table, checking of pre assembled LIUs, communication cables etc. | SET | 2 | .0011446 |
| H.3.1 | Protection panel for Generator/GT/UT/ST with associated loose supplied items such as Laptop, PC, Printer, UPS, interconnecting cables, RJ45 cables etc. Size of the Panel: 800 (W) x800 (D) x 2295 (H) mm Approximate weight of the panel : 450 kg. Lump sum rate to be quoted. | SET | 8 | .0040249 |
| H.4 | Data concentrator panels along with loose items size 800mm(W) x800mm(D) x 2000mm(H) aprox weight 200kg along with Loose items of Data concentrator system - HMI OWS computer with monitor - 3 nos, console table 75 KG (1000mm x 750mm x 574 mm) - 1 no, A4 color printer - 1 no, UPS 1 KVA - 1 no, Ethernet switch - 12 nos, LIU - 10 nos, Laptop computer - 1 nos, Patch cards & RJ45 conecters reqd qty, GPS antanna alongwith cable, GPS receiver, GPS clock etc. Assembling of loose supply computer table, printer table, chairs etc | SET | 1 | .0008109 |
| H.4.1, H.4.2, H.4.3 | Earthing Trucks (feeders and busbars) 33 kV/ 11 kV/ 6.6 kV | SET | 5 | .0004062 |

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at Udangudi Thermal Power Station

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|-------------|--|---------------------|--------|--|
| L.7.5 | 11 kV Neutral Ground Resistor (NGR) with NGR Cubicle of size 1200x1350x950 of weight app. 495 kg and with Supporting Structures | SET | 4 | .0022805 |
| L.7.6 | 6.6 kV Neutral Ground Resistor (NGR) with NGR Cubicle of size 1000x900x800 of weight app. 290 kg and with Supporting Structures. | SET | 6 | .0034207 |
| L.7.8 | Generator circuit breaker (GCB) below generator Rating 27000 A, 21 kV size app. 6751mm x 4000 mm x 3535 mm along with centralizing cubicle and overall weight - 10288 kg. | SET | 1 | .0033361 |
| M.3 | Unit Control Panel(UCP)- approx panel size 2216(L) x1000(W) x 2355(H) approx weight 900 kg | No. | 1 | .0005701 |
| M.4 | Unit Electrical Control Panel(UECP)- approx panel size 2792 (L)x 1000(W) x 2355(H) , approx weight 900 kg | No. | 1 | .0005701 |
| M.5, M.6 | EDMS/IEMS (CYJ-01,CYJ-02 & CYJ03) electrical interface system panel size 750(L) x750(W) x 2067(H) approx weight 400 kg each along with HMI items i.e Server,OWS,EOWS,Printer,Cable ,etc. | SET | 1 | .0005747 |
| L.11.3 | Digital AVR consisting of 2No. Regulation cubicle, 1 No. Thyristor cubicle & 1 No. Field suppression cubicle, and associated loose supplied items including laying & termination of loose supplied power & control cables for DAVR system.DAVR Overall dimension: 4053 (L)x 800 (Wx 2465(H) mm Aproximate wt. : 3000 Kg. * Lump sum rate to be quoted. | SET | 1 | .0018104 |
| V | LAYING OF HT CABLES | -- | | |
| V-A | LAYING OF HT CABLES 11KV (UE) ARMoured; ALUMINIUM CONDUCTOR ,XLPE INSULATED PVC/FRLS OUTER SHEATHED CABLE. | -- | | |
| K.2.3. 2 | 1C x 630 sqmm (AL) | Mtrs | 34,500 | .0404072 |
| L | 1C x 300 sqmm (AL) | Mtrs | 15,000 | .0106335 |

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at Udangudi Thermal Power Station

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|-----------------|---|---------------------|--------|--|
| L.1 | 3C x 240 sqmm (AL) | Mtrs | 7,750 | .0105102 |
| VI | LAYING OF HT CABLES 6.6 KV (UE) ARMOURED; ALUMINIUM CONDUCTOR ,XLPE INSULATED PVC/FRLS OUTER SHEATHED CABLE. | -- | | |
| L.1.2 | 1C x 630 sqmm (AL) | Mtrs | 14,500 | .0167593 |
| L.1.3 | 3C x 150 sqmm (AL) | Mtrs | 10,750 | .0135847 |
| VII | Installation of Cable termination and joint kits | -- | | |
| VII-A | Installation of Cable termination and joint kits for 11/11 KV (UE) GRADE, XLPE Insulated aluminium conductor armoured cables for the following sizes. | -- | | |
| L.2.1, L.3.2 | Termination/Joint KIT 11KV 1C-630 sqmm AL ARM (indoor) AL LUG | Nos. | 92 | .0061858 |
| L.2.2, L.3.3 | Termination/Joint KIT 11KV 1C-300 sqmm AL ARM (indoor) AL LUG | Nos. | 142 | .0058035 |
| 0L.4 | Termination/ Joint KIT 11KV 3C-240 sqmm AL ARM (indoor) AL LUG | Nos. | 46 | .0032978 |
| VII-B | Installation of Cable termination kits and joint kit for 6.6 KV (UE) GRADE, XLPE Insulated aluminium conductor armoured cables for the following sizes. | -- | | |
| L.4.2 | Termination KIT 6.6 KV 1C-630 sqmm AL ARM (indoor) AL LUG | Nos. | 22 | .0013782 |
| L.4.3, L.5.1 | Termination /Joint KIT 6.6 KV 3C-150 sqmm AL ARM (indoor) AL LUG | Nos. | 84 | .005745 |
| VIII | INSTALLATION OF HOT DIP GALVANIZED STEEL FLATS | -- | | |
| L.6 | GS FLAT 65 X 8 mm | Mtrs | 3,300 | .006001 |

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at Udangudi Thermal Power Station

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|-----------------------------|---|---------------------|-------|--|
| L.6.1 | GS FLAT 50 X 6 mm | Mtrs | 2,750 | .0033056 |
| L.7 | GS FLAT 25 X 6 mm | Mtrs | 1,125 | .0012136 |
| L.7.1 | GS FLAT 25 X 3 mm | Mtrs | 330 | .000356 |
| L.7.2 | GI WIRE 14 SWG | Mtrs | 1,700 | .000131 |
| IX | FABRICATION & ERECTION OF STRUCTURAL STEEL | -- | | |
| L.9.7, L.9.8, OL.11.1 | Structural Steel (ISMC, ISMB, ISA, etc) | MT | 47 | .0127862 |
| X | COMMISSIONING OF THE FOLLOWING ERECTED BY MECHANICAL CONTRACTOR | -- | | |
| L.8 | Generator Circuit Breaker and accessories | SET | 1 | .0027908 |
| L.8.1 | Generator circuit breaker (GCB) below generator Rating 27000 A, 21 kV size app. 6751mm x 4000 mm x 3535 mm along with centralizing cubicle and overall weight - 10288 kg. | No. | 1 | .0000528 |
| L.9. | Commissioning of the following erected by Mechanical contractor | No. | 1 | .0000528 |
| L.9.1 | Generator 660 MW - H.V. testing, meggering of Bushings & Accessories, resistance measurement, meggering including dry out of Generator and as per field quality plan. | No. | 1 | .0000446 |
| L.9.2 | Exciter dryer / heater | No. | 1 | .0000446 |
| L.9.3 | 11 KV HT drives | Nos. | 10 | .001859 |

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|-----------------|---|---------------------|--------|--|
| L.9.4, L.9.5 | 6.6 KV HT Drives | Nos. | 38 | .0036853 |
| XI | LAYING OF LT POWER / CONTROL CABLES 1.1KV, XLPE INSULATED, GALVANISED STEEL ARMOURED SINGLE/MULTICORE CABLES FRLS PVC. (AL/CU CABLES) | -- | | |
| L.11.4 | 3C x 50 sqmm copper (Excitation + power input) | Mtrs | 800 | .0002219 |
| M.1 | 1Cx 70 sqmm copper (earthing) | Mtrs | 100 | .0000277 |
| XII | END TERMINATION OF LT POWER / CONTROL CABLES -1.1KV PVC/FRLS ARMOURED AL/CU CONDUCTOR PVC INSULATED, FRLS OUTER SHEATHED. | -- | | |
| M | 3C x 50 sqmm copper (Excitation + power input) | Nos. | 16 | .0000722 |
| M.2 | 1Cx 70 sqmm copper (earthing) | Nos. | 4 | .0000039 |
| XIII | LAYING AND TERMINATION OF INSTRUMENTATION CABLES | -- | | |
| H.4.4 | OFC cable includes fixing of fibre optic components and termination kits LIU, face plates,cabinets,SC coupler,grounding etc | Mtrs | 11,000 | .0038989 |
| H.4.5 | OFC Cable splicing | Nos. | 75 | .0001422 |
| H.4.6 | D link 4 pair PVC, CAT 5 Lan cable | Mtrs | 6,000 | .0006473 |
| XIV | ERECTION OF MISCELLANEOUS ITEMS | -- | | |
| L.7.3, M.10 | Flexible braided copper conductor with copper clamp for gate earthing & Earthing with MS earth rod 40 mm (Below ground earthing system) | Nos. | 12 | .0000141 |

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|------------------------|---|---------------------|------|--|
| L.7.4 | Treated Earth pit of CI pipe 3000 m long with funnel and accessories including all civil works, filling of earth pit with alternate layer of chrcoal & salt as per IE specification and making of brick chamber, with both side plastering, supply and fising of manhole CI cover plate/RCC Slab etc. complete as per IS 3043 (only 100 mm CI pipe shall be supplied by BHEL) | SET | 56 | .0077075 |
| TOTAL Weightage | | | | 1.0 |