



R & M JOB FOR BOP OF PATRATU TPS  
(2x 110 MW) FOR JSEB

PDX/06-313  
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BHOPAL

TECHNICAL SPECIFICATION FOR  
ERECTION & COMMISSIONING PACKAGE

REV. 0

**TECHNICAL SPECIFICATION**  
**FOR**  
**ERECTION OF ELECTRICAL EQUIPMENTS AND**  
**ACCESSORIES**

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Prepared by:

**Tractebel** Engineering  
**Suez**

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ELECTRONIC EARTHING DRAWING

SOOT BLOWER MCC SLD

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**01.00.00 INTENT OF SPECIFICATION**

This specification is intended to cover the following:

- 1) Complete and efficient dismantling, unglinding of cables from panels & switchgears wherever required, dismantling of gland plates, marking of cables with aluminium tag, unlugging wherever required, efficient storing of dismantled items etc. as described in various sections/clauses below. (Most of the equipments had already been dismantled. However contractor shall consider dismantling of 10% of the equipments in his scope)
- 2) Supply, efficient storing, loading, unloading of new items, efficient transport up to the work place, as described in various sections/clauses below.
- 3) Erection, testing, commissioning of new items as described in various sections/clauses below.
- 4) Glanding of cables in gland plates, fixing of gland plates in the panels & switchgears, marking of cables with alluminium shims wherever required, lugging of cables wherever required, connection of cables to various feeders of panels, IR tests of all the cables etc.
- 5) IR tests of all motors, external heating of motors to achieve required IR level & find out resistance of winding.
- 6) Testing and commissioning and putting into successful commercial operation of all electrical equipment inclusive of supply of all hardware, erection tools, labors, administrative, supervisory personnel, etc. as necessary.

In the event of any discrepancy with listed documents, the stipulation of this specification shall govern.

It shall be the responsibility of the Contractor to furnish equipment, which shall meet in all respects the performance specification and will have satisfactory durability for the prevailing site conditions.

The Contractor shall furnish all material and labour not herein specifically mentioned or included, but which may be necessary to complete any part of the work or work as a whole, in compliance with the requirements of this specification.

**01.00.01** BHEL approved FQP shall be given to the Contractor during execution of work at site. Where BHEL approved FQP are not available, Contractor will be required to submit there own FQP & get it approved from BHEL/Customer.

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All work shall be done strictly as per FQP's. Protocol shall be submitted for each equipment/work duly signed by Contractor, BHEL site representative & Customer after completion of work.

No bills shall be processed unless accompanied by approved FQP & relevant protocol duly signed.

**02.00.00 SCOPE OF WORK**

**Scope for Installation, Erection, Testing, Commissioning Packages**

This specification is intended to cover complete work for shifting, storing, handling, dismantling (Most of the equipments had already been dismantled. However contractor shall consider dismantling of 10% of the equipments in his scope), assembly, erection, testing, commissioning of electrical equipments/system as mentioned below including handing over of the plant/ liquidation of punch list.

**Erection, Testing & Commissioning of the following equipment.  
(Equipment shall be supplied by BHEL)**

Steps to be followed:

- (a) Efficient transportation of new panels from Customer's store to Work place.
- (b) Alignment of new panels in the foundation & fixing.
- (c) IR testing of cables before connection, thereafter laying & termination of cables will be in contractor's scope.
- (d) Tagging using aluminium tags, lugging, ferruling & termination in proper terminals. Glands, Lugs and any other consumables, as required for these panels shall be included in contractor's scope. Price for cable termination shall be included in price of Erection & Commissioning of panels.
- (e) Testing & Commissioning for proper connection by running the drives individually.

**(A) 6.6KV Switchgear, Unit 9 & 10**

- i) Unit Switch Board 9A
- ii) Unit Switch Board 9B

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- iii) Unit Switch Board 10A
- iv) Unit Switch Board 10B
- v) Station Switch Board 4A
- vi) Station Switch Board 4B

**B) LT switchgear & Local Control Panels, Unit-9 &10**

- i) Emergency MCC – Common for both Units
- ii) Turbine MCC – Unit 9 & 10
- iii) Unit Service Switchgear - Unit 9 & 10
- iv) Station Service Switchgear – Unit 9 & 10
- v) ACDB – 4 Nos.
- vi) Centrifuge Panel - Unit 9 & 10
- vii) Boiler MCC - Unit 9 & 10
- viii) Ventilation MCC - Unit 9 & 10
- ix) Chemical MCC – Common for both units
- x) Valve & Damper MCC - Unit 9 & 10
- xi) AC Seal oil Pump Panel - Unit 9 & 10
- xii) Vacuum Pump Panel - Unit 9 & 10
- xiii) DC Emergency Oil Pump Panel - Unit 9 & 10
- xiv) Seal air fan Local control Panel - Unit 9 & 10
- xv) Stand by switchgear – Common for both units
- xvi) DC Seal oil Pump Panel - Unit 9 & 10

**C) Control Panels, Unit 9 & 10**

- i) Bus Change Over Scheme Panel.
- ii) Generator, GT, UAT Protection & Control Panel.
- iii) Station transformer Protection and Control Panels.
- iv) Retrofitting of Switchyard Relay Panel. This also includes restoration of existing Bus Zone Protection Scheme. Existing Scheme shall be checked, Test and Commissioned. Relays & Scheme shall be supplied by BHEL. Consumables such as Terminal Blocks, wires, lugs and ferrules are in the scope of Contractor.
- v) DCDB, Sub-DCDB & Battery Charger.

**D) Erection, Testing and Commissioning of 1.5 MVA transformer.**

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- E) Electrical installation for Air dryers includes cabling from MCC to Air Dryer and installation of pressure transmitters and dew indicators and their cabling.
- F) Cabling for Air conditioning system, Package Air conditioner and window Air conditioners.
- G) Refurbishment of Soot Blower MCC – 2 Nos. (Drawings Enclosed). Spares will be supplied by Customer/BHEL. Consumables, wires and painting shall also be part of refurbishment.
- H) Bus Duct (2500A, 6.6KV, Non Phase Segregated Type)
- I) Erection, Testing and Commissioning of Earthing Transformers/NGT

The work mentioned in this specification shall be carried out within specified schedule time.

The contractor shall provide all labour, unskilled & skilled, supervisory and administrative personnel, tools & tackle, testing instruments, transport vehicles & mobile cranes, consumables and services necessary for timely & effectively execution of the contract i.e. dismantling (if any), erection, testing and commissioning of items listed in this specification.

Omission of any specific reference to any method, parts, accessories or material required for proper and efficient execution of the work shall not, in any way relieve the contractor from his responsibilities from providing such facilities and performing the complete erection, testing, commissioning & trial run at no extra cost to the purchaser. Purchaser hereinafter shall mean BHEL Bhopal.

BHEL approved FQP shall be given to the Contractor during execution of work at site. Where BHEL approved FQP are not available, Contractor will be required to submit their own FQP and get it approved from BHEL/Customer.

All work shall be done strictly as per FQP's. Protocol shall be submitted for each equipment/work duly signed by Contractor, BHEL site representative & Customer after completion of work.

**No Bills shall be processed unless accompanied by approved FQP & relevant protocol duly signed.**

Withdrawal of equipments from customers store and transportation/shifting of material from stores to work site and dismantled material back to customer's store shall be in contractor's scope. The contractor will be required to make his own arrangement for office and

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store to keep their tools and tackles etc. The open space for this purpose shall be provided by customer.

Fabrication, supply and erection of supports, hangers, flanges, base frames etc.

Installation, interconnection of electrical equipment, panels, control station, Air dryer, Air conditioners etc. cable tray erection, cable laying, termination, equipment earthing etc shall be the scope of contractor..

Supply of consumables, arrangement of tools & tackles.

Preparation and submitting of various erections, inspection, testing pre-commissioning, commissioning, testing, trial reports, FQP formats, planning sheets as and when required.

Pre-commissioning checks for corrective action, if any, to ensure proper erection and suitable corrective action.

Testing and commissioning and trial run of electrical equipment erected and commissioned by him under the scope of this tender during trial run/ performance testing of 110MW Thermal Power Plant in presence of BHEL/customer etc.

This scope is inclusive of erection of cables, cable trays, cable tray support, laying of all cables, cable termination and jointing of cables.

Priority of erection of panels will be decided by the BHEL at the time of execution.

**Responsibility for Commissioning Of Entire System lies on Electrical Contractor.**

1. Electrical Contractor shall co-ordinate with Overhauling contractor in commissioning of overhauled equipments.
2. Testing not in scope of Electrical Contractor for overhauling items.

List of overhauling equipments:

1. Generator Bus Duct: Unit 9 & 10
2. Generator Transformers(137.5 MVA,220/11KV): Unit 9 & 10
3. Unit Auxiliary Transformer(20 MVA,11/6.6KV): Unit 9 & 10
4. Station Transformer(30 MVA,230/6.9KV): Unit 9 & 10

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5. Auxiliary Transformer(1 MVA,6.6/.4KV): 16 Nos.

6. HT Motors: Unit 9 & 10 - 21 Each(Mill Motors-6 Nos.,BFP-2 Nos.,ID Fan-3 Nos.,FD Fan-2 Nos.,PA Fan-2 Nos.,CW Pump-3 Nos.,CE Pump-3 Nos.)

7. LT Motors: Unit 9 & 10 – 45 Each

**Supply Packages:-**

**All the Cable Tray support required in side the main plant building and out side area such as angle, channel is to be supplied as per the corresponding drawings and specification.**

**Cable Trays supports shall be fabricated & painted at site.** Material required for the above is covered in the supply of Structural steel.

Existing embedded steel inserts inside the floor and ceiling of the main plant building shall be used.

The Bidder will provide the damaged embedded steel inserts in wall / trenches / floor/ceiling. The Bidder shall have to secure rack / tray supports by welding to those inserts or other available building steel surfaces.

During the mounting of equipments over foundation/trenches and erection of cable trays,minor civil works including structural steel works required shall be in the scope of contractor.

**Hume pipes, Steel and PVC conduits required for cabling purposes shall be provided by the bidder.**

50X6mm & 100X10mm GI earth strip shall be used and will be supplied by the contractor for the earth mat.Drawing for earthing will be provided by the BHEL.

Cable glands, lugs and ferrules including hardwares for power and control cable shall be supplied by the bidder.

**Structural such angles, I section, C sections etc required to support the cable trays or any other item/equipment during execution shall be supplied by bidder as per relevant drawings/specification and quantity.**

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**Local Push Button Station: 90 Nos. LPBS with Start & Stop Push Button and 42 Nos. LPBS with Mushroom, stay put type Emergency Stop Push Button.**

**03.00.00 SITE CONDITION**

All equipment and materials shall be designed and suitable for operation under the following site conditions.

Maximum ambient Temperature - 45<sup>0</sup> C

Minimum ambient Temperature - 4<sup>0</sup> C

Design Temperature - 50<sup>0</sup> C

Design Relative Humidity - 100%

Altitude above sea level - Less than 1000 mts.

Atmospheric Pollution - To withstand the site conditions, dust, Vapors

**04.00.00 GENERAL SCOPE**

This specification covers all activities related to erection, testing and commissioning, cabling and earthing of all electrical works specified hereinafter, including supply of labour, supervision tools and tackles, instruments and materials. Installation of the electrical equipment (i.e. cubicles, panels, local control station, cable trays, cable laying, earthing and testing etc.) shall be carried out strictly in accordance with the latest Indian Electricity Rules, relevant Indian standards and codes of practices, to comply with the statutory regulation of Govt. The contractor shall employ only qualified personnel holding electrical wiring permit etc. issued by the competent authority.

Any material or accessories which may not have been specifically mentioned in the specification but which is necessary or useful for satisfactory and trouble-free and proper **erection** & commissioning of the items stated herein in the specification, considered deemed included in his offer and no extra charge shall be asked by bidder during execution.

**Necessary drawings, data sheets and technical leaflets for supply items.**

Pre-commissioning check-up to ensure correctness of erection as per actual Manufacturer's instructions.

Final checking, testing and commissioning of the all equipments in presence of BHEL/Customer

**Handing over the installation for commercial operation.**

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Approval from Statutory Authority.

The Bidder shall obtain the necessary clearance from the electrical inspector/ competent authority for equipment supplied and installed. All necessary drawings, calculations, test certificates etc. as required by Electrical Inspector/Competent Authority shall be furnished by BHEL. Any modification/ rectification as required by him shall be carried out free of cost. The fees required to be paid to the state electrical inspector/ statutory authority for inspection shall be borne by BHEL on production of documentary evidence.

Repair of all minor damages such as removal of paint, loosening of components of the assembly etc.

Transport vehicles necessary for efficient transportation of equipment from stores to site of erection, handling and returning excess/dismantled materials back to stores.

Minor civil work like chipping, plastering, breaking of walls, anchoring etc. required for erection/alignment of panel/equipment shall be done by the Bidder with no extra cost.

**General Instructions for Electrical Equipment Erection**

The contractor shall install the equipments/items on respective foundation/supports, level and align the same and arrange for necessary grouting/anchoring. **The contractor shall furnish mounting hardware such as bolts, nuts, screws, washers as required mounting the installations as per drawings/specification and grade.** During the mounting of equipments over foundation/trenches and erection of cable trays, minor civil works including structural steel works required shall be in the scope of contractor.

The erection work shall be carried out in compliance with manufacturer's instruction and shall include all adjustments, checks and measurements.

All electrical **panels, motors** and such other devices/equipments/items/components shall be properly dried before they are installed and energized.

The contractor shall record results of all erections tests and measurements and furnish copies of the same to BHEL/ customer.

Any internal wiring of the equipment that has been left incomplete because of shipping split or which requires minor modifications shall be

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carried out by the contractor. This also includes mounting of items like relays, meters etc. and connecting the same as per wiring scheme diagram.

Installation & testing of electrical equipment, cubicles, panels, all electrical installation work shall comply with the requirements of the following acts/rules/codes as amended up to date:

- ❖ **Indian Electricity Rules**
- ❖ **All relevant IS Codes of Practice**
- ❖ **IS : 2274 & 732 : Electrical wiring installation**
- ❖ **IS:3072 : Installation & maintenance of switchgear**
- ❖ **IS:5561 : Specification for electrical power connection.**
- ❖ **IS:5216 : Guide for safety procedure and practices in electrical work**
- ❖ **IS: 3043 : Code or practice for earthing**

In addition, any rule or regulation applicable to the work shall be followed. In case of discrepancy, the more restrictive rules shall be binding.

**Testing & Commissioning**

On completion of erection work, the contractor shall request the Engineer, for inspection and tests with minimum of seven – (7) days advance notice.

The BHEL engineer shall arrange for joint inspection of the installation for completeness and correctness of the work. The contractor shall promptly rectify any defect pointed out during such inspection.

The installation shall be then tested and commissioned in presence of the BHEL Engineer/Customer Engineer.

The contractor shall provide all men material and equipment and drawings etc required for carrying out the tests.

All rectification, repairs or adjustment work found necessary during inspection, testing and commissioning shall be carried out by the contractor, without any extra cost. The handing over of the installation shall be effected only after the receipt of written instructions from the Purchaser/His authorized representative.

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**05.00.00 GENERAL REQUIREMENTS:**

**Drawings:**

The Bidder shall submit Engineering Data, Documents and Drawings for approval of Engineer as per submission schedule to be furnished along with the Bid.

All approved engineering data and drawing by BHEL/Consultant shall form part of the Contract Documents.

Each drawing submitted by the Bidder shall be clearly marked with the name of the BHEL, the unit designation, the specification title, the specification number and the name of project.

All submissions by the Bidder shall be in MKS units.

All drawing shall be generated on Auto Cad. 2004

After final acceptance of plant from the Bidder, the Bidder shall update all original drawings to "as built" conditions. Bidder will hand over Two sets of "as built" drawings to BHEL / Consultant.

The Bidder shall make and submit drawings for approval of the mounting arrangement of all LT and HT panels, for the making of mounting arrangement GA drawings of the respective panels will be given by BHEL.

2. Documents to be submitted after order (Six (6) hard and one (1) soft copy)

a) For Approval.

b) For Reference /Information.

3. As built / final documentation (Ten (10) hard and Two (2) soft copy) will be furnished after the erection of the equipment.

**06.00.00 DEVIATIONS**

Should the bidder wish to deviate from this specification in any way; bidder shall draw specific attention to such deviation.

All such deviations shall be clearly mentioned on the deviation sheet enclosed as Annexure - V with reference to the respective clause of the

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specification. The deviation listed elsewhere in the text of the tender will not be considered.

If there are no deviations, then annexure - IV shall be submitted with NIL DEVIATION.

07.00.00 **QUALITY ASSURANCE**

Bidder shall follow BHEL approved procedure for quality assurance plan. The bidder shall enclose quality assurance plan along with the offer, raw material in process and test to be conducted at works.

Manufacturing and quality control procedures shall be available for audit to the BHEL and/or his representative at the place of manufacture.

Bidder shall be required to submit their MQP (Manufacture quality plan) in format attached as annexure for approval of BHEL.

**ERECTION SCHEDULE**

The entire erection work of all the packages mentioned shall be carried out in a phased manner. The erection schedule **on MS project/Primavera** shall be prepared & submitted by the bidder for approval of the BHEL **before start of work.**

The erection schedule, as approved by the **BHEL** shall be strictly followed by the Bidder. If for any reason beyond the control of the Bidder, the work is held up then the Bidder shall bring it to the notice of the BHEL. without any delay.

**RESPONSIBILITY OF ERECTION**

The Bidder shall be fully responsible for proper erection, safe and satisfactory operation of plant under his scope of work to the entire satisfaction of the BHEL.

The work shall be executed in accordance with the directions, instructions, drawings and specifications which shall be supplied to the Bidder by the BHEL from time to time.

If in the opinion of the Bidder any work is insufficiently specified or requires modification the Bidder shall refer the same in writing to the BHEL and obtain his instruction/approval before proceeding with the work.

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In the event of wrong installation of equipment under the scope of bidder, the same shall be re-installed to comply with the design requirement at the Contactor's expense, to the satisfaction of the BHEL.

**Supervision**

The BHEL. shall have the overall responsibility for coordination of Bidder's work and his direction shall be final.

Such direction and supervision however shall not relieve the Bidder of his responsibility of correctness and quality of workmanship and of other obligation under the contract.

Bidder may also make his recommendation regarding equipment (under free-issue) for which manufacturer's supervision is required for erection and / or commissioning.

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**08.00.00 WORKMANSHIP**

All work shall be installed in a first class, neat workman like manner by mechanics/ electricians skilled in the trade involved.

The erection work shall be supervised by competent supervisors holding relevant supervisory license from the Government.

All details on installation shall be electrically and mechanically correct.

**09.00.00 PROTECTION OF WORK**

The Bidder shall effectively protect his work, equipment and materials under his custody from theft, damage or tampering.

Finished work where required shall be suitably covered to keep it clean and free from defacement or injury.

For protection of his work Bidder shall provide fencing and lighting arrangement as directed by the BHEL.

**10.00.00 SAFETY MEASURES**

All safety rules and codes as applicable to work shall be followed without exception.

All safety appliance and protective devices including belts, hand gloves, aprons, helmets, shields, goggles etc. shall be provided by the Bidder for his personnel.

The Contactor shall provide guards and prominently display caution notices if access to any equipment/area is considered unsafe and hazardous.

**11.00.00 CO-OPERATION**

The bidder shall at all times work in close coordination with the BHEL's supervising personnel and afford them every facility to become familiar with erection and maintenance of the system under the scope of the bidder.

The bidder shall arrange his schedule of work and the method of operation to minimise inconvenience to other Bidders working on the project.

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In case of any difference between bidder and other bidder, the decision of the Engineer shall be final and binding on all parties concerned.

**12.00.00 ERECTION PROGRAMME AND PROGRESS**

The bidder shall submit at such times and in such forms as may be requested by the BHEL, schedule showing the programme and the order in which the bidder proposes to carry out the work with dates and estimated completion time for various parts of the work.

Such Schedules shall be approved by the BHEL prior to starting the erection. The Bidder shall adhere to this approved programme for all practical purposes. If for any reason the work is held up, the Bidder shall bring it to the attention of the BHEL in writing without any delay.

During the progress of work the Bidder shall submit monthly progress report and such other reports on erection work and organisation as the BHEL may direct.

If in the opinion of the BHEL the progress of erection work by the Bidder at any stage needs expediting so as to ensure completion of work within stipulated times, the BHEL shall have the right to instruct the Bidder to increase Bidder's man power in appropriate categories and/or the working hours per day and/or erection tools and tackles and the Contactor shall comply with such instruction forthwith.

**13.00.00 STEEL FABRICATION**

All racks, trays, supports, hangers & brackets wherever necessary shall be modified by the Bidder.

Support structure as and where required shall be fabricated as per site condition.

Structural Steel for fabrication shall be straightened and cleaned of rust and grease. All fabrication shall be free of sharp edges & burrs so as not to cause any damage to personnel or cables

All fabricate material shall be painted

**14.00.00 CLEANING UP OF WORK SITE**

The Contactor shall, from time to time, remove all rubbish resulting from execution of his work and shall be dispose off the same as directed by the Engineer. No materials shall be stored or placed on passage or drive ways

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Upon completion of work, the Contactor shall remove all rubbish, tools, scaffoldings, temporary structures and surplus materials etc. to leave the premises clean and fit for use.

15.00.00 STANDARDS AND REGULATIONS

**Standards:** Electrical equipment and system design, manufacture, testing, installation, testing and commissioning will comply with all latest applicable standards, regulations and codes.

BIS	-	Bureau of Indian Standards
IEEE	-	Institute of Electrical & Electronics Engineers
IER	-	The Indian Electricity Rules
IEA	-	The Indian Electricity Act.

**Regulations:** The electrical erection, testing, commissioning shall comply with requirements of the following rules/ regulations as amended up to date:

- (a) The Indian Electricity Rules
- (b) The Indian Electricity Act
- (c) The Indian Electricity Supply Act
- (d) The Indian Factories Act
- (e) Fire insurance regulation.
- (f) Any other State Regulations in force.

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16.00.00 COMMISSIONING

After successful erection, inspection and testing of the packages/item/equipment/system, the same shall be commissioned by the Contactor/**Bidder** as per procedures as stipulated by manufacturers. Testing of the installation as per electrical inspectors requirements.

17.00.00 TAKING OVER OF INSTALLATION

On successful testing, commissioning of the packages mentioned in this specification to the satisfaction of the BHEL, the Contactor shall request in writing for taking over the installation.

The Engineer, on receipt of the request, shall arrange to take over the installation either wholly or in part as the case may be after final inspection.

Till such taking over, the responsibility of the whole installation against theft or damage of any kind shall remain with the Contactor.

As regards taking over of cable installation, this shall be taken over after successful completion of testing, commissioning, cable dressing, cable clamping, cable tagging, cleating work etc. by the Contactor. Testing and Commissioning of cables shall be in the scope of Contactor.

18.00.00 TESTING EQUIPMENTS

The major testing equipments that are required to be arranged by the Contactor are listed below:

a. Insulation Tests:

- i) Power operated Megger – 1 KV and 10KV grade
- ii) Hand operated Megger – 1 KV grade

b. Hand driven earth Resistance Megger, range 0-1/3/30 ohms.

c. High Potential testing set – roller mounted type

d. Tong testers of suitable ranges

e. Contact resistance measuring set for micro-ohms

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f. Torque wrench of various sizes

g. Multi-meters test lamp spirit level, field telephone with buzzer set, etc.

h. Secondary injection relay kit.

The list of equipment mentioned above is indicative only. In addition to the above, any other instrument/equipment required shall be arranged by the Contactor at his cost.

**19.00.00 INSPECTION & TESTING**

a) On completion of erection work, the Bidder shall request the Engineer for inspection and testing with minimum seven (7) days advance notice.

b) The Engineer shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contactor.

c) It shall be the Contactor's responsibility to ascertain that approval/clearance is obtained of local statutory authorities including Electrical Inspector, wherever applicable, for conducting of any work or for installation carried out which comes under the preview of these authorities.

d) All rectification, repair or adjustment work found necessary during inspection, testing shall be carried out by the Contactor without any extra cost.

e) All site tests shall be performed in presence of BHEL/BHEL's representatives.

**20.00.00 VOLTAGE LEVELS**

The electrical equipment and material shall be designed, manufactured for the following power supply system and service conditions.

**Power supply /Voltage:**

A) Voltage..... 240KV  $\pm$  10%.

Frequency..... 50Hz  $\pm$  5%.

Phase & Wire..... 3 Ph, 3W

Fault level.....40KA for 1 Sec

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Neutral Earthing..... Solidly Earthed.

- B) Voltage..... 6.6KV  $\pm$  10%.  
Frequency..... 50Hz  $\pm$  5%.  
Phase & Wire..... 3 Ph, 3W  
Fault level..... 40 KA for 3 Sec.  
Neutral Earthing..... Earthed with Earthing Transformer.

- C) Voltage..... 0.415KV  $\pm$  10%.  
Frequency..... 50Hz  $\pm$  5%.  
Phase & Wire..... 3 Ph, 4W  
Fault level..... 50 KA for 1 Sec  
Neutral Earthing..... Solidly Earthed.

**Control supply voltage:**

- A) Voltage..... 240V  $\pm$  10%..  
Frequency..... 50Hz  $\pm$  5%.  
Phase & Wire..... 1 Ph, N, 2W
- B) Voltage..... 220V DC  $\pm$  10%.

21.00.00 **GENERAL INSTRUCTIONS FOR ELECTRICAL EQUIPMENT ERECTION**

**Cable Trays, racks, & accessories:**

Pre fabricated cable trays and accessories shall be assembled at site

Cable trays either inside concrete trenches, cable gallery and racks inside cable shafts shall be aligned and levelled properly.

In case of non-availability of embedded steel inserts in certain tray routes, the Bidder shall have to secure the supports on wall / floor / ceiling surfaces by suitable anchoring system having adequate load bearing capability at no extra cost to the BHEL.

Suitable embedded steel inserts shall be kept by the bidder where required on wall/floor/ceiling surfaces for welding of cable tray brackets. The Bidder shall carefully examine existing inserts & if necessary shall provide extra anchoring in order to make the cable tray system withstand horizontal/vertical accelerations due to seismic forces for indoor trays and also wind load for outdoor trays such as on outdoor cable bridge, boiler platforms etc. in addition to normal tray cable loadings.

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As far as practicable, cable trays shall be supported from one side only in order to facilitate installation and maintenance of cables from the other side.

The cable trays shall be supported in general at a span of 2 metres horizontally and at a distance of 1.5 metre vertically.

Sufficient spacing generally 300 mm but not less than 250 mm shall be provided between tray top to another tray bottom to permit adequate access, for installing and maintaining the cables.

Approximate quantities are indicated in the Schedule of rates annexed with the specification. The unit price quoted for provision and installation of cable trays shall include all necessary coupler plates, bolts nuts, screws, washer and any other sundry material required to make the installation complete.

Complete cable tray support structure after installation shall be inspected / tested for welding strength, straightness, accuracy, use of proper sizes and compliance to drawings.

Complete cable tray and accessory installation work shall be inspected / tested for proper alignment, levelling, use of proper accessories, high quality workmanship etc.

The Bidder shall remove the RCC / Steel trench covers whenever required and shall again place the same in their positions after the erection work in the particular area is completed or when further work is not likely to be taken up for some time.

Whenever any pipe/conduit/cable tray emerges out or enters into a building, care should be taken to ensure that no water enters into the building.

Cable trays in areas subject to excessive dust, mechanical damage or accessible to personal contact shall be provided with sheet metal tray cover as directed by the BHEL.

Cable trays/racks shall be so arranged that they do not obstruct or impair clearances of passage way.

Any modification required at site to install the cable trays shall be done contractor as per site condition

**Cable Laying**

Erection of cabling work shall be carried out in such a way as to provide a reliable and assured electric power supply system to all Power Station auxiliaries.

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Erection of cabling work shall be executed keeping in view all necessities and requirements of fire fighting codes for Generating Stations having an adverse industrial environment.

Cable shall generally be installed in prefabricated trays except for some short run in rigid / flexible conduit for protection or crossings.

Cables laid on trays and risers shall be neatly dressed and clamped with self locking type Nylon cable ties of requisite length at an interval of 1500 mm for horizontal runs, in case of power, control and instrumentation. For vertical runs cables shall be clamped at an interval of 900 mm. The cable ties shall be of fire retardant Nylon & shall be capable of withstanding short circuit forces of the system.

All single core power cables shall be laid in trefoil formation and suitably clamped with cast aluminium trefoil clamps. Alternatively, clamps fabricated from 25 x 3 mm aluminium strips of suitable lengths may be used for such cables. Bidder shall quote for both the cast aluminium trefoil type/cast aluminium clamps claw type and the strip type clamps. BHEL's decision regarding choice/selection of the type of clamp will be final.

All H.T. multicore power cables and L.T. multicore power cables with cross sectional area including & above 70sq.mm. shall be clamped individually by cast aluminium claw type clamp. Alternatively, clamps fabricated from 25 x 3 mm aluminium strips of suitable lengths may be used for such cables. Bidder shall quote for both the claw type and the strip type clamps. BHEL's decision regarding choice/selection of the type of clamp will be final.

L.T. Power cables of cross sectional area less than 70 sq.mm and all control and Instrumentation cables shall be clamped in bunches with clamps fabricated from 25 x 3 mm aluminium strips of suitable lengths. The number of cable in one bunch shall not exceed eight (8) for control & instrumentation cables & number of power cables in one bunch shall not exceed six (6).

Prior to laying of cables inside the indoor and outdoor trenches, the Bidder shall properly clean the trenches at no extra charge.

In outdoor areas, buried cables shall be laid and covered with sand/riddled earth and protected from damage by bricks at sides and precast slab at top.

When buried cables cross road adequate protection shall be provided in the form of hume / galvanised iron pipes laid at a minimum depth of 1(one) meter below ground.

The Bidder shall install, terminate and connect up all cable and conduits as per drawings and cable schedules.

The drawings shall be strictly followed except where obvious interference occurs. In such cases, the routing shall be changed as directed and approved by the BHEL site engineer.

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Approximate lengths of cable and conduit runs will be given in the cable schedule for guidance only. Before commencement of work, the Bidder shall take actual measurements and prepare his own cable cutting schedule to reduce wastage to a minimum.

During the erection period, the Bidder shall furnish a monthly report on cable position in an approved proforma so as to keep the BHEL apprised of the position and to enable him to initiate any procurement action in time.

The Bidder shall also maintain and submit when requested, a record of cable insulation value when drawn from store, after laying, before and after termination/jointing.

Cabling / wiring in offices, laboratories, control room etc. shall be taken through concealed G.I. or rigid PVC pipes as directed by the BHEL.

At certain places where hazardous fumes/gases may cause fire to the cables, cable trenches after installation of cables shall be sand filled.

Instrumentation cables shall be suitable for the area through which they are routed. Suitable distance shall be maintained in routing and laying instrumentation cables so that the interferences from electrical HT & LT cables are minimized. Cables carrying redundant instrument signals shall be alternately routed. In hazardous areas cables of suitable R/L ratio shall be provided for intrinsic safety.

**Cable Tags & Markers**

Each cable and conduit run shall be tagged with numbers that appear in the cable and conduit schedules cables and conduits shall be tagged at their both ends, bends and at every 50.0 M for straight runs. When a cable/conduit passes through a wall, tags shall be fixed on both sides of the wall.

The tags shall be of aluminium with the number punched on it and securely attached to the cable by not less than two turns of 16 SWG G.I. wire. For single core cables the wire shall be of non-magnetic material.

The location of cable joints, if any, shall be clearly indicated with cable marker with an additional inscription "cable-joint".

The Bidder shall furnish and install all tags and markers stated above.

For buried cable, the marker shall project minimum 100 mm above ground and shall be spaced at an interval of 30 meters and at every change of direction.

**Cable Termination and Connection**

The termination and connection of all cables shall be done strictly in accordance with manufacturer's instruction, drawing and/or as directed by the BHEL.

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The work shall include all clamping, fitting, fixing, soldering, tapping, compound filling, cable jointing, crimping, shorting and grounding as required for the complete job. All equipment required for all such operations shall be Bidder's procurement under this specification.

Supply of all consumable materials such as soldering material, electrical tape as well as sealing material shall be included in the offer.

The equipment will be generally provided with blank bottom plates for cable/conduit entry and cable end box for power cables.

The Bidder shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job.

If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the Bidder at the discretion of BHEL. The expenses incurred for such work will be paid as per provisions of 'Extra work' detailed hereinabove.

Control/Instrumentation cable cores entering control panel/ HT switchgear/MCC/ PCC etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block.

The Bidder shall put ferrules on all control / Instrumentation cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers as per drawings. All ferrules shall be coloured, plastic & interlocked type. Bidder shall consider a maximum of eight ferrules per core for each end of termination of control cables. The cost of ferrules shall be inclusive in the cable termination unit rates indicated in the Price Schedule.

Spare cores shall be similarly ferruled, crimped with lug and taped on the ends. Spare cores shall be ferruled with individual cable number.

Termination and connection shall be carried out in such a manner as to avoid strain on the terminals.

All cable entry points shall be properly sealed by suitable heat resistant compound and made vermin and dust proof. Unused opening, if any, shall be effectively closed.

**Cable Joints**

Cable shall be installed without joints as far as practicable.

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If, however, jointing becomes necessary, it shall be made only by qualified cable jointer and strictly in accordance with manufacturer's recommendation

**Cable Handling**

Rolling of drums shall be avoided as far as practicable. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum.

In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable.

For unreeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending.

The drum shall be rolled on the spindle slowly so that the cable should come out over the drum and not below the drum.

While laying cable, cable rollers shall be used at an interval of 2000 mm. The cables shall be pushed over the roller by a gang of people positioned in between rollers over a suitable distance. Care shall be taken so that kinks and twists or any mechanical damage does not occur in cables. Only approved cable pulling grips or other devices shall be used. Cables shall not be dragged on ground or along structure while laying out from cable drums.

Cable shall not be pulled from the end without radius having intermediate pushing arrangement. Bending radius of the cable during installation shall not be less than what is specified by the manufacturer.

Empty cable drums shall be returned to the BHEL as directed by the BHEL.

During the erection period the contractor shall furnish weekly report on cable position in an approved performa so as to keep the Client apprised of the position and to enable him to intimate any procurement action in time.

The contractor shall also maintain and submit a record of cable insulation value when drawn from store, after laying, before and after termination/jointing.

**Earthing**

Grounding work shall be carried out as per IS 3043 & IEEE-80(2000 Std.), IE Rules.

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The Bidder shall carry out the interconnections between various peripheral earthing grids/mats as well as the grounding of all electrical equipment, steel structures etc. Excavation and backfilling, if required, shall be done by the Bidder. The grounding work shall be carried out in compliance with the provisions of I.E. rules and as per enclosed "EARTHING NOTES AND DETAILS.

The grounding for the electronic system shall be done by 50X6 mm MS Strip the same shall be connected to the risers of main ground mat. Overall ground resistance of ground mat shall be less than 0.3 Ohm or as per the recommendation of DCS manufacturer.

For cable trays, a separate ground conductor (50 x 6 mm G.S.flat) shall run along the entire length of each route of cable tray being suitably arc welded on the cable tray supports. Individual cable tray shall be connected to above ground conductor through 50 x 6 mm G.S. flat to maintain continuity of ground path. Cold galvanising touch-up paint shall be provided on the welded areas.

All ground conductor connections shall be made by electric arc welding/brazing. Ground connections shall be made from nearest available station ground grid risers.

Equipment will generally have two separate ground pads with tapped holes, bolts and spring washers. If, however, the same are not furnished, Bidder shall drill the tap holes and provide bolts, spring washers for connection.

Equipment ground connections, after being checked and tested by the BHEL, shall be coated with anti-corrosive paint.

Whether specifically shown or not, all conduits, trays, cable shielding, armour and cable end box, electrical equipment such as motors, switchboards, panels, cabinets, junction boxes, fittings, fixtures, etc. shall be effectively grounded.

In the case of 415V system having 3 phase 4 wire bus if there is no provision to ground the L.T. transformer neutral at transformer end, to make an effective earthed 415V system the neutral bus of all 415V distribution boards shall be connected to ground grid at two different and distinct point.

The conductors, hardware, accessories of the lightning protection system shall be non-deteriorating and non-corrosive type galvanised steel rods

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and flats shall be used for air termination and connections. All connections shall be welded type.

#### Site Tests

Physical checking of connections for earth mat conductor as well as equipment earthing conductor & continuity of grounding connection.

Measurement of ground resistance (Rg).

#### Cable Termination & Jointing Kits

Cable joint or end terminations of electrical equipment shall be suitable for Indoor & Outdoor use. Technical requirements for Heat Shrinkable terminations / heat shrinkable type straight through Joints are mentioned below.

Cable Glands and lugs for all power, control, and instrumentation cables shall be supplied by the Bidder.

Termination kit will be free issue from BHEL.

#### Cable Glands

Cable glands shall be nickel plated brass gland, double compression type complete with necessary armour clamp and tapered washer etc. The sealing rubber ring shall not have aging effect and shall retain its sealing characteristics for more than 20 years. Cable glands shall match with the sizes of different LT Power/Control/Instrumentation.

#### Cable Lugs

Cable lugs shall be suitable for termination of different cross-sections of HT & LT Power/ Control/ Instrumentation cables and shall be of following types.

- i) Copper tubular terminal end for solder less crimping to copper conductors.
- ii) Cable lugs for control cable termination shall be insulated type. These lugs shall be flat type/ring type/U type to suit the terminals provided in the pan
- iii) Pin type lugs shall not be used.
- iv) Aluminium tubular terminal ends in solder less crimping to Al. conductor



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Solder less crimping of terminals shall be done by using corrosion inhibiting compound. The cable lugs shall suit the type of terminals provided on the equipment. Lugs for control/instrumentation cables shall be PVC insulated/sleeved type.

**Site Tests for cables**

Contactor shall tests all cables, wires to prove that the same are free from ground and short circuit after erection and installation at site.

If any ground or short circuit is found the fault shall be rectified or the cables, wires shall be replaced at no extra cost.

All cables shall be megger tested before jointing/terminating. After jointing is completed all L.V. & H.V. cables shall be megger tested and H.V. cables (11KV, 6.6KV) shall be pressure tested before commissioning. The leakage current shall also be measured during pressure test.

Cable cores shall be tested for:

- i. Physical damage
- ii. Continuity
- iii. Correctness of connections as per relevant wiring diagram.
- iv. Insulation resistance.
- v. Insulation resistance between conductors.
- vi. Proper earth connections of cable glands, cable boxes, cable armour, screens etc.

**Site Tests for the Equipments:-**

Site tests shall be carried out to the following equipments by the Contactor. The tests specified below are not exhaustive. Any other pre-commissioning and field test not included in the following list but specified in the relevant standards, Electricity Rules, Code of practice and/or recommended by the manufacturer of the equipments shall also be deemed to be included under the scope of this specification.

In addition to testing of individual components/assemblies functional test shall be carried out for the system like 6.6KV switchboard, 415V PCC&

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MCC, Generator control panel, Generator Relay panel, Generator synchronizing panel, Battery charger & DCDB, 220KV Switchyard relay panel, Bus change over panel etc.

**Painting**

Painting of various assemblies, equipment, structures etc. are to be done by contractor, with brush/spray gun to the colour scheme as specified. All ironwork erected shall be provided with one undercoat, and two final coats of paint. The contractor will do the necessary surface preparation and removal of paint wherever required. Colour scheme to be approved by BHEL/ Customer.

Generally all structural steel etc. fabricated and erected at site by contractor shall be sand/grit/shot blasted and painted with two coats of Zinc rich epoxy primer of minimum dry film thickness 62 to 70 microns (total) which is to be supplied by the Contractor. A drying time of minimum four (4) hours shall be given after application of each coat of primer.

Two (2) coats of final finish paints shall be applied (either sprayed or brushed) in position to generally all equipment, structural steel etc. after erection and commissioning before final handing over. However, a drying time of about four (4) hours shall be given in between the two coats. Touch up and finish painting as well as anti corrosive protection painting as required painting after installation shall be done by the Contractor.

It is necessary that prior to application of paints, all surfaces shall be free of dust, oil, rust, grease, moisture etc. Sand blasting to be carried out before applying primer. Excessive rust, scale may be removed by hand hammering, hand chipping, etc. All loose mill scales and all the loose or non adherent rust shall be removed by hand wire brushing and sanding, hand scraping etc. Contractor shall obtain clearance before proceeding for every coat of paint.

The integrity of coat shall be checked by the paint detectors, to be provided by the contractor to check for holes, porosity & thickness where flaws are detected, the contractor shall repaint the area of surface involved.

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1)

**HT Switchgear / PCC/MCC**

- a) Physical checking of various parts/equipment
- b) I.R. Test on each pole with HV megger
- c) I.R. test on Control Circuit
- d) Measurements of control resistance (in micro- ohms) for all the three phase of circuit breaker.
- e) Measurement of resistance of the closing and tripping coils.
- f) Checking the close trip operation at 70% and 100% of the rated auxiliary DC voltage.
- g) Checking the auxiliary circuits.
- h) Checking of interlock provided and tripping of breaker through relay.
- i) Space heater operation check.
- j) Functional check.
- i) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation.

**2) Current Transformer**

- a) Polarity
- b) Continuity
- c) I.R. value of windings
- d) Checking of all ratios on all cores by primary injection of current (ratio identification test)
- e) Connection to correct taps (if any)
- f) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation

**4) Potential Transformer**

- a) Polarity
- b) I.R. value of winding
- c) Ratio test
- d) Connection to proper taps (if any)
- e) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation



5) **MCC, Distribution Board**

- a) Physical checking of various parts/connections
- b) I.R. test
- c) Checking of control circuit
- d) Checking of overload relay & other protective devices
- e) Functional check.
- f) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation

6) **Relay, meters**

- a) Calibration test
- b) Operation test
- c) Secondary injection test for in site checking.
- d) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation

7) **Bus duct**

- a) Physical checking of various parts/connections
- b) I.R. test and high voltage test
- c) Multi volt drop test of joints
- d) Functional test of auxiliaries
- e) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation

8) **Battery & Battery Charger, DCDB**

- a) Physical checking of various parts/connections
- b) Electrolyte filling & topping up
- c) Charging & discharging of batteries.
- d) Checking cell voltage and specific gravity
- e) Functional check of battery charger
- f) Functional check of main & sub DCDB.
- g) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation





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**9) Local Control Panels**

- a) Physical checking of connections & circuits
- b) I.R. Test
- c) Functional test of circuits
- d) Calibration & operation test
- e) Any other check/test specified in drawing or asked by customer to ensure proper erection/commissioning of the installation

**Other Electrical Equipments :-**

There will some equipments like HT,LT motors ,Transformers, Bus Duct and Associated NGR cubicle ,line side CT,PT cubicle etc which shall be over hauled , installed and commissioned by a separate servicing contractor . Air Dryer and Air conditioning system will also be erected by other contractor however, cabling work related to these equipments i.e. Cable laying ,termination ,testing and commissioning & equipment earthing shall be in the Bidder's Scope. The bidder shall co-ordinate for cabling, earthing work, installation of electrical part for these equipments with the equipments servicing contractors.

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**ANNEXURE – I : PROJECT INFORMATION**

OWNER	:	Jharkhand State Electricity Board
		Patratu Thermal Power Station, Patratu (Jharkhand State), India.
CONSULTANT	:	Desein Consulting Engineers Limited
AT THE TIME OF INITIAL		73/1, St. Mark's Road
DESIGN, ENGINEERING,		Bangalore – 560 001.
ERECTION & COMMISSIONING		
PROJECT	:	Patratu Thermal Power Station
		2 x 110MW -Unit Nos. 9 & 10– Of Stage II
		Overhaul Project
LOCATION	:	At Patratu, Jharkhand State, India.
NEAREST AIRPORT	:	Ranchi
ROAD APPROACH	:	Accessible by road from Hazaribagh & Ranchi
NEAREST RAILWAY STATION	:	Patratu & Ranchi
NEAREST PORT	:	Kolkata
SEISMIC ZONE	:	Zone II – as per Indian Standard IS: 1893 (Current Issue)
RAINFALL (ANNUAL TOTAL MEAN)	:	1200 mm (Maximum rainfall occurs during June to September)
AMBIENT AIR TEMPERATURE		
a Maximum dry bulb	:	45.0 Deg. C
b Minimum dry bulb	:	2.0 Deg. C
c Reference temperature for design of electrical equipment / devices	:	(+) 50 Deg. C
RELATIVE HUMIDITY		
a Maximum	:	80%
b Minimum	:	20%
C Relative humidity for design of equipment / devices	:	(+) 100%
CLIMATIC CONDITION	:	Hot, dry and dusty but healthy climate.

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**TROPICALISATION** : All equipment supplied against this specification shall be given tropical and fungicidal treatment in view of the severe climatic conditions prevailing at site as described above.

**WIND DATA**

a Wind load as per IS 875  
(Part-3) 1987

i) Basic wind speed : 50 km/hr.

B Prevailing wind direction : Tending South

**ELECTRICAL**

**Auxiliary Power Supply**

Auxiliary electrical equipment pertaining to this project shall be suitable for operation at the following supply system:



- a For AC motors above 175 kW : 6600 V ( $\pm 10\%$ ), 3 phase, 50 Hz, ( $\pm 5\%$ ) non-effectively earthed neutral
- b For AC motor rated 175 kW and below : 415V ( $\pm 10\%$ ), 3 phase, 3 wire, 50 Hz, ( $\pm 5\%$ ) non-effectively earthed
- c AC Control and protective device : 110 V ( $\pm 10\%$ ), 1 phase, 2 wire, 50Hz AC supply with one point earthed
- d For DC motors, control and protective devices : 220V ( $\pm 15\%$ ), 2 wire, unearthed DC supply from battery / battery charger
- e For lighting fixtures, space heaters, for motors rated above 30 kW and indicators / recorders : 240V, 1 phase, 2 wire AC 50 Hz with neutral lead effectively earthed
- f For solid state controls and annunciation : (+) 24V/48V ( $\pm 10\%$ ), 2 wire, negative earthed DC supply (For instrumentation and control)
- g Uninterruptible power supply : 230V, 1 phase, 50 Hz, AC supply with one lead earthed (for I&C)
- h Construction power supply : 415 V, 3 phases, 3 wires, 50 Hz, AC supply will be provided by JSEB. Details will be discussed later.

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**ANNEXURE – III : CHECKLIST FOR BID OFFERS**

Bidder to ensure the completeness of the below mentioned checklist, without which the offers shall be treated as Non-Responsive.

S. No.	DESCRIPTION	YES/NO
1	Compliance to complete scope of work	
2	Compliance to Relevant Codes and Standards	
3	Compliance to Technical and Specific Requirements	
4	Compliance to Quality Assurance Plan	
5	Compliance to Test Procedures	
6	Compliance to Data/ Drawings/ Documents/ Manuals etc.	
7	Compliance to Packing, Shipping & Storage	
8	Complete Schedule of Deviations (Annex-IV)	

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**ANNEXURE – IV : SCHEDULE OF DEVIATION**

If the proposal has got any deviation from the technical specification, the Bidder shall tabulate these deviations clause by clause in this schedule.

Against each and every deviation from the Technical Specification, the amount by which the Bid Price will thereby be increased or decreased in case of withdrawal of deviation shall be intimated clause by clause in this schedule. In case the amount is not mentioned in this Schedule against any of this deviation mentioned in deviation sheet, it will be taken for granted that the same does not involve any change in the Bid Price.

Add more sheets, if required.

Clause No.	Deviations	Amount by which the Bid price will change	
		Increase (*)	Decrease (*)

We hereby confirm that only the above mentioned deviations are there from Purchaser's tender specification. Apart from these deviations, all other technical stipulations of specification are acceptable to us and are taken care of in the Contract Price.

Name of Firm : \_\_\_\_\_

Signature of Bidder : \_\_\_\_\_

Name of Bidder : \_\_\_\_\_

Designation : \_\_\_\_\_

Date : \_\_\_\_\_

Seal of the Company

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**ANNEXURE – V : DRAWINGS & DOCUMENTS REQUIREMENTS**

**A) Drawings & Documents to be submitted with Bid (1 H + 1 S)**

- i. Checklist for Bid Offers, Annexure-III
- ii. Schedule of Deviation, Annexure-IV
- iii. Bidder's General Information, Annexure-VI
- iv. Catalogue
- v. Manufacturing Quality Plan
- vi. List of type test certificates along with date of test & testing agency.
- vii. List of major order executed in last three years with name of client, PO Number, Project,
- viii. Detail of test facilities available at Manufacturer's works.

**B) Drawings & Documents to be submitted after Order (6 H + 1 S)**

**B.1) For Approval**

- i. Manufacturing Quality Plan, Annexure-II
- ii. Test Certificates as mentioned in the Specification.

**B.2) For Reference**

- i. Test Reports, as per list furnished with Bid.

**C) Final Documentation to be submitted before Dispatch. (10 H + 2 S)**

- i. Filled up Technical Datasheet as per Annexure-I.
- ii. Catalogues.
- iii. Test Certificates

Final Documentation shall be submitted in neatly bound volumes.

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S. No.	Details	To be Filled by Bidder
1.	Bidder Name	
2.	Number of Years in Operation	
3.	Address for Correspondence	
4.	Operation Address if different from above	
5.	Phone Number	(Country Code) (Area Code) (Telephone Number)
6.	Fax Number	(Country Code) (Area Code) (Telephone Number)
7.	E-mail address	
8.	Website	
9.	ISO Certification, if any	
10.	Bid Currency	
11.	Port of shipment	
12.	Whether Supplier / Manufacturer Dealer/ Trader/ Bidder	
13.	Type of Material Supplies	
14.	Banker's Name & Branch	
15.	Branch Code	
16.	Bank account number	
	<b>ONLY FOR INDIAN BIDDERS</b>	
17.	PAN No	
18.	EPF No.:	
19.	CST No	
20.	Local ST No	
21.	Excise Registration number	
22.	Excise Range	
23.	Excise Division	
24.	Excise Collectorate	
25.	NSIC / SSI Registration No.	

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