


SECTION 1 – SCOPE OF ENQUIRY

1. This Specification covers the design, manufacture, inspection and testing at vendors work, if required, proper packing and delivery to site of ELECTRICAL WORKSHOP EQUIPMENTS as mentioned in different SECTION of this specification for :

4 X 200 MW PARBATI – II HEP
2. It is not intent to specify herein all the details of design and manufacture. However the equipment shall conform in all respect to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to vendors guarantee.
3. The general terms and conditions, instructions to tender and other attachment referred to elsewhere be hereby made part of the tender specification.
4. The tenderer shall be responsible for and governed by all requirements stipulated herein after.
5. **Deviation**, if any should be brought out very clearly on deviation sheet (ANNEXURE-III) of the specification. Otherwise it would be presumed that the tender offer is in line with what has been stated/asked for in this specification.
6. The offer should be complete with technical data, catalogue, brochures and drawings, as applicable.
7. The bid shall be in English language and MKS system of unit.


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 Engineer

PREPARED BY


 Mandvi Gupta
 Dy. Manager

APPROVED BY

SECTION 2 – General Conditions

1. SCOPE OF SUPPLY

The scope of supply indicating technical specification & Bill of quantity shall be as per Annexure –I (Details of Equipments) along with all essential accessories required for the successful operation of the equipments.

2. CODES AND STANDARDS

All relevant National and International standards shall be specified and followed.

3. DESIGN CRITERIA

- 3.a. Electrical Workshop Equipment shall be used for testing various electrical equipment/ devices during Commissioning, Operation and Maintenance of plant.
- 3.b. The equipment will be kept in a clean but hot, humid and tropical atmosphere when not in use. Equipment will be placed in dust laden, hot, humid atmosphere during its use.
- 3.c. For continuous operation at specified rating, temperature rise of various equipment/ components shall be limited to the permissible value stipulated in the relevant standards and this specification.
- 3.d. The equipment and component thereof shall be capable of withstanding the mechanical forces and thermal stresses of the short circuit current without any damage and deterioration of material.

4. SPECIFIC REQUIREMENTS & RATINGS

- 4.a. The bidder may note that the equipment ranges, ratings, quantities as detailed herein, are the minimum requirement only. The equipment shall be furnished in strict accordance with the same. All accessories for the equipment not covered here, but are necessary for satisfactory and trouble free operation of the equipment, shall be supplied by the Bidder. Bidder may also quote for optional accessories.

4.b. The instrument shall be designed suitably for satisfactory operation and storage in wide range of temperature variations prevailing at projects sites:

Parbati II: (-) 4°C to 46°C.

4.c. Analog instruments shall be provided with knife-edge pointer and anti-parallax mirror.

4.d. Instrument/meters suitable for DC supply should be provided with rechargeable batteries, charger and low battery charge indication.

4.e. The portable instruments shall be suitable for hand held operation, rugged in construction and suitable for field use.

4.f. Power supply for AC operation Instrument shall be 240 V AC, 50 Hz single phase.

4.g. All electrical instruments shall be dust and moisture proof.

4.h. Calibration tests shall be done on all instruments, wherever applicable and calibration certificates are to be furnished with instruments.

4.i. Equipments shall be of shock proof.

4.j. Instruments shall meet National or International relevant safety standards.

4.k. Manufacturers name plate:

The following data shall be shown in accordance with the relevant standard

- Manufacturers name and address
- Works serial number and date of manufacture
- Main technical data

4.l. Warning Plates:

Warning plates / caution for the safety of instrument & human beings with Dos and Don'ts to be inscribed on the instruments / Recorders / all electrical equipment in English.

 BHEL-EMRP MUMBAI	TECHNICAL SPECIFICATION FOR ELECTRICAL WORKSHOP EQUIPMENTS PARBATI-II – HEP	SPECIFICATION NO. EM-NHP-PBTII-050	
		Rev. No	00
		Rev. Date	

SECTION 2 – General Conditions ---Contd.

5. TESTING & INSPECTION

- 5.a The manufacturer shall carry out all acceptance and routine tests as per relevant standards and specification in line with BHEL specifications . Charges for all these routine and acceptance tests for all the equipments shall deem to be included in the bid price.
- 5.b Equipment shall be completely assembled, wired, adjusted and tested in factory as per the latest edition of relevant standards.
- 5.d The Bidder shall submit the Test Certificates/Reports for all the acceptance and routine tests as per relevant standards, specifications and in line BHEL approval. Based on approved Test Certificates/ Reports, the BHEL will give the dispatch Clearance. Only after Clearance vendor can dispatch the material.
- 5.e Bidder shall also submit the Test Certificates for all the acceptance and routine tests as per relevant standards, specifications along with the equipment as per TABLE-2, Annexure - II.

6. Documentation

6.a. To be submitted with bid:

The Bidder shall submit all documents as per TABLE-1, Annexure - II along with the bid.

The Bidder shall ensure that the all-necessary information required to fully describe the equipment are submitted with the bid.

6.b. To be submitted after award of order:

The Bidder shall submit all documents as per TABLE-2, Annexure - II.

After award of contract for BHEL and/ or end customer approval (NHPC) and also along with equipment.

SECTION 2 – General Conditions ---Contd.

7. DELIVERY

The delivery of Equipment shall be completed as per NIT (Notice Inviting Tender)

8. While quoting Bidder shall have to furnish unit rate for each item. Purchaser reserves the rights to add/delete quantity of any item during detailed engineering as finally required for the project. Unit rate quoted shall be applicable for price adjustment in such cases.

9. All the equipment shall be procured from reputed manufacturers and make of equipment shall be subjected to the approval of BHEL/ BHEL's Customer.

10. Performance Guarantee

The bidder shall guarantee that the equipment offered shall meet the requirement as stipulated in this specification and as confirmed by them in annexure – I, (Duly filled in). In case the performance of equipment is not as per performance guarantee, the bidder will have to replace the equipment at site free of cost.

11. Deviation

The Bidder shall indicate the deviation, if any, in Schedule of Technical Deviation as per Annexure – III, along with the justification for the deviation. Deviations mentioned anywhere else shall not be entertained.

12. Package & Consignment Data

The Bidder shall pack all the equipment, their accessories and spares in road -worthy package. Bidder to indicate the number of packages of consignment together with the size (L x W x H) and weight for transporting the equipment along with their bid.

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Each package shall be legibly marked with the following information:

Applicable for Parbati – II Project:

ELECTRICAL WORKSHOP EQUIPEMENTS for 4 X 200 MW **PARBATI –II
HEP**

BHEL Purchase Order No:

Job No: 3864-11

Supplier's Name:

Manufacturer's Name:

Name of the Equipment:

Item Code of the equipment: (As per ANNEXURE – I)

Quantity:

Weight:

Annexure – I

Details of Equipments

Bidder must quote the material code number, material description & quantity offered in their quotation /bid, as specified below project wise. Bidder's alternate description can also be given in separate column.

Completeness of Equipment

Each of the equipment listed shall be complete with applicable accessories like power supply main leads, screened guard leads, screened line test leads, earth leads, connectors and clips, leather carrying case and any other accessories required for completing the equipment.

Sl.No	Item specification	Qty	Item Code	Details of Equipment offered by the Bidder	
				Make & Model No	Catalogue No
1	High frequency Welding Set for Brazing of Stator Coil Ends.Detailed Specifications as per attached Annexure-IV	3No.	IM4386417567		

**TECHNICAL SPECIFICATION
FOR
ELECTRICAL WORKSHOP EQUIPMENTS**

**SPECIFICATION NO.
EM-NHP-PBTII-049**

Rev. No 00

**Rev.
Date**

PARBATI-II – HEP

Sl.No	Documents	No of copies
1	Annexure – I Details of Equipments (Duly Filled)	2 copies
2	Product Catalogue for all equipments/ instruments referred in Annexure – I	2 copies
3	Schedule of Deviation (Annexure – III)	2 copies

NOTE: All above documents to be submitted strictly, failing which the offer may likely be rejected.

Table 2

LIST OF DOCUMENTS TO BE SUBMITTED AFTER AWARD OF ORDER FOR BHEL / END CUSTOMER APPROVAL and ALONG WITH EQUIPMENT

Sl.No	Documents	No of copies
1	Product catalog with complete specifications, model nos. physical dimensions etc.	3 copies (2 for NHPC + 1 for BHEL)
2	Quality Assurance Plan along with test certificates and calibration certificates for MDCCs	4 copies (3 for NHPC + 1 for BHEL)
2	Test Certificates of all acceptance and routine tests as applicable.	3 copies (2 for NHPC + 1 for BHEL)
3	Calibration certificates as applicable.	3 copies (2 for NHPC + 1 for BHEL)
4	Guarantee certificate valid for 12 months from the date of delivery.	2 copies (1 for NHPC + 1 for BHEL)
5	Instruction manual of individual equipment shall clearly indicate in English the installation and connection method. Operating, Maintenance and Calibration methods shall be provided in the manual.	7 copies (6 for NHPC + 1 for BHEL)

Deviation Statement (Technical)

Sr No.	Item	Deviation	Justification for Deviation

Use extra sheet if required.



ANNEXURE - IV

1.1 SPECIFICATIONS OF INDUCTION BRAZING MACHINE WITH WATER COOLER.

1.2 INTRODUCTION:

The equipment will be used for brazing copper conductors of various sections during hydrogenerator stator winding at site. The equipment shall be mounted on wheels for easy portability and lifting hooks are to be provided for lifting by overhead crane. The set shall be of robust construction to withstand the hazards of the site.

2.0 TECHNICAL DATA

- 2.1 Input Power - 3 Phase, 415 Volts, $\pm 10\%$ - 15%, 50 Hz, $\pm 10\%$
- 2.2 Current Rating - 63A
- 2.3 KVA at full load - 50 KVA
- 2.4 Fuse Rating - 75 A
- 2.5 Max. output power - 40 KW FOR 10 MIN.
- 2.6 Max. continuous output power - 30 KW
- 2.7 Output frequency - 20-30 KHz.
- 2.8 Power converter efficiency - better than $> 90\%$
- 2.9 Power Regulation - 0 to 100%
- 2.10 Max. DC current at 50% duty cycle (10 min.) 75A, DC
- 2.11 Max. continuous DC current - 70 A, DC
- 2.12 Cooling water flow rate - 40 to 50 LPM.
- 2.13 Cooling water temperature - Less than 35°C
- 2.14 Main Cable - Type HO7RN-F4G10 15 Metres each
- 2.15 (a) O.P Voltage - 350V(Max.)
(b) O.P Current - 150A(Max.)
- 2.16 (a) Water Tank Capacity - 75 Litres
(b) Compressor - 3.5 Tons Refrigeration type

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[Signature]



- 2.17 Heating Time to brazing temp.(cherry red)- 30 sec(Max),
Total Brazing Time with filling - 55 to 65 sec (max)
- 2.18 Max Dimensional of unit (L x B x H) 500 x 1200 x 1200 mm
- 2.19 Net weight To be furnished.

3.0 FEATURES OF INDUCTION BRAZING MACHINE.

- 3.1 Incoming moulded case circuit breaker
- 3.2 Compact, Economical Easy access construction
- 3.3 Output Power, Voltage, frequency meters & input voltage & current metres.
- 3.4 On/Off Reset push buttons for starting and stopping of heater power
- 3.5 Power Control Knob for setting the desired power level.
- 3.6 Provision for remote control of the power supply.
- 3.7 Indication lamps to show the operation of the equipment.
- 3.8 Diagnostic indicators which provides visual indication at the abnormal/overload/operating conditions of the equipment and internal fault conditions.
- 3.9 Brazing Heads/Coils/Tongues-3 Nos. of thick hollow cross section tube (To suit joint as per enclosed Sketch No.HGE-155) Universal or Adjustable brazing heads will be preferred. Coils shall be insulated type. Silicon / Amorphous sheet steel shall be used for induction on the coils. Laminations and insulation shall be placed such that they do not get dislodged during brazing. Breakable ferrites shall not be used.
- 3.10 Protective thermal switches and interlocking to prevent operation of the power supply without adequate/Normal cooling water flow established.
- 3.11 Water cooled capacitors with tapings to obtain desired operating frequency
- 3.12 Load matching transformers with tapings to facilitate optimum power delivery under varying load conditions.

4.0 MACHINE TYPE:

Electro-brazing machine consisting of transformer of suitable rating @ 50% duty cycle. Transformer fitted inside the body of sturdy, all welded sheet steel fabrication, mounted on wheels, secondary terminals are to be brought for connection to cable to which the Electro-brazing tong is connected at the other end. To facilitate movement, the unit will be provided with a handle.



5.0 TRANSFORMER:

Transformer shall be of a special type conforming to ISS 4804 Part 1, 1968 and to international standards applicable for this class of transformers suitable for portable use and to suit long length of secondary circuit. Water cooled, having core of high grade electrical steel, primary and secondary coils of solid electrolytic copper of ample section, heavy duty class 'F' insulated and impregnated suitable for withstanding continuously a temperature of 140°C

6.0 CURRENT CONTROL BY TRANSFORMER TAPS:

Transformer primary coil shall be provided with taps brought out to tap change switch for adjustment of current in 8 steps from 50 to 100%.

7.0 ELECTROMAGNETIC CONTACTOR:

Machine shall be provided with heavy duty electromagnetic contactor of 63 Amps.

8.0 BRAZING INITIATION:

By means of foot operated switch and Electromagnetic contactor. The foot switch connections are made to low voltage (110V) for safe initiating circuit.

9.0 MAIN SUPPLY:

Main suitable for connection to 2 lines of 3 phase 415 \pm 10%/- 15 % Volts, 50 \pm 10% Hz. supply.

10.0 SECONDARY CABLES:

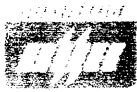
Two single core water cooled secondary cables of suitable cross section to suit the machine and tong shall be provided.

11.0 COOLING SYSTEM:

Transformer, electro holders shall be water cooled. Internal water cooling piping with wheel valves for each circuit shall be provided with the machine. The equipment shall be suitable for cooling water of 2 to 5 kg/cm² and 30°C maximum available at works.

12.0 WATER FLOW SWITCH:

Water flow switch shall be provided with the machine to ensure adequate water while operating the machine. When adequate water flow is not established, the control circuit shall trip the machine.



14.0 PAINTING:

All parts shall be given a minimum of two coats of paint and all high stress components shall be coated with rust preventive paint before dispatch.

14.0 SERVICE REQUIREMENTS:

14.1 POWER SUPPLY:

415 + 10% - 15 % Vrms, single phase, 50 + 10% cycles, machine is suitable for connection to two lines of a 3 phase supply. Main supply cable two core type, disconnect switch with fuses of suitable size recommended to be provided by the supplier.

14.2 COOLING WATER SYSTEM: Closed circuit with Chiller Refrigeration type.

Cooling water at 2 to 5 kg/cm² pressure and temperature below 30°C at recommended flow rate and system shall be closed circuit with water Chiller for cooling the water.

15.0 OTHER ACCESSORIES.(FOLLOWING ACCESSORIES SHALL ALSO BE SUPPLIED)

15.1 STAND FOR BRAZING - This stand shall be suitable for brazing on stator winding at a height of 0 to 5 m and stator dia of 3 to 6 m shall include swivel arm, centre pillar, rotating arm and other necessary components. Drawing and description of stand shall be given in offer.

15.2 TOOLS - All tools and devices like tongs, pliers, clamps, 'C'-clamps etc required for holding the joint together during brazing shall be supplied. Any other tool required for brazing shall also be supplied. A list of such tools and devices shall be given in offer.
4(FOUR) SETS OF SUCH TOOLS SHALL BE SUPPLIED.

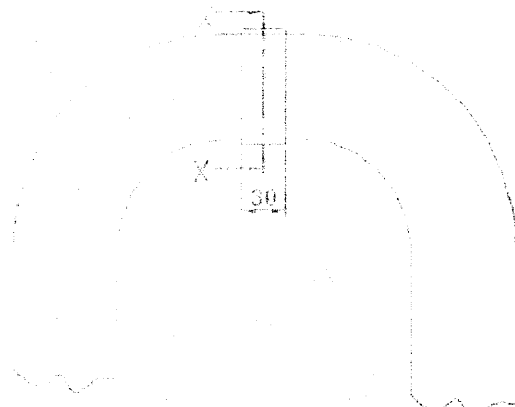
16.0 TEST AND INSPECTION

- Supplier to submit his QA plan alongwith offer.
- Testing shall be done as per relevant standards. Inspection will be done at supplier's works by BHEL representative. Internal testing and QC reports alongwith one copy instruction manual shall be furnished for BHEL's approval before giving call for inspection.

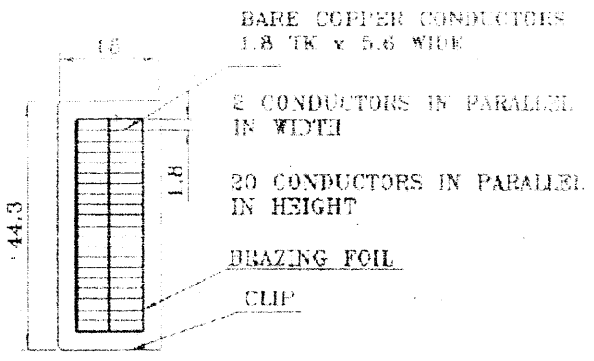
17.0 INSTRUCTION MANUAL

17.1 The instructional manual shall consists of following sections. The instruction manual shall be made on good quality paper (At least 90 gsm) and shall be made in bound volumes suitable for long term usage in shop

- Introduction.
- Photograph of all items of equipment.
- Description of equipment

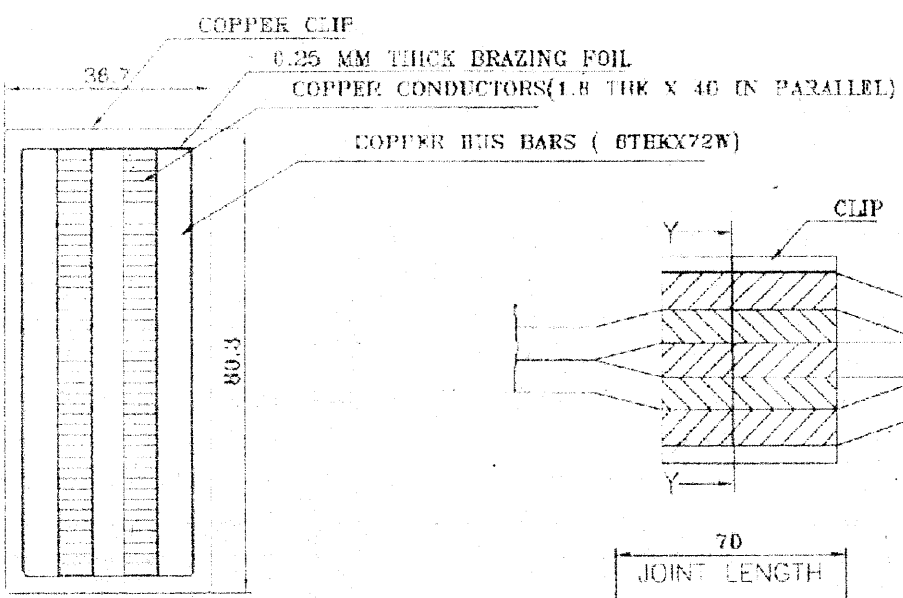


JOINT-1

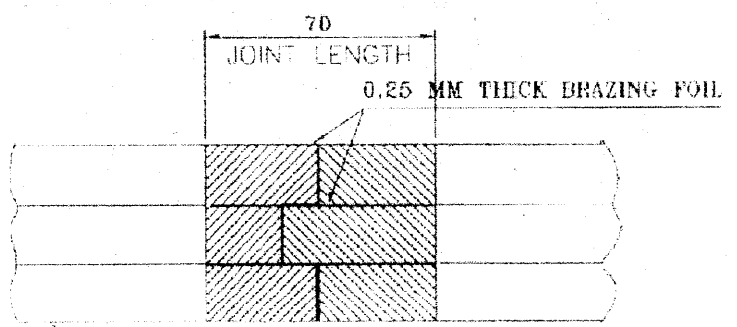
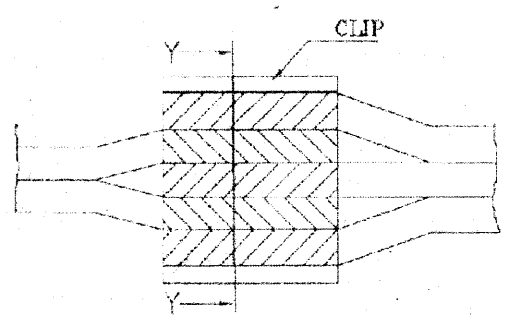


SECTION-XX

AREA OF JOINT-1 = 797.4 SQ. MM.



JOINT-2
SECTION-YY
(C.S. AREA OF JOINT-2 = 2947 SQ. MM.)



JOINT-3
6 THK X 80 WIDE COPPER BUS BARS (3 IN PARALLEL)
C.S. AREA OF JOINT-3 = 1480 SQ. MM.

- JOINT-1 - BAR TO BAR
- JOINT-2 - BAR TO BUS BAR
- JOINT-3 - BUS BAR TO BUS BAR

DETAILS OF BRAZED JOINTS

CHECKED	<i>[Signature]</i>
APPD.	<i>[Signature]</i>
SKETCH NO. HCE-155 (PARBAT)	



- GA drawings
- Schematic diagrams, Circuit diagrams
- Test certificate
- Detailed procedure to operate the equipment (written in easy language for understanding of operators)
- Dos and Donts
- FAQ(Frequently asked Questions) and answers
- Trouble shooting flow chart.

(B) GENERAL

1.0 Spares & Consumables - 1 set of Bulbs, fuses, water filters, contactor, coils, carbon brushes etc. shall be quoted for each machine. Suppliers shall also recommend additional spares required for 5 years operation.

2.0 Guarantee - Equipment is to be guaranteed for reliable & trouble free operation for 48 months from supply or 24 months from commissioning which ever is earlier.

3.0 Suppliers to indicate for each machine the maximum size of joint (Total Cross Section)that can be brazed with each machine.

4.0 Supplier to describe the de-brazing/repair procedure of brazed joints in the operation instruction manual.

5.0 Supplier to furnish the methods for testing the efficiency/solidity of brazed jointed.

6.0 Supplier to train BHEL winders for making joints on actual job for 3 days.

7.0 Supplier to indicate the type of brazing materials viz ROD/foil and its grade to be used for brazing for best joint efficiencies.

8.0 Documentation

8.1 With Offer

3 sets complete with drawings/leaflets/catalogue and technical information giving full description, operation, dimensions, weight etc. etc.

8.2 With Supply:

10 sets of drawings and O&M manuals giving Introduction, main data, maintenance, Tech. Installation, Description, Handling, Storage Instruction, Operation, Maintenance Instructions Instruments, spare part list etc. shall be supplied and in electronic form on 4 nos. compact Computer Discs compatible with latest PCs

9.0 Completeness of Offer

Supplier to confirm compliance of specifications clause-by-clause in first instance itself. Any deviation shall be clearly brought out in the offer, without this the offer will not be considered and will be rejected.