



PRODUCT STANDARD  
HYDROGENERATOR

HG 10 071 Rev. 01

SPECIFICATION FOR RESISTANCE BRAZING MACHINE  
WITH WATER CHILLER

PART A: TECHNICAL SPECIFICATION.

PART B: GENERAL CONDITIONS.

PART A: TECHNICAL SPECIFICATION.

1.0 INTRODUCTION:

The equipment will be used for brazing copper conductors of various sections during winding hydrogenerator. The equipment and all its accessories shall be mounted on a trolley with wheels for easy portability and lifting hooks are to be provided for lifting by overhead crane. The set shall be robust construction to withstand the hazards of the shop and transportation. The equipment shall be suitable for indoor application and for ambient temp of 0 to 50 deg C and humidity of 0 to 95%.

2.0 TECHNICAL DATA

- 2.1 Input supply : 415 + 10%/- 15 % volts, 50 ± 10% Hz, 3 Phase AC supply.
- 2.2 Output voltage : 8 to 20 Volts
- 2.3 Output current : 3000A
- 2.4 Max. continuous output power : 45 KW
- 2.5 Output frequency : 20-30 KHz
- 2.6 Cyclic duration factor : 30%
- 2.7 Cycle time : 15 Minutes

3.0 FEATURES OF RESISTANCE BRAZING MACHINE

- 3.1 Protection against short circuit, over heating & over-load to be provided .
- 3.2 Inter-locking with water circuit to be provided i.e. when cooling water is not "ON", Power should be switched "OFF"
- 3.3 Features on Panel:

- Meters for indication of Input voltage & current and output power ,voltage,frequency.

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इस प्रपत्र पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे

संशोधन :  
REV:01 31-03-2010

- Reviewed and updated.

*A. Dixit*  
31-03-10

हाइड्रोजनरेटर इंजीनियरिंग विभाग  
भारत हेवी इलेक्ट्रिकल्स लिमिटेड

तैयारकर्ता	जाँचकर्ता	अनुमोदनकर्ता	जारी करने की दिनांक
-SD-DOLLY	-SD-K.V.AJANE	-SD-J.K.BHATI	10-09-05



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- ON/OFF/Reset Push Buttons for starting and stopping of heater power & Indications for the same.
  - Provision for remote control of power supply.
  - Power control knob for setting the desired power level
  - Diagnostic Indicators with visual indications for abnormal overload operating conditions and internal fault condition.
  - Equipped with moulded case circuit breaker for control of power supply.
  - Unit shall be compact, economical and have better accessibility.
  - Equipped with protection and interlock to prevent operation of unit without adequate cooling water flow.
- 4.0 **CHILLER UNIT** :Adequate capacity chiller unit shall be of refrigeration type with closed circuit system. It should be suitable for use of normal drinking water for cooling purpose.
- 4.1 Cooling water pressure – 2 to 5 kg/cm<sup>2</sup>.
- 4.2 Cooling water temperature – 20 °C to 50 °C
- 4.3 Chiller should be equipped with quick release coupling type water cooled flexible cables of 10 M length(minimum) for each brazing pliers.
- 4.4 Capacity of chiller and quantity of cooling water required shall be decided and furnished by the supplier.
- 5.0 **BRAZING PLIERS**  
3 Nos. each of various sizes to suit joints as per ANNEXURE-I enclosed with the enquiry. Universal or Adjustable brazing heads will be preferred.  
Drawings of brazing tong/pliers shall be approved by BHEL prior to manufacture.
- 6.0 **CABLES**
- 6.1 **Main supply cable**  
Minimum 15 M long suitable for connection to 2 lines of 3 Phase 415 ± 10%/- 15 % volts, 50 ± 10% Hz AC supply.
- 6.2 **Secondary Cable-**  
Two single core water-cooled secondary cables each of minimum 5M long and of suitable cross-section to be supplied with each brazing pliers. These cables should be of electrolytic copper, flexible, enclosed in carbon free double-ply rubber hose with asbestos lining.
- 7.0 **BRUSHES-** Five sets (one main set + 4 spare set) of molybdenum brushes having very low rate of wear shall be provided
- 8.0 **COPPER SECTION TO BE BRAZED:**  
**Cross Section : 20 x 20 mm, 20 x 30 mm, 20x50 mm**  
Details / cross-section of the joints, to be brazed by the resistance brazing machine, (in line with the example shown) shall be as per ANNEXURE-I enclosed with the enquiry. These details are specific to each project.
- 9.0 Max. Dimension of unit (L x B x H) to be furnished with the offer.
- 10.0 Net weight with GA drawing to be furnished with the offer.



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या अप्रत्यक्ष रूप से कम्पनी के बिना को नकलाना पसंदना है। बिना कदापि उपयोग नहीं किया जाये।

**13.0 PAINTING:**

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

**14.0 SERVICE REQUIREMENTS:**

**14.1 POWER SUPPLY:**

415 ± 10%/- 15 % Volts, 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/cm<sup>2</sup> pressure and temperature be 20°C to 50°C at recommended flow rate and system shall be closed circuit with water Chiller for cooling the water. Approximately 50 litre water will be required to be stored.

**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.
- GA drawings.
- Schematic diagram./ 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.
- Service centre contact details like address, email address, phone nos, cell nos etc.



**PART B: GENERAL CONDITIONS**

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या अपरकाश रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे

- 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 trouble free operation.
- 2.0 **Guarantee** – Equipment is to be guaranteed for reliable & trouble free operation for 48 months from supply or 24 months from first use / commissioning whichever ever is earlier.
- 3.0 **Instructions to supplier**
  - 3.1 Suppliers to indicate for each machine the maximum size of joint (Total Cross Section) that can be brazed with each machine.
  - 3.2 Supplier to describe the de-brazing/repair procedure of brazed joints in the operation instruction manual.
  - 3.3 Supplier to furnish the methods for testing the efficiency/solidity of brazed joints.
  - 3.4 Supplier to demonstrate the operation of machine and train BHEL winders for making joints on actual job for 3 days at site. The site address will be given in annexure-CL. Separate charge to be quoted for this purpose on lumpsum , all inclusive basis.
  - 3.5 Supplier to indicate the type of brazing materials viz ROD/foil and its grade to be used for brazing for best joint efficiencies.
- 4.0 **Documentation**
  - 4.1 **With Offer**  
3 sets complete with drawings/leaflets/catalogue and technical information giving full description, operation, dimensions, weight etc. etc.
  - 4.2 **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.
- 5.0 **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 considered and will be rejected.