

TECHNICAL SPECIFICATIONS NO. EMT 6689(REV. 00)

WITH INDENT NO. E/6743/5/5954

**ROCKER ARM TYPE SPOT WELDING MACHINE WITH MICROPROCESSOR
FOR SPOT WELDING OF SPACERS ON VENTILATING STAMPINGS OF
TURBOGENERATORS**

1.0 PURPOSE :

The spot welding machine is required for spot welding of spacers having rectangular/ square cross section or 'I' profiles on ventilating stampings of Turbogenerators providing high quality welds and very high degree of repeatability.

2.0 SCOPE OF SUPPLY:

The scope of supply includes design, manufacture, testing, supply, erection & commissioning and proving of the spot welding machine at BHEL works as per technical specifications below.

3.0 TECHNICAL SPECIFICATIONS OF SPOT WELDING MACHINE : Qty. 01 No.

3.1 WORK PIECE MATERIAL :

3.1.1 ETS ventilating stampings :

As per Spec. AA10917 (Cold rolled Non-grain oriented sheet steel, Grade-530), HW10998 (Magnetic Sheet Steel Grade-700, Cold Rolled finally Annealed) & AA10740 (Austenitic Stainless Steel Sheets, Solution Annealed, ASTM A240) etc.

Dimensions	:	Length	:	1300 mm (max.)
		Width	:	1300 mm (max.)
		Thickness	:	0.5 to 2.0 mm

3.1.2 SPACERS :

As per Specification AA10112 (Bright Steel Bars & Sections, Standard Quality), TG60497 (Cold drawn Bright Steel Profile Bars to specification AA10112), AA10724 (Stainless Steel Bars, Austenitic Solution Annealed, ASTM A276), HW10773 (Stainless Steel Strips, Austenitic Steel Grade X5 Cr N 1810K) & HG55032 (Austenitic Stainless Steel Sections cold finished - Ti Stabilised) etc.

The spot welding machine shall be suitable for spot welding spacers of various profiles in use at HEEP, Hardwar in various sizes including 3mmX5mm, 5mmX3mm, 5mmX5mm, 4mmX6mm and I-section spacers including 5mmX8mm(Height), 4mmX10mm(Height), 5mmX10mm(Height), 8mmX10mm(Height) etc. with the ventilating stampings.

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3.2 **SPECIFICATIONS** : The spot welding machine shall have following specifications:-

Rating with 50% duty cycle	: 50 KVA
Max. KVA @ 8% duty cycle	: 122 KVA
Supply	: 415 Volts
Phase/Frequency	: Single/ 50 Hz
Primary Current	: 120 Amp
Max. Primary Current	: 294 Amp
Sec. Volts	: 4.9 to 7.4
Sec. Short Ckt Current	: 16.5 KA
Number of Taps	: 4
Insulation	: Class 'F' 155 deg centigrade or better
Throat depth	: 750 mm
Throat clearance	: 150- 380 mm
Electrode Stroke	: 50 mm
Cooling	: Water
Water Pressure	: To be given by vendor
Water Flow requirement	: To be given by vendor
No. of Circuits	: 4
Cylinder Dia/ Stroke	: Dia 150/ 25
Air Pressure requirement	: To be given by vendor
Electrode force with above Air pressure	: 500 Kgf approx.

Upper Holder:

Dia / Length : 31.5/200 mm

Lower Holder :

Dia / Length : 31.5/300 mm

Upper Horn Dia : 63.5 mm

Lower Horn Dia : 63.5 mm

Type of Machine : Pneumatically operated, rocker arm type
Spot Welding machine.

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Cooling Water : Suitability of locally available water shall be examined by supplier and necessary measures to be incorporated along with the machine, required, if any.

3.3 STANDARD ACCESSORIES : All standard accessories for successful operation of the machine including following shall be offered along with the machine giving their list and other details :

- 3.3.1 Table of size 1500mmX2000mm of suitable height (i.e, the table top should be just below the tip of lower electrode). The table top shall be of suitable insulated material for spot welding of work piece materials.
- 3.3.2 Suitable Guard for protection of operator from sparks during welding.
- 3.3.3 Set of Top & Bottom Spot Welding Electrodes
- 3.3.4 Pneumatic Solenoid Valve
- 3.3.5 Air Filter
- 3.3.6 Regulators
- 3.3.7 Pressure Gauge
- 3.3.8 Foot Switch
- 3.3.9 Microprocessor based weld controller having thyristor contactor
- 3.3.10 Suitable Protection Devices
- 3.3.11 Any Other

4.0 OPTIONALS :

- 4.1 **Close circuit water circulation system :** BHEL would prefer to use running water for cooling purpose. However, close circuit water circulation system shall be offered as an option.
- 4.2 **Compressor :** Suitable capacity air compressor for required compressed air shall be quoted separately.
- 4.3 **Optional Accessories :** All optional accessories, not covered under standard accessories above shall be offered giving their list and other details with price break up of each.

5.0 SPARES:

List of spare parts for Mechanical / Electrical / Electronic equipment and control system, lubricating Hydraulic & Pneumatic system for two years of trouble free operation of machine and its accessories including followings shall be quoted with complete breakup of prices, specifications along with manufacturer's catalogue.

- 5.1 Upper Horn and accessories
- 5.2 Lower Horn and accessories
- 5.3 Pneumatic system and accessories
- 5.4 Each type of PCB used in welding controller.
- 5.5 Power supply of the system.
- 5.6 All types of sensors e.g pressure switch, flow switch temp sensor & proximity switch, etc.
- 5.7 Display unit of welding controller, if used any.
- 5.8 Complete pump motor unit of water circulating system.
- 5.9 All types of valves, solenoids and control elements of water circulating system.
- 5.10 Complete AC DRIVE CONTROLLER as spares, if used any.
- 5.11 Any other.

6.0 TECHNICAL CONDITIONS:

Machine shall be installed in covered shed, environment of which is not dust proof or temperature controlled. Machine shall be suitable to operate under following environmental and power supply conditions. Any additional equipment other than mentioned herein needed for machine to operate under these conditions should also be quoted :-

- | | |
|-------------------------|---|
| • Power supply | 3 Phase 3 Wire AC, 415V+/- 15%, 50 Hz+/- 3% |
| • Compressed air | 5 Kg / Cm Sq |
| • Temperature | 0 Deg. C to 45 Deg. C |
| • Humidity | 95% R.H. Max. |
| • Normal running water | 2.5 Kg/ Cm Sq. |
| • Tropical environment. | |

7.0 ERECTION & COMMISSIONING:

Erection of machine by BHEL under the supervision of vendor's representative and commissioning of machine at BHEL by the vendor. Special equipments required if any to be arranged by vendor.

8.0 TRAINING OF BHEL PERSONNEL:

The vendor shall provide training to BHEL personnels at BHEL works in the areas of - Mechanical, Electrical/ Electronic / PLC maintenance and operation of the machine.

9.0 PROVING OF BHEL COMPONENTS :

After erection & testing at BHEL Hardwar, vendor will carry out spot welding for 3 types of Turbogenerators (stampings and spacers) as per BHEL drawings (25 nos each) to specified design accuracy (Weld Strength as per HW0999002) to prove the machine. Stampings and spacers for the same shall be supplied by BHEL.

During the proving out process, 3 types of stampings & spacers (with different combinations of spacers and base materials as per clause 3.1.1 & 3.1.2) will have to be spot welded for the final acceptance of the machine by BHEL.

10.0 MACHINE MANUAL:

Five copies (Four no. hard copies and one no. on CD) of all operation and maintenance manuals in English shall be supplied with the machine. Maintenance manuals should

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contain list and specifications of all the parts of machine. The following details shall be covered in manuals:

- 10.1 Detailed assembly drawings with clear marking of each component giving reference to manufacturer(s) for each assembly/ sub-assembly.
- 10.2 Detailed Electrical circuit diagram/ PCB details.
- 10.3 Hydraulic diagram
- 10.4 Water circuit diagramme.
- 10.5 Pneumatic circuit diagramme.
- 10.6 Wiring diagram indicating layout of plugs, junction boxes and strips.
- 10.7 Installation and commissioning manuals.
- 10.8 Maintenance manual of any auxiliary system / equipment
- 10.9 Test Weld preparation and testing.
- 10.10 Current selector or tap-change procedure.
- 10.11 Welding force calculation and its adjustment.
- 10.12 Pressure Force chart indicating relationship between air pressure and tip force.
- 10.13 Force/ Air- consumption chart.
- 10.14 Details of Cooling system, Pneumatic system etc.
- 10.15 Maintenance recommendations including Electrodes drawings and other details.
- 10.16 Recommendation for quality control.
- 10.17 Reference data for spot welding.
- 10.18 Operation and maintenance manual of welding controller.
- 10.19 Interface manual.
- 10.20 Functional diagram /circuit diagram of controller.
- 10.21 Installation and start up manual of AC DRIVE CONTROLLER IF USED.
- 10.22 Spare parts list and alarm listing.
- 10.23 Any Other.

11.0 OTHER REQUIREMENTS:

- 11.1 Five sets of complete layout / foundation drawings shall be supplied within one month after placement of order by BHEL.
- 11.2 Total electrical power requirement of the machine should be mentioned in the quotation
- 11.3 Compliance List indicating point by point compliance to BHEL technical specifications should be sent along with the quotation.
- 11.4 Guarantee period of the machine shall be 12 months after commissioning.
- 11.5 Colour of machine should be mentioned in the quotation.
- 11.6 Reply to the following questionnaire about environmental performance of the machine should sent along with the quotation.
 - 11.6.1 Party shall mention noise level at a distance of 1 Meter from the machine, during its operation.
 - 11.6.2 Emission from the machine, if any? Its nature and quantum.
- 11.7 All motors used in the machine should be AC drives. Use of DC motor in the machine to be avoided.
- 11.8 With the supply of machine sufficient quantity of paint to be supplied to give touching to the machine on the spots where dents have occurred during transportation and erection.
- 11.9 Electrical cable should not be placed in the trench in which oil and water pipes are placed. Also all the wires & cables used should be of copper.
- 11.10 There should not be any leakage of oil / coolant from the machine.

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- 11.11 Detailed catalogues giving design / constructional details of machine / assemblies / accessories should be sent along with the quotation.
- 11.12 All items / features mentioned above should be quoted giving their complete technical details.

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