

SPECIFICATIONS FOR SUBMERGED ARC WELDING (SAW) MACHINE MOUNTED ON TRACTOR/TROLLEY

1.0 PURPOSE

The equipment is intended for heavy duty circumferential and longitudinal welding of pressure vessel, heat-exchanger and boiler drum shells and also for seam and fillet welding of heavy sections in mild steel, low alloy or stainless steel.

2.0 CONSTRUCTION

2.1 Welding Head:

2.1.1 The welding head shall consist of wire feed mechanism incorporating a high torque DC geared motor, wire straightening and feed rollers, welding tip, vertical and horizontal adjustment mechanism and a flux hopper.

2.1.2 The welding head has to be adjusted transversely and also vertically to bring the welding tip in correct position and swivel up to 45° for fillet seams in fillet position.

2.2 Tractor Carriage:

2.2.1 The tractor carriage shall be fabricated from steel sheets and provided with four wheels suitably insulated and for travelling on rails.

2.2.2 The trolley is to be driven by a high torque DC geared motor with the help of chain and sprocket arrangement, giving power to the four wheels, thereby avoiding any slippage of the wheels.

2.2.3 The trolley has to support the cross/vertical beam fitted with welding head on one side and control box on the opposite side, which can be fixed on the top of the trolley. Capacity of Tractor = 60 Kgs. (max.) without wire roll.

2.2.4 A suitable clutch arrangement has to be provided for disengaging the geared motor for manual pushing. And also handles for pushing and pulling the system manually.

2.2.5 Rails made out of steel sections with suitable reinforcements, in segments of 2000 mm (in length) with suitable end couplers to build a welding track length of 12,000 mm. (To offer for rails of six segments each of 2000 mm long with couplers).

2.3 Controls:

2.3.1 The controls shall be thyristorised for traction and wire feed, speed.

2.3.2 The control panel shall be mounted opposite to the welding head and able to be fixed at a convenient angle for easy reading of parameters.

2.3.3 The control panel shall incorporate the following:

- a. Meters for reading welding current, voltage and carriage speed.
- b. Potentiometer for wire feed and carriage speed adjustment.
- c. Push buttons for upward and downward inching of the electrode wire.
- d. Switches for start and stop of welding.
- e. Forward, off and reverse movement of the carriage.
- f. Spot light (24V) for welding with the switch in the panel and indication lamp for welding 'ON'.
- g. The panel for thyristor control equipment shall take an input of 42 Volts or 110 Volts and include PCBs for wire feed and carriage speed controls (thyristor control system) D.C. supply voltage for motors, control fuses and switching socket.

3.0 TECHNICAL DATA

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|----|--|---|---|
| a) | Welding speed | : | 120 mm to 1800 mm/min. |
| b) | Wire feed speed | : | 2.5 to 10 M/Min. |
| c) | Wire diameter | : | 2.4 mm to 6.3 mm |
| d) | Max. Welding Current | : | 1000 Amps(At 100% duty cycle)
1140 Amps(At 60% duty cycle) |
| e) | Capacity of flux container | : | 5.0 Kg. (min.) |
| f) | Welding Head Adjustment | | |
| | 1) Vertical traverse | : | Min. 250 mm |
| | 2) Horizontal traverse
to weld seam | : | Min. 200 mm |

- g) Angular displacement
 - 1) Along the vertical axis : 360°
 - 2) Vertical plane traverse to weld seam : 45°
 - 3) Vertical plane parallel to weld seam : 45°

4.0 POWERSOURCE

- a) Welding Current Range : 150 to 1200 Amps.
- b) Duty Cycle : Continuous, even for 1200 Amps.
- c) Open Circuit Voltage : 72 Volts (DC)
- d) Welding Voltage : 20 to 46 Volts DC
- e) Characteristics : full wave constant potential
- f) Input Power Supply : 415 \pm 10% V, 50 \pm Hz, 3-phase AC, 3 - wire system.
- g) Insulation : Class H
- h) Design Feature : Fully thyristorised with six SCRs.

4.1 The power source shall be provided with:

- a) 100 % copper or superior quality aluminium windings
- b) Ammeter and Voltmeter (either analog or digital)
- c) Hand-held remote control unit for welding current & voltage variation
- d) Two numbers of lifting hook for EOT crane
- e) Four numbers castor wheels
- f) Electrostatic powder coating for outer casing
- g) Swivel base handle for easy manoeuvrability
- h) Two numbers of plug points for connecting hnadlamps of rating 24 V/40W with MCBs for protection.

4.2 The control, welding and earth cables connecting the powersource to the welding unit shall have a length of twenty metres.

4.3 The control voltage shall be 110 V AC or 42 V AC for the wire-feeder / tractor drive unit / voltage adjustments.

5.0 GENERAL:

- 5.1. The offer shall meet all the requirements mentioned in the specifications. A point to point comparison has to be given with offer.
- 5.2. Arrangement for the cable trailing shall be specified.
- 5.3. Consumables like contact tip/nozzles for 2.4mm, 3.15mm, 4.0mm, 4.8mm, 5.0mm and 6.3mm dia. wires shall be quoted separately. Feed and straightening rollers suitable for the above said dia. wires also may be quoted.
- 5.4. Electrical and Mechanical spares for two years of trouble free operation shall be quoted. (Please refer ANNEXURE –1 for type & quantity).
- 5.5. Weight of the powersource and the welding unit with the trolley shall be given.
- 5.6. The equipment shall be offered for inspection and trials before despatch.
- 5.7. The supplier shall depute his representative for the commissioning of the equipment at B H E L works and for further job trials.
- 5.8. The guarantee shall be for a minimum period of twelve months from the date of commissioning of the equipment.
- 5.9. Three sets of instruction and maintenance manual containing all the detailed electrical and electronic circuit diagrams shall be given in care of ordering.

ANNEXURE – 1

S. No.	Description	Part No.	Quantity
	<u>POWERSOURCE</u>		
1.	O/P Terminal Board Assembly		2 Nos.
2.	I/P Terminal Board Assembly		1 No.
3.	RC Network PCB Assembly		2 Nos.
4.	Resistors		1 set
5.	Spin Receptacle		1 No.
6.	Cooling Fan Assembly		1 No.
7.	SCR		3 Nos.
	<u>TRACTOR/WELDING HEAD</u>		
1.	D.C. Motor		1 No.
2.	Pressure Roller Assembly		1 No.
3.	Straightening Roller Assembly		1 No.
4.	Guide Roller Assembly		1 No.
5.	Tightening Knob Assembly		2 Nos.
6.	Wire Guide House with Spiral		1 No.
7.	Wire Guide Tube with Spiral		1 No.
8.	Wirefeed Roll (4.00 mm dia. Wire)		4 Nos
9.	Wirefeed Roll (5.00 mm dia. Wire)		4 Nos
10.	Nozzle 3.15 mm		2 Nos.
11.	Nozzle 4.00 mm		2 Nos.
12.	Nozzle 5.00 mm		2 Nos.
13.	Set / Weld Switch		1 No.
14.	Ammeter		1 No.
15.	Voltmeter 0-100 VDC		1 No.
16.	Carriage Speed Meter		1 No.
17.	5 - Pin Socket		1 No.
18.	14 - Pin Socket		1 No.
19.	Speed Control PCB Assembly		2 Nos.
20.	Sequence Control PCB Assembly		1 No.
21.	Transformer		1 No.
22.	PCB Power Relay P1		2 Nos.
23.	PCB Relay		1 No.
24.	PCB Relays		1 No.
25.	Main PCB		1 No.
26.	Wire Guide hose with spiral		2 Nos.
27.	Insulating Bush for Wirefeed Roll		1 No.