An ISO 9001 Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2620900175**	**Enquiry Date:** **07.09.2009**	**Due date for submission of quotation:** **21.10.2009**

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.
Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of **tender opening.**

Item	Description	Quantity
10	**Long Seam / Cir-Seam Welding Machine for Drums-Travel Type Column and Boom Sub-merged Arc Welding Station** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**1 No**.

Important points to be taken care during submission of offer

1. **Delivery required 10 months from the date of purchase order.**
2. **Grace period of 2 months beyond the above delivery period will be considered.**
3. **Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**

BHEL's General guidelines / instructions (refer MM/CE/GT/001) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2620900175".

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Manager / Capital Equipment / MM

PART A.

QUALIFYING CRITERIA FOR THE SUPPLY OF TRAVELING TYPE COLUMN & BOOM SUB-MERGED ARC WELDING STATION

SECTION – I : COMPANY PROFILE

The BIDDER has to provide the details pertaining to each clause in the table given below, to understand the profile of the BIDDER's COMPANY.

S.No.	PARTICULARS	VENDOR's RESPONSE
1.0	Number of Years of Experience of the BIDDER / VENDOR in the field of Design, Manufacture & Supply of Heavy Duty Traveling Column & Boom Sub-merged Arc Welding Machines with associated welding flux circulating/slag recovery unit.	
2.0	Details on the Codes/Standards of Machine Design and Manufacture	
3.0	Details on Manufacturing Facilities available with the VENDOR for : a) Heavy Structural Fabrication b) Heat Treatment c) Machining & Grinding d) Machine Assembly & Testing	
4.0	Details of Quality System (with Stages of Internal Inspection) followed for the Machine Building and Testing of Capacity	

SECTION – II : QUALIFYING CRITERIA

The BIDDER / VENDOR has to meet the following requirements to get qualified for submitting an offer for the Traveling Column & Boom Sub-merged Arc Welding Machines :
[Additional Sheets shall be attached with the OFFER, to provide requisite details]

S.No.	REQUIREMENTS	VENDOR's RESPONSE
5.0	The BIDDER / VENDOR shall have a minimum of TEN Years of Continuous Experience of in the Field of Design, Manufacture and Supply of Heavy Duty Traveling Column & Boom Type [Tandem Arc – AC & DC] Sub-merged Arc Welding Machines	

S.No.	REQUIREMENTS	VENDOR's RESPONSE
6.0	The BIDDER / VENDOR might have supplied atleast FIVE numbers of Traveling Column & Boom Sub-merged Arc (Tandem Arc) Welding Machines with minimum 5 Mtr. x 5 Mtr. configuration. [5 Mtr. tall Column and 5 Mtr. long Boom]. The current rating (@ 100% Duty Cycle) for the DC and AC Powersources employed shall NOT be less than 1200 Amps. and 1000 Amps. respectively.	
7.0	Performance Certificate in the enclosed FORMAT for a period, not less than one year, from Customers or Reference List of Customers with full contact details of CONTACT PERSON, who are the End Users of Traveling Column & Boom Sub-merged Arc [Tandem Arc – AC and DC] Welding Machines supplied as per the above **Clause No.6.0**	
8.0	The Performance Certificate or Reference shall be only from customers who are Heavy Engg. Fabricators like Manufacturers of Pressure Vessels and Heat-Exchangers, Off-Shore Oil Rigs, Thermal Power Plant Equipment, etc.	
9.0	BHEL reserves the right to verify the information provided by vendor. In case, it is found to be false/ incorrect, the offer shall get rejected.	
10.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished .	

SECTION – III : BID / OFFER FORMATS

The BIDDER / VENDOR has to note the following :

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
11.0	The BIDDER shall submit the offer in TWO PARTS - Technical **[**with **PART A & PART B]** & Commercial and Price Bid.	
12.0	The OFFER shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each Clause. A just 'YES' or 'CONFIRMED' or 'NO-DEVIATION' or 'COMPLIES' or 'ACCEPTED' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
13.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue (if applicable)	
14.0	The Commercial Offer shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation of the inclusion of all the accessories, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements.	
15.0	Earlier performance/field experience (including service support) if any, with BHEL for the VENDOR's Equipment / Service, will be a reckoning factor for the technical qualification of the OFFER.	
16.0	The expected delivery period (including the time for Pre-Dispatch Inspection clearance by BHEL) for the welding station is not more than TEN Months (which includes time for General Arrangement Drawing approval by BHEL also) from the date of issue of BHEL Purchase Order. In case the quoted delivery period extends beyond TEN Months, an additional grace period of two months is permitted, but with a loading for arriving at the PRICE COMPETITIVENESS of the Commercial Offer (if the Offer is technically acceptable on all accounts). Details are given in the Commercial Terms of this Tender.	

PERFORMANCE CERTIFICATE – [SAMPLE FORMAT]

(On Customer's Letter Head with Additional Sheet – if necessary)

1. Supplier of the Equipment/Machine :

2. Make & Model of the Equipment :

3. Month & Year of Commissioning :

4. Application for which Machine is used :

5. a. Equipment Serial Number :
   b. Powersource Rating for AC and DC :
   c. Column & Boom Dimensions :
   d. Seam-Tracking System :
   e. Other Specifications [optional] :

6. Performance of the Machine : Satisfactory / Good / Average / Not Satisfactory

7. Comments / Remarks or Reasons for Recommendations :

8. Feed- back on 'After Sales Service' from the Supplier :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B

TECHNICAL SPECIFICATIONS for TRAVELING TYPE COLUMN and BOOM SUB-MERGED TANDEM ARC WELDING STATION

01. APPLICATION

The proposed machine is intended for the welding of longitudinal and circumferential seams coming in the formation of cylindrically shaped pressure vessels. Here the cross section of the shell is not of uniform thickness, but with two thicknesses as shown in the ANNEXURE - 1. The weld edge preparation for the longitudinal weld seam and the circumferential weld seam are shown in ANNEXURE –2 and ANNEXURE – 3. The machine shall also have an integrated welding flux recovery and circulation system.

02. WORK-CENTRE CONFIGURATION

The work-centre will have one traveling type column & boom sub-merged arc welding machine, moving on floor rails for the traverse of the (column & boom) carriage. The job is independent of the welding machine and is positioned by means of a separate job manipulator system. So, the scope of supply covers only the welding machine with the raised platform and other accessories forming part of the welding machine. The job manipulation system is under the scope of BHEL [Refer to ANNEXURE –4 for the schematic diagram of the work-station.]

03. JOB DETAILS

Cylindrical Shell Outer Diameter	:	900 mm to 2300 mm
Shell Wall Thickness (at the weld joint)	:	50 mm to 200 mm
Minimum Length of Job	:	3000 mm
Maximum Length of Job	:	28000 mm
Maximum Weight of the Job	:	275 Tons

Job Material	:	SA 299 Gr.A / SA 299 Gr.B / SA515 Gr.70 / SA302 Gr C, WB 36 [as per ASTM standards.]
Weld Edge Preparation Process	:	By Machining or by Machine Grinding

04. TECHNCIAL SPECIFCATIONS

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.1.0	**COLUMN & BOOM DESIGN**		
4.1.1	Mode of Longitudinal Travel of Carriage.	Column & Boom on Carriage travelling on machined floor mounted rails. The wheels to be designed to match the existing floor rails at BHEL..	*[Bidder to give details of drive mechanism.]* The size of the machined & hardened rail is 50 mm square and the pitch distance between the rails is 1900 mm (rail outer to outer)
4.1.2	Effective Traversing Length of Carriage	36000 mm	
4.1.3	Carriage Travel Speed.	100 - 2000 mm/min. (infinitely variable)	Bidder to specify.
4.1.4	Height under Boom of the Welding Machine from ground, during normal welding applications.	4000 mm	
4.1.5	Minimum Height under Boom of the Welding Machine from ground.	1200 mm	
4.1.6	Boom Effective Stroke in Horizontal Direction	6000 mm	
4.1.7	Boom Effective Stroke in Vertical Direction	6000 mm	
4.1.8	Maximum sag at the end of boom	2 to 3 mm only. *(when measured for the full stroke in the horizontal direction)*	
4.1.9	Boom Effective Stroke in Vertical Direction	Bidder to Specify *(to suit the Clause No. 4.2.4 and 4.2.5)*	
4.1.10	Boom Vertical Travel Speed – fixed speed.	Around 1200 mm /min .	Bidder to specify.
4.1.11	Boom Horizontal Travel Speed	100 - 2000 mm/min. (infinitely variable)	Bidder to specify.
4.1.12	Maximum Boom extension (from centre of column)	Bidder to Specify (to suit the stroke of 6000 mm)	
4.1.13	Minimum Boom extension (from center of column)		
4.1.14	Speed holding accuracy : for Carriage	Bidder to specify (to ensure weld quality, as this will be one of the parameters for weld quality)	
4.1.15	Speed holding accuracy : for Boom		
4.1.16	Vibration Level	Maximum 1.0 mm during the traverses	

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.1.17	Rotation of Column (about the vertical axis)	0 to 180º (mechanized rotation is preferred)	Bidder to give details
4.1.18	Clamps for Column Rotation	Details of clamping mechanism to be furnished with offer.	
4.1.19	Clamps for Boom (for vertical & horizontal movements)	Details of clamping mechanism to be furnished with offer.	
4.1.20	Self locking mechanism in case of power failure for above clamps	Bidder to give details	
4.2.0	**SAW TANDEM ARC WELDING HEAD**		
4.2.1	Weld Head Vertical Traverse Stroke *[This stroke is to be provided for traverse of the entire weld head at fixed speed, at the BOOM end, to avoid interference with attachments welded to job]*	1000 mm	
4.2.2	Weld Head Rotation to switchover between Long Seam and Cirseam Welding	0 to 90º swivel. The mechanism of rotation shall be made easy to handle by the machine operator single handed.	
4.2.3	Wire feed speed	100 to 4000 mm/min	
4.2.4	Weld joint depth	250 mm (maximum)	
4.2.5	Joint width	25 to 74 mm	
4.2.6	Distance between two wires (DC and AC)	12 to 20 mm (while tandem welding)	
4.2.7	Welding wire diameter	3.2, 4.0 & 4.8 mm	
4.2.8	Flux Hopper Capacity	10 Litres (minimum)	
4.2.9	Flux Handling Temperature	Around 250º C	
4.2.10	Motorised Horizontal Base Slide Unit (traverse parallel to boom movement) for carrying slides (4.2.12 & 4.2.13) - Stroke	300 mm	
4.2.11	Speed of Horizontal Slide (4.2.10)	Bidder to specify	
4.2.12	Stroke of Vertical slide unit (Manual) carrying AC or DC wire feed motor assembly.	200 mm	
4.2.13	Stroke of Cross slide unit (Manual) carrying AC or DC wire feed motor assembly.	200 mm	

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.2.14	The AC and DC wire feed motors shall be mounted onto the respective slides through a rotary slide arrangement for tilting the wire feed units (min. ± 90°) by Manual Adjustment (through Hand Wheel) for Torch angle adjustment.	Bidder to furnish details.	
4.2.15	Wire Straightening Unit for AC and DC: Independent pressure adjustment knobs to be provided for the drive roller and idler roller to achieve straight feeding of wire to a minimum length of 500 mm.	Bidder to confirm and furnish details.	
4.3.0	**WELDING POWERSOURCES**		
4.3.1	DC Power source Current Rating	Minimum 1500 Amps.	Bidder to specify
4.3.2	DC Power source Duty Cycle	Continuous Duty	(to suit the specified welding application without break).
4.3.3	DC Power source Welding Voltage	0 to 60 Volts	
4.3.4	DC Power source Type	Fully Thyristorised (with 6 SCRs)	
4.3.5	AC Power source Current Rating	Minimum 1200 Amps.	
4.3.6	AC Power source Duty Cycle	Continuous Duty	(to suit the specified welding application without break.)
4.3.7	AC Power source Welding Voltage	0 to 60 Volts	
4.3.8	Powersource Meters	Analog / Digital Ammeter & Voltmeter may be provided on the powersources	
4.3.9	Power source Location	Both AC and DC Powersources are to be positioned in the Machine Carriage	

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.4.0	**OPERATOR CONTROLLER [POSITIONED NEAR WELDING HEAD]**		
4.4.1	Controller Operations	a. Movement of all machine elements b. Pre-setting of all welding parameters c. Display of actual welding parameters d. Inching forward / reverse of wires. e. Pre-setting of Burn back time. f. Switches for Start & Stop of welding. g. Manual over-ride of welding parameters h. Indication Lamp for Welding 'ON' i. Emergency "OFF" Switch. j. Flux Feeding & Recovery Operation k. Long-seam or Cir-seam Weld Selector Switch.	
4.4.2	Machine Operations	a. To & fro Carriage Movement b. Column Rotation with limit switches c. Boom Up & Down Movement d. Boom forward & reverse movements	
4.4.3	Welding Process Parameters	a. Welding Speed (either by carriage movement or by boom movement) b. Welding Voltage / Current for DC and AC Modes c. Weld ON / OFF d. Wire Feed – inching (up and down) e. Auto-Stop and Reverse for Carriage / Boom stroke with limit switches f. Manual over-ride on pre-set parameters.	*(Welding Current is representation of wire feed speed)*

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.4.4	Type of Controller	Bidder to provide latest control units & furnish technical details.	
4.4.5	Compatibility	Compatible to the Data Logging Unit proposed.	
4.4.6	Additional Features for Enhanced Productivity	Bidder to give the details (if available)	
4.5.0	**SEAM TRACKING MECHNAISM** (Optional Item to be quoted separately)		
4.5.1	Type (suitable for a tough working environment)	A simple and reliable system, is to be offered	
4.5.2	Working Principle	Bidder to give Technical Details	[Bidder to quote for various options]
4.6.0	**FLUX FEEDING & RECYCLING UNIT**		
4.6.1	Capacity of the Flux Handling System	Bidder to Specify	(to meet the requirement for 5 to 6 welding cycles)
4.6.2	Type of Flux	Agglomerated / Fused	
4.6.3	Flux Grain Size	12 to 65 in Tyler Mesh	
4.6.4	Flux Bulk Density	1.1 to 1.8 kgs./litre	
4.6.5	Air Displacement (Minimum)	6.50 Cubic Mtrs./Min.	
4.6.6	Measure of Vacuum	Bidder to Specify (in mm of water column) , to suit the weld grove depth of 250 mm and length of hoses involved in the recovery and recycling system	
4.6.7	Recovery/Feeding Hose	40 mm ID – special high temperature & erosion resistant hose to withstand 250 Deg. C.	
4.6.8	Flux Handling Temperature	250 Deg. C	
4.6.9	Filter Area	Around 35,000 sq.cms.	
4.6.10	Fine Dust Storage Capacity	Around 25 Litres in Vacuum Unit	
4.6.11	Flux Storage Capacity	Around 30 Litres in Primary Separator	
4.6.12	Fresh Flux filling method	Vendor to furnish details on the mode of transfer of fresh / make-up flux from floor level to the flux storage tank.	
4.6.13	Dust removal process	Vendor to furnish details on the mode of removal of extracted dust from the dust collection unit without splashing.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
4.6.14	Vacuum Unit : Primarily there shall be a multi-stage rotary turbine or regenerative blower coupled to an electric motor (of rating above 5.0 HP) for high vacuum generation.	
4.6.15	Dust Filter Unit: The turbine/regenerative blower shall be connected to a vacuum chamber, provided with a fabric filter bag assembly to separate fine dust and a dust collecting tank. Teflon Coated Filters are to be used in the Filter Unit.	
4.6.16	Primary Separator: The vacuum chamber shall be connected to a primary cyclone/ baffle type separator through a flexible vacuum hose. The primary separator shall have a mesh for separating slag particles and a conical bottom (hopper) with a tapping facility to drain the collected flux.	
4.6.17	Flux Pressure Feeding: The system shall have a pressure feeding system to carry the flux from the flux-chamber to the flux-hopper fitted near the welding head. Hoses with suitable diameter & material to be quoted.	
4.6.18	Flux Recovery (Scope to include the Flux Recovery Hose with End Fittings): For sucking the flux a flexible hose with recovery/collecting nozzles (suitable for grooves and flat surface) shall be connected to the primary separator.	
4.6.19	Flux Level Indicator: An electronic flux level (in the pressure chamber) indicator has to be provided, to indicate the low level of flux, through an audio alarm.	
4.6.20	Automatic Dust Cleaning: The dust collected in the filters has to be cleaned automatically by pulse jet actuated by sensing the low vacuum level.	
4.6.21	The flux feeding conduit and recovery hoses shall ensure no clogging of flux at any junctions, bends, nozzles, etc.	
4.6.22	Suitable accessories like crevice nozzle, extension pieces, handles, filters etc., shall be offered in addition to the Flux Feeding Hopper near the Welding Head..	
4.6.23	The sucking and feeding hoses or tubing shall withstand the temperature of 250 Deg. C in continuous duty application with reasonably long life.	
4.6.24	Both electrical and mechanical spares such as rubber gaskets, filter fabric, suction hoses, V-belt, pulleys, heating elements etc. shall be offered with unit rate. Complete set of spares shall be quoted and the Indian equivalent may be mentioned in the offer.	
4.6.25	The flux feeding and recycling system shall be coated with heat resistant and anti-corrosive paint because of the nature of working environment.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
4.6.26	Flux Chamber and Heating: A heated flux chamber/hopper with suitable heating elements and temperature gauge to maintain the temperature of recycled flux at a minimum of 150 Deg.C, while in operation. The heating system offered shall be explained in detail with principle of operation and electric shock-proof heating mode.	[The Heating Elements shall be provided in the Hopper near the Welding Head and the Main Storage Chamber of the System at the Machine Carriage also with selector switch].
4.6.27	Air Dryer Unit : The system shall include a refrigerant type air dryer, for removing moisture from the compressed air supplied.	
4.6.28	Flux Sucking Rate: Bidder to specify the quantity (in litres) of unfused flux, that can be sucked by the recovery unit for a duration of 20 minutes, without any interruption, when the vacuum unit is put on.	

05. BASIC CONSTRUCTIONAL FEATURES

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
5.1	The column, boom and carriage shall be of fully welded construction and amply ribbed, and built in closed construction.	
5.2	If heat-treatment is required for the fabricated structure, proper heat-treatment shall be carried out prior to taking up machining or grinding works. Bidder to mention/give heat-treatment details.	
5.3	The carriage has to be filled with heavy material like concrete or cast-iron blocks to give self-weight for the column & boom structure.	
5.4	The guide-ways (sliding surfaces) shall be hardened and ground to give a smooth traversing.	
5.5	The powersources and welding flux handling system shall be positioned in the carriage itself.	
5.6	Suitable bellow covers with metallic / anti-tear materials are to be provided to protect the rotating / sliding parts from the dust, welding flux/slag, wastes , etc.	
5.7	Since the jobs are welded with preheating to a temperature of 250 Deg. Celsius, all the machine parts shall be suitable for this working environment, by providing suitable covering or coatings.	
5.8	Wipers are to be fitted to machine parts to clean/remove the dust collected on guide-ways.	
5.9	All gears used in the machine are to be hardened and ground.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
5.10	Bidder to give complete technical details on the drive mechanism for the column/carriage travel, boom vertical and horizontal travel, arrangement of boom holding onto the machine column, etc.	
5.11	A lifting hook shall be provided at the top of the column, to lift the column & boom with carriage structure, by use of a crane in case of need.	
5.12	A control box for effecting all the machine movements, to be provided at the carriage.	
5.13	A portable control panel shall be provided with ten metre long cable with metallic sheathing, with duplicated functions for all the machine operations, except welding, in addition to the ones provided on the carriage .	
5.14	To design carriage travel with two double flanged & two plain wheels to suit machined floor rails and provided with guide rollers.	
5.15	An operator seat shall be provided near the welding head (fitted to the boom) so as to have a better access when carrying out circumferential weld seam joints (at this stage the column and boom structure will be stationary).	
5.16	Wire feeder shall be capable to handle 25 Kg wire spool as a standard feature and from a 250 kg. pay off pack as an option feature.	
5.17	The wire spool shall have the facility for adjustable brake on wire coil.	
5.18	The welding wire conduit (welding torch made of copper) to which the contact tip is screwed on shall not be more than 20 mm in diameter, as it may foul with the side walls of the narrow weld-groove during welding.	
5.19	A third wire feed unit with independent wire feed motor and controller and corresponding provision for holding the wire reel near the weld head, to be quoted as an OPTIONAL Item, to be used as a third wire (other than DC and AC wire) in cold condition, during the welding operation to increase the metal deposit rate.	
5.20	The supply shall also include the return current (earth) cables of suitable rating for both the AC and DC Powersources. The length of each cable set shall be suitable to connect the job of length around 15 Mtrs. at the maximum.	
5.21	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features may be enclosed with the offer	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
5.22	Vendor to furnish details of material, hardness & constructional details including explanatory drawings of various components/assemblies like Machine Frame, Drive /Transmission System, Electric Motors, PLC, etc. employed in the machine.	
5.23	Interlock to be suitably provided to make the Carriage / Boom movement start / stop in response to switching ON / OFF of DC Welding during Long-seam Welding (as there is no carriage travel in Cir-seam Welding).	

06. MACHINE LIGHTING SYSTEM

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
6.1	A fluorescent machine lamp with drip proof protective cover to be provided for the welding area visibility.	
6.2	A spot light with sufficiently long cable should also be provided with 24V AC supply.	
6.3	Flashing / Rotary type machine lamp to denote Machine ON, Working, Alarm / Tripping Condition, etc. as per Industry Standards, to be provided.	

07. DATA LOGGING UNIT (to be quoted as a separate item under price bid)

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
7.1.0	Basic Features	To record : a. actual welding parameters b. date & time as default values c. in-feed data like job details, operator details d. to record number of weld passes and total pass meter of welding, etc.	Bidder to provide details of Data Logging Unit with Catalogue.
7.2.0	Data Transfer	Software and Hardware facility to transfer stores data from the Data Logging Unit to an IBM PC (for taking print-out, data-analysis) by means of a USB Mass Storage Device or so.	
7.3.0	Make	BHEL prefers Yashkawa make of Data Logger.	Bidder to confirm.

08. IMPORTANT POINTS

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
8.1	415V + 10% / -10%, 50HZ +/-1.5 HZ, 3 Phase AC (3 wire system with out neutral) Power Supply Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor.	
8.2	All electrical equipment shall be Tropicalized and shall have IP 54 degree of protection	
8.3	All electrical control cabinets & panels should be dust and vermin proof	
8.4	All electrical components in the cabinets should be mounted on DIN Rail	
8.5	All electrical panels should be provided with CFL lamps for sufficient illumination and electric power receptacles of 220 Volts, 5/15 Amp. AC. All adapters/receptacles should have compatibility with Indian equivalents.	
8.6	Motors shall be from M/s Siemens / ABB or other reputed make conforming to IEC Standards and acceptable to BHEL	
8.7	All electrics shall be of reputed make like Siemens, L&T, BCH, Tele-mechanique.	
8.8	Electrical drives shall be of Siemens / ABB / L&T / Eurotherm and PLC of SEW / Allen Bradley / Siemens / Messung / Fanuc	
8.9	BHEL prefer to have standard gear boxes used in the machine. Gear boxes shall be of Radicon / greaves / Bonfiglioly or any other reputed make acceptable to BHEL.	
810	All pneumatics shall be of Festo make and hydraulics if any shall be of Rexroth / Vickers make.	
8.11	All components / devices / terminals are to be incorporated with ferrules.	
8.12	Vendor should ensure the proper earthing for the machine and its accessories.	
8.13	Wiring: All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed cable running in conduits to common terminal block	
8.14	External wiring from / to control panel, control desk, external motors, etc. shall be by means of unarmoured multi-core / multi strand copper cables.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
8.15	All cables/ hoses moving with traversing axes should be installed in cable drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	
8.16	Pneumatics on machine, and associated equipment shall be connected by nylon and/or steel tube to common point on machine. Fitted at the common point would be a lubricator, regulator, filter and hand wheel valve	
8.17	BHEL supplied compressed air will be at a pressure of 60 PSI to 70 PSI only. All pneumatic systems on the machine shall be designed to operate efficiently at this air pressure. A suitable refrigerant type air drier shall be included in the system by the vendor.	
8.18	The control voltage for all applications shall be less than 110 V	
8.19	The Welding Power sources shall be sourced from any one of the following manufacturers (OEM) only: ESAB/Sweden or LINCOLN ELECTRIC/USA. The make and rating of the Welding Power sources shall be clearly indicated in the offer.	
8.20	All non-working surfaces and control panels shall be given a primer coat & two coats of paint as specified in Vendor's Painting scheme. All unpainted surfaces shall be protected from rust during transit	
8.21	GUARANTEE: The equipment has to be guaranteed for its performance and also of the sub-assemblies / bought-out items, for a minimum period of 24 months from the date of commissioning at BHEL Works.	

09. ENVIRONMENTAL PERFORMANCE OF THE MACHINE

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
9.1	Maximum noise level shall be 85 dB (A) at normal load condition, 1 M away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635-16. Vendor to demonstrate compliance to noise level, if so required.	
9.2	The machine shall be suitable for an ambient temperature of + 50° C and relative humidity of 85 % respectively, but both do not occur simultaneously.	
9.3	If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor.	

10. SAFETY ARRANGEMENTS

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
10.1	Machine shall have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to mistakes or the malfunctioning.	
10.2	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.	
10.3	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator, for effective use of machine.	
10.4	Emergency Switches at suitable locations as per International Norms should be provided.	
10.5	Enclosures or protective covers shall be provided for the moving parts (either linear or rotary), as a safety measure, as per industry standards.	
10.6	Steel railings shall be provided in the carriage to support the sub-systems or maintenance staff during trouble shooting.	
10.7	Counter-balance & Safety device for holding the boom and the welding head against rope breakage. Offer details to be elaborated.	
10.8	Anti-tipping or anti-toppling device (mechanism) has to be provided for safe guarding the fall of the entire column & boom (with carriage) structure from elevated platform due to imbalance, on any account. Offer details to be elaborated.	
10.9	An access ladder and platform with hand rail shall be provided for the maintenance staff to attend to fault in the boom vertical travel mechanism.	
10.10	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations, Noise and suitably guarded.	

11. MACHINE SPARES

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
11.1	Itemised break-up of Mechanical, Electrical , Electronic and Pneumatic /Hydraulic Spares used on the machine in sufficient quantity as per recommendation of BIDDER for 2 years of trouble free operation on three shifts continuous running basis should be offered by BIDDER. The list to include following, in addition to other recommended spares (for guidance refer to ANNEXURE–5 and ANNEXURE –6, for Mechanical & Electrical Spares) . (Unit Price of each item of spare shall be offered)	
11.2	Mechanical & Hydraulic Spares: Bearings, Clutches, gears and all types of Pumps, Valves, Pressure Switches / Transducers, Filters, Seals, 'O' Rings, Hydraulic Hoses, etc.	
11.3	Electrical: All types of Relays, Contactors, Proximity Switches, Printed Circuit Boards, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, etc.	
11.4	All types of spares for total machine and accessories shall be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & Vendors to enable BHEL to procure these in advance, if required.	
11.5	Vendor to confirm that complete list of spares for machine and accessories, along with specification / type / model, and name & address of the spare Vendor shall be furnished along with documentation to be supplied with the machine.	

12. DOCUMENTATION :

S.No.	**DESCRIPTION / PARTICULARS**	**VENDOR's COMPLIANCE**
12.1.0	Set of Documents **to be submitted along with the Offer** for technical evaluation:	
12.1.1	General Lay-out of the machine with major and critical dimensions in line with the specification	
12.1.2	General Assembly drawing of the machine with bill of materials and critical dimensions.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
12.1.3	Sub-assembly / Arrangement drawings with bill of materials and critical dimensions for the following: a) Carriage long travel drive arrangement. b) Column rotation / clamping arrangement. c) Boom vertical travel drive arrangement. d) Boom Horizontal travel drive arrangement. e) Weld Head Slides (vertical, Horizontal & Rotation) arrangement. f) Wire straightening roller arrangement. g) Weld head swing mechanism for Long-Seam to Cir-Seam Welding Mode conversion h) Flux recovery and feeding arrangement.	
12.1.4	List of bought out items with make and specification along with catalogues: Welding Power source, controllers, Drives, Motors, Gear boxes, Wire straightener, Flux recovery & feeding system, Air drier, Data logger, etc.	
12.1.5	Hydraulic / Pneumatic Circuit with Bill of Materials (if proposed in the system)	
12.1.6	Electrical Circuit with Bill of Materials.	
12.1.7	Video images on CD /Hard copy of literature with photographs & drawings explaining the technical features.	
12.2.0	Set of Documents **to be submitted after placement of order** for approval / verification before manufacturing:	
12.2.1	General Lay-out of the machine with major and critical dimensions in line with the specification and Preliminary Foundation drawing.	
12.2.2	General Assembly drawing of the machine with bill of materials and critical dimensions.	
12.2.3	Sub-assembly / Arrangement drawings with bill of materials and critical dimensions for the following: a) Carriage long travel drive arrangement. b) Column rotation / clamping arrangement. c) Boom vertical travel drive arrangement. d) Boom Horizontal travel drive arrangement. e) Weld Head Slides (vertical, Horizontal & Rotation) arrangement. f) Wire straightening roller arrangement. g) Weld head swing mechanism for Long-Seam to Cir-Seam Welding Mode conversion h) Flux recovery and feeding arrangement.	
12.2.4	Hydraulic / Pneumatic Circuit with Bill of Materials (if available in the system)	
12.2.5	Electrical Circuit with Bill of Materials.	
12.2.6	Quality Plan	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
12.3.0	Set of Documents **to be submitted along with machine:**	
12.3.1	**Three sets** of following documents as Hard copies and 1 set of all documents including bought out item catalogues – soft copy in CD in English Language should be supplied along with the machine.	
12.3.2	**One set** of complete documents as Hard copy and complete documents in CD / Pen drive to be submitted during inspection at supplier's works for verification.	
12.3.3	Operating Manuals of equipments	
12.3.4	Programming Manuals if any for the station.	
12.3.5	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical /PCB circuit diagrams/ Pneumatic/ Hydraulic Circuit Diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list / Bill of Materials giving complete specification and make of components.	
12.3.6	Maintenance, Interface & Commissioning Manuals for speed drives.	
12.3.7	Manufacturing drawings for all wearing components like bushes, pulleys, gears, etc.	
12.3.8	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable highlighting the specific model used in the supplied machine.	
12.3.9	Detailed specification of all rubber items, hoses, fittings, etc. List of bearings, belts used to be provided.	
12.3.10	Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories.	
12.3.11	Complete Master List of parts used in the equipment.	
12.3.12	Complete list of spares for equipments and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished.	
12.3.13	PLC (if any) program print-outs with comments in English.	
12.3.14	PLC (if any) Program / Ladder Diagram on CD, NC Data & PLC Data on Floppy Disc.	

13. TRAINING OF BHEL PERSONNEL

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
13.1	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	
13.2	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	
13.3	BHEL Personnel shall be trained at Supplier's Works for mutually agreed period (10 Days) in the area of a. Mechanical, Electrical & Electronic Maintenance for Machine & other Accessories supplied c. Operation of the Machine & other Accessories supplied	
13.4	Bidder to quote for training on man-day / week basis	

14. INSPECTION & MACHINE ACCEPTANCE

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
14.1.0	MACHINE ACCEPTANCE: (Tests/Activities to be performed by Vendor at Vendor's works, on the machine, before dispatch:)	
14.1.1	Physical Inspection and Verification of Certificates or Records for Materials of Construction, Bought-out Items, Adherence to Machine Building Procedures given by the Vendor, etc.	
14.1.2	Idle running of mechanical, electrical components / parts of machine for 48 hrs. continuously and other tests as per applicable standard test chart recommended by the Vendor	
14.1.3	Demonstration of all features of the machine, control system & accessories	
14.1.4	Welding of sample test plate and the sub-sequent testing for establishing the quality of weld, for performance rating of the machine.	
14.2.0	Tests / Activities to be carried out at BHEL works while commissioning the machine:	
14.2.1	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	
14.2.2	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	
14.2.3	The details of prove-out trials shall be based on the mutually agreed job pattern (welding sample test plate and actual jobs) arrived at, during the technical discussions, to be held at BHEL Works after the tender opening.	
14.2.4	Supervision by BIDDER of independent operation of machine by BHEL after job prove-out during the training period of 5 working days	

15. MACHINE ERECTION & COMMISSIONING

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
15.1	Vendor to take full responsibility for supervision of the erection, vendor shall start up, test the machine, it's control & all types of other supplied equipment, carrying out welding of test pieces etc. Service requirement like power & air shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL.	
15.2	Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned in Clause No.14.2.0 shall form part of the commissioning activity.	
15.3	Tools, Tackles, Testing Instruments and other necessary equipment required to carry out all above activities shall be brought by the Vendor.	
15.4	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the Vendor on returnable basis.	
15.5	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the Vendor should supply sufficient quantity of touch-up paint of various colours of paint used.	
15.6	Schedule of Erection and Commissioning shall be submitted with the offer.	
15.7	Charges, duration, terms & conditions for Erection & Commissioning should be furnished in detail separately by Vendor along with the Technical Offer.	
15.8	LEVELLING & ANCHORING SYSTEM : Vendor to supply the required foundation details for mounting the machined rails on the floor. Machined rails with anchoring and leveling materials shall form part of the scope of supply, by the vendor. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation.	

16. MACHINE PACKING

S.No.	DESCRIPTION / PARTICULARS	**VENDOR's COMPLIANCE**
16.1	Sea worthy & rigid packing for all items of complete machine, control panels , all accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	

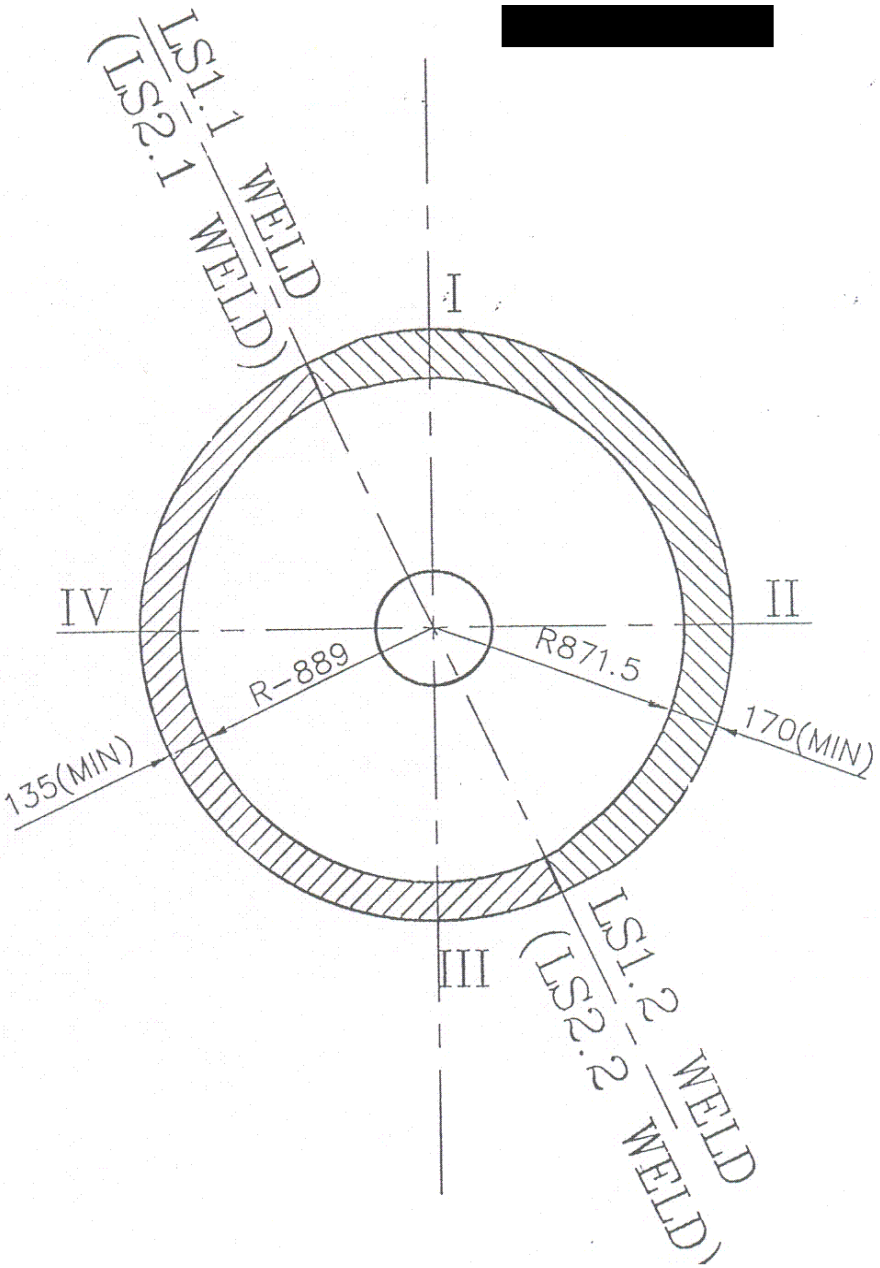
17. MACHINE DATA [GENERAL] – *DESIRED TO BE INDICATED WITH THE OFFER*

S.No.	**DESCRIPTION / PARTICULARS**	**VENDOR's RESPONSE**
17.1	Machine Model Number	
17.2	Total Connected Electrical Load in kVA	
17.3	Floor area required (Length, Width, Height) for Complete Machine & Accessories	
17.4	Painting of Machine / Electrical Panels	
17.5	Total weight of the Machine	
17.6	Weight of heaviest part of Machine	
17.7	Weight of the heaviest assembly / sub-assembly of the Machine	
17.8	Dimensions of largest part/ sub-assembly/ assembly of the Machine	
17.9	Earliest delivery period from the date of issue of Purchase Order by BHEL.	

Enclosures : **Annexure – 1, 2, 3, 4, 5 & 6**

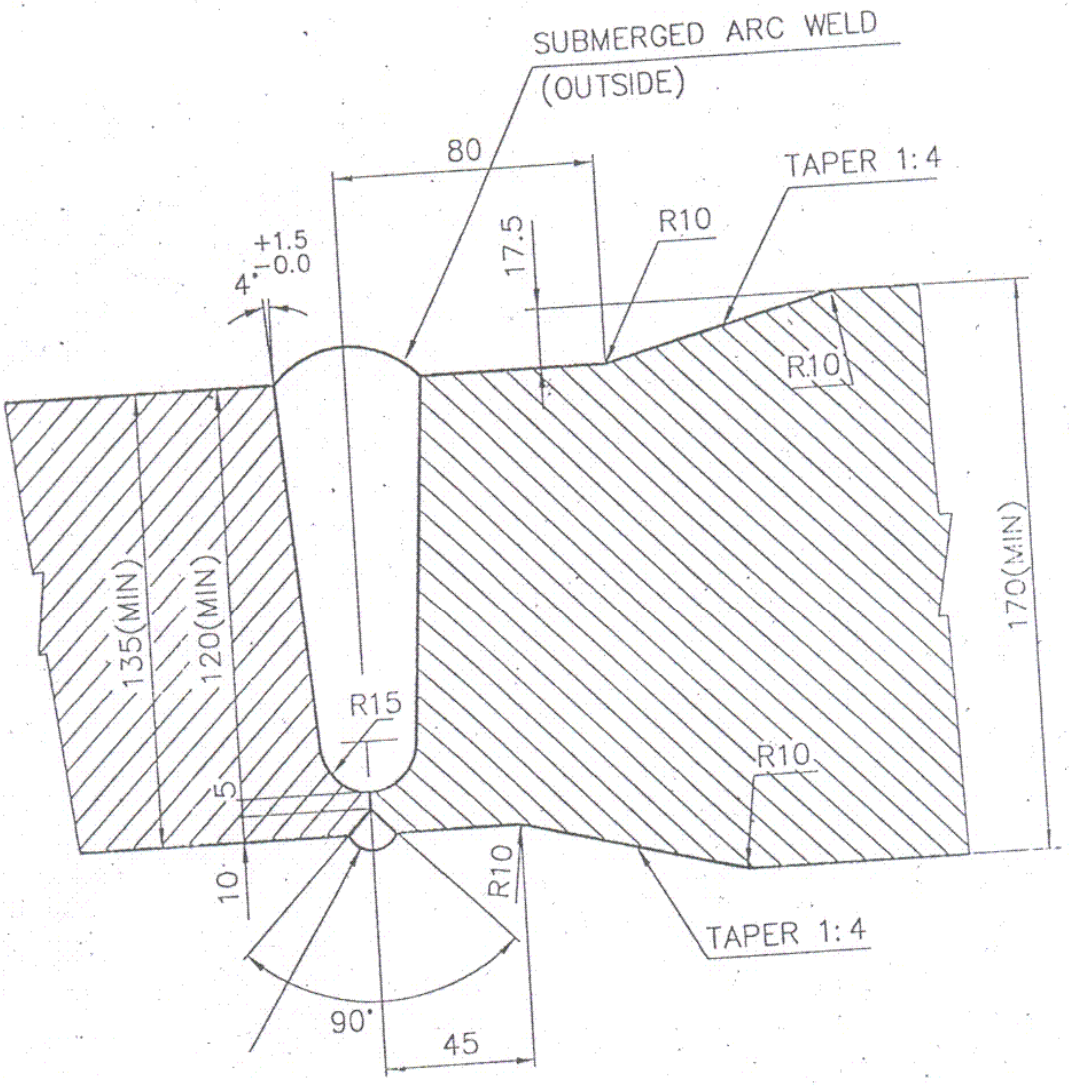
ANNEXURE - 1

[redacted]

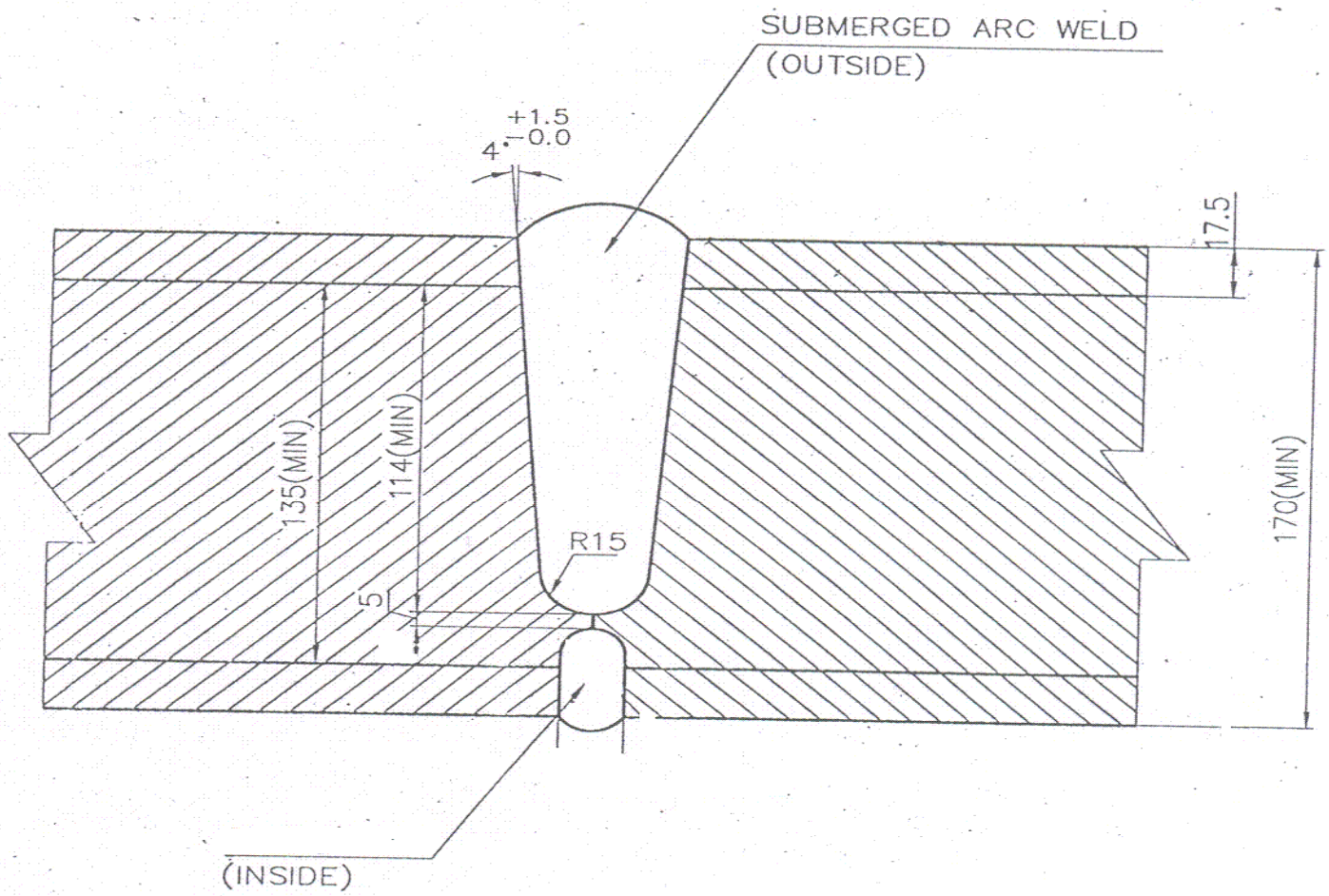


TYPICAL CROSS-SECTIONAL VIEW OF A CYLINDRICAL SHELL

ANNEXURE - 2



TYPICAL LONGITUDINAL WELD JOINT E P STYLE

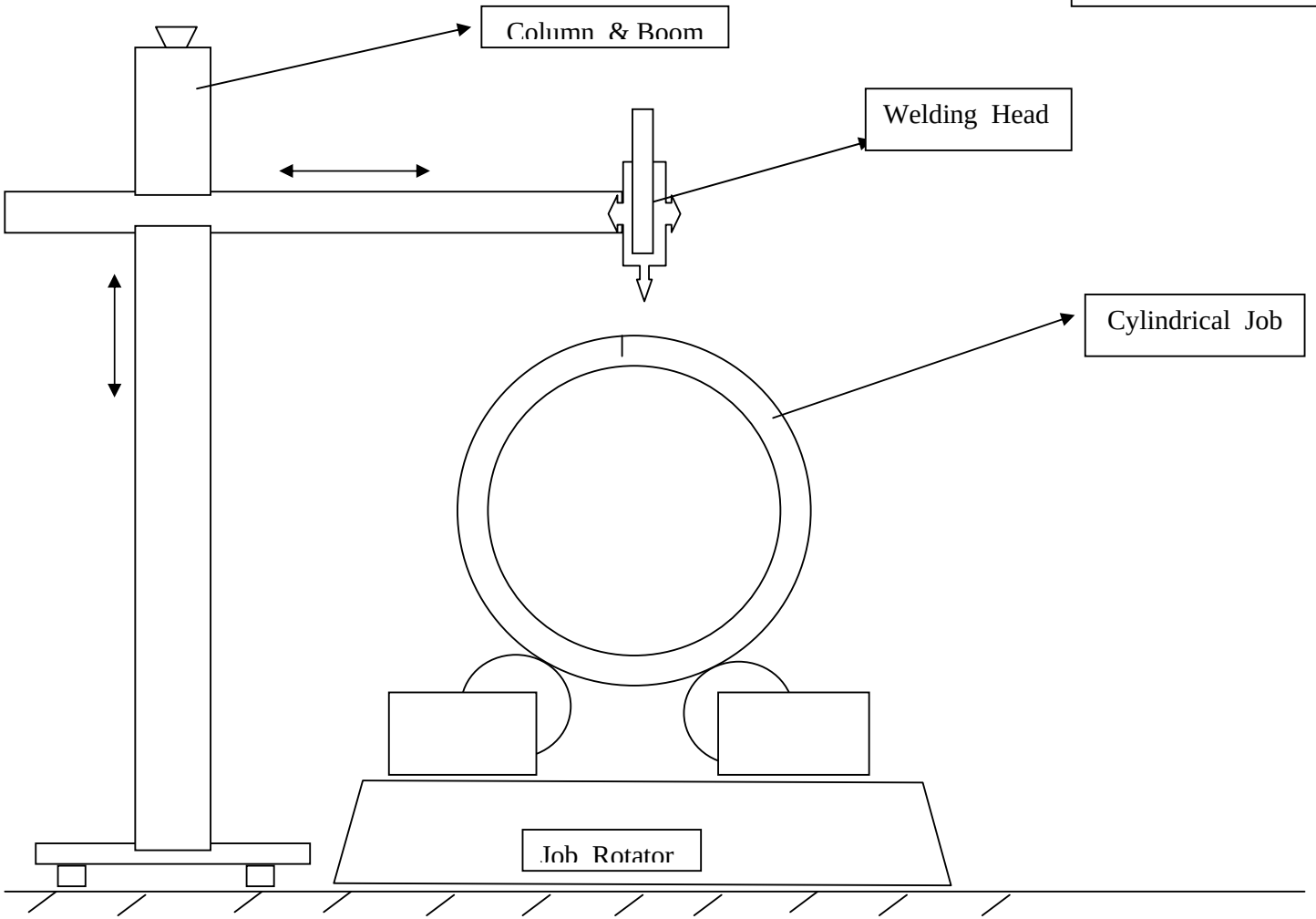


TYPICAL CIRCUMFERENTIAL SEAM WELD-JOINT EP STYLE

ANNEXURE - 3

ANNEXURE -4

SCHEMATIC DIAGRAM OF WELDING STATION



ANNEXURE – 5 :: LIST OF MECHANICAL SPARES

S.No.	Part Description	Quantity
1	Wire Feed Motor Gear Box	1 No.
2	Cross Slide Gear Motor	2 Nos.
3	Flux Feeding Hose Pipe (Total & Complete Assembly)	4 Nos.
4	Flux Hopper	2 Nos.
5	Wire Reel Holder	4 Nos.
6	Wire Feed Roller for 4.0 mm Dia. Wire	6 Nos.
7	Wire Feed Roller for 4.8 mm Dia. Wire	12 Nos.
8	Coupling Spider	10 Nos.
9	Vacuum Pump for Flux Recovery	1 No.
10	Flux Recovery Lifting Nozzle	5 Nos.
11	Flux Recovery Hose Pipe	30 Mtrs.
12	Bearing Column/Boom (Side Guide)	4 Nos.
13	Bearing Column/Boom (Main Guide in Roller)	4 Sets
14	Boom Horizontal Travel Drive Pinion	2 Nos.
15	Boom Vertical Travel Drive Pinion	2 Nos.
16	Column Vertical Rack – 1 Mtr. Piece	2 Nos.
17	Boom Horizontal Travel Rack – 1 Mtr. Piece	2 Nos.
18	Wire Feed Roller Fixing Bracket	4 Nos.
19	Gear Box for Carriage Travel	1 No.
20	Gear Box for Boom Vertical Travel	1 No.
21	Gear Box for Boom Horizontal Travel	1 No.
22	Set of Mechanical Spares of Refrigerant Air Dryer	1 Set.
23	Set of Washers and “O” Rings for Flux Recycling System	3 Sets.
24	Air Filter Cartridges for Flux Recycling Unit	5 Sets

ANNEXURE – 6 :: LIST OF ELECTRICAL SPARES

S.No.	Part Description	Quantity
1	Control Cards for AC Welding Powersource	1 Set
2	Control Cards for DC Welding Powersource	1 Set
3	Voltmeter and Ammeter (All Types – 1 No. each)	2 Sets
4	VFD Drive for Carriage	1 No.
5	VFD Drive for Boom	1 No.
6	Wire Feed PCB for DC Wire	1 Set.
7	Wire Feed PCB for AC Wire	1 Set.
8	Thyristor Stack (6 Nos. per set)	1 No.
9	PLC Control Card	1 No.
10	Push Buttons	10 Nos.
11	Potentiometer (Voltage / Current)	10 Nos.
12	Digital Carriage Speed Indicator (Meter)	2 Nos.
13	Digital Boom Speed Indicator (Meter)	2 Nos.
14	Control Contactor	2 Nos.
15	Selector Switch	2 Nos.
16	Indicating Lamp	20 Nos.
17	Limit Switch	5 Nos.
18	Potentiometer for Boom and Carriage	5 Nos.
19	Set of Electrical Spares for Refrigerant Air Dryer	1 Set
20	Set of Electrical/Electronic Spares for Data Logging Unit	1 Set
21	Set of Heating Elements in Flux Recycling Unit	1 Set