Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
An ISO 9001 Company
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

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

	Enquiry Number:	**Enquiry Date:**	**Due date for submission of quotation:**
	2620700083	**20.08.2007**	**03.10.2007**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

Item	**Description**	**Quantity**	**Delivery (Item required at BHEL on)**
10	Travelling Column and Boom Drum LS / CS welding Station (Travelling Type Column and Boom Submerged Arc Welding Machine as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	2 Nos.	30.10.2008

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications 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 "2620700083".

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 Purchase / MM / Manufacturing

PART A.

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

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
6.0	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	
7.0	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** 3 Mtr. configuration. [5 Mtr. tall Column and 3 Mtr. long Boom].	

S.No.	REQUIREMENTS	VENDOR's RESPONSE
8.0	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.7.0**	
9.0	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.	
10.0	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.	
11.0	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
12.0	The BIDDER shall submit the offer in TWO PARTS - Technical **[**with **PART A & PART B]** & Commercial and Price Bid.	
13.0	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.	
14.0	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)	
15.0	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.	
16.0	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.	

PERFORMANCE CERTIFICATE – [SAMPLE FORMAT]

(On Customer's Letter Head)

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 (with reasons for recommendation) : Best in the market / Satisfactory / Good / Average / Not Satisfactory

7. Any other Remarks :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B

TECHNICAL SPECIFICATIONS for TRAVELLING TYPE COLUMN & BOOM SUB-MERGED ARC WELDING MACHINE

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 thickness 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 an elevated platform like structure, with machined 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 Shell	:	3000 mm
Maximum Length of Shell	:	12500 mm
Maximum Weight of the Job	:	60 Tons

Job Material	:	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

NOTE : Test Coupons representing the Welding Joint is also welded in this machine, using a low height job holding fixture. To accommodate this type of test plates, a vertical stroke of 1000 mm is specified for the entire welding head with the Operator Controller Unit, to reach the working height.

04. TECHNCIAL SPECIFCATIONS

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.1.0	**ELEVATED PLATFORM**		
4.1.1	Height from Floor (to the top of machined rails fitted to the platform top surface)	2000 mm	
4.1.2	Width of Platform	Bidder to Specify *(to accommodate the welding machine base)*	
4.1.3	Effective Length of Platform	Bidder to Specify *(to suit the total traverse of the welding machine)*	
4.1.4	Platform Design	Platform Base and Vertical Support shall be of box-type steel fabricated structure with not more than FOUR vertical supports.	
4.1.5	Platform Foundation	The vertical supports shall be grouted to floor with four number of foundation bolts for each vertical support.	
4.1.6	Rails on Platform *(for the very smooth traverse of the column & boom welding machine without jerk, for quality weld)*	Two number of rails (top sliding surface hardened and ground) running to the full length of the platform.	Bidder to give details *(including number of joints and the type of joint between rail segments).*
4.2.0	**COLUMN & BOOM DESIGN**		
4.2.1	Type of Travel	Column & Boom on Carriage travelling on base frame/elevated platform, through an inverted rack & Pinion mechanism (to protect from falling welding flux, slag and other wastes) .	
4.2.2	Effective Traversing Length of Carriage	14000 mm	
4.2.3	Carriage travel speed	100 to 3000 mm/min.	
4.2.4	Maximum Height under Welding Tip	4250 mm	
4.2.5	Minimum Height under Welding Tip	1200 mm	

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.2.6	Boom Effective Stroke in Horizontal Direction	3000 mm	
4.2.7	Maximum sag at the end of boom	2 to 3 mm only. *(when measured for the full stroke in the horizontal direction)*	
4.2.8	Boom Effective Stroke in Vertical Direction	Bidder to Specify *(to suit the Clause No. 4.2.4 and 4.2.5)*	
4.2.9	Boom vertical travel speed	2000 mm/min (fixed)	
4.2.10	Boom horizontal travel speed	100 to 2000 mm/min	
4.2.11	Maximum Boom extension (from center of column)	Bidder to Specify (to suit the stroke of 3000 mm)	
4.2.12	Minimum Boom extension (from center of column)		
4.2.13	Weld head vertical traverse	1000 mm (specific requirement)	
4.2.14	Weld head vertical traverse speed	Bidder to Specify (as per Industry Standard)	
4.2.15	Speed holding accuracy : Carriage	Bidder to specify (to ensure weld quality, as this will be one of the parameters for weld quality)	
4.2.16	Speed holding accuracy : Boom		
4.2.17	Vibration Level	Maximum 1.0 mm during the traverses	
4.2.18	Rotation of Column (about the vertical axis)	0 to 180º (mechanized rotation is preferred)	Bidder to give details
4.2.19	Clamps for Column Rotation	Mechanized rotation is to be quoted as OPTIONAL	
4.3.0	**SAW TANDEM ARC WELDING HEAD**		
4.3.1	Weld Head 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, while doing circumferential seam welding]*	1000 mm	
4.3.2	Weld Head Rotation to switchover between Long Seam and Cirseam Welding	0 to 90º swivel	
4.3.3	Wire feed speed	100 to 4000 mm/min	
4.3.4	Weld joint depth	250 mm (maximum)	

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.3.5	Joint width	25 to 65 mm	
4.3.6	Distance between two wires (DC and AC)	20 mm (while tandem welding)	
4.3.7	Welding wire diameter	2.4 to 6.3 mm	
4.3.8	Flux Hopper Capacity	10 L	
4.3.9	Flux Handling Temperature	150º C (maximum)	
4.3.10	Vertical slide unit stroke	400 mm	
4.3.11	Cross slide unit stroke	300 mm	
4.3.12	Speed Vertical slide	Bidder to specify	
4.3.13	Speed Cross slide	Bidder to specify	
4.4.0	**WELDING POWERSOURCES**		
4.4.1	D C Powersource Current Rating	Minimum 1200 Amps.	Higher Rating Unit – 1600 Amps. may also be quoted
4.4.2	D C Powersource Duty Cycle	Continuous Duty	(to suit the specified welding application without break).
4.4.3	D C Powersource Welding Voltage	0 to 60 V	
4.4.4	D C Powersource Type	Fully Thyristorised (with 6 SCRs)	
4.4.5	AC Powersource Current Rating	Minimum 1200 Amps.	
4.4.6	A C Powersource Duty Cycle	Continuous Duty	(to suit the specified welding application without break.)
4.4.7	A C Powersource Welding Voltage	0 to 60 V	
4.4.8	Powersource Meters	Analog/Digital Ammeter & Voltmeter are to be provided on the powersources	
4.4.9	Powersource Location	Both AC and DC Powersources are to be positioned in the Machine Carriage	
4.5.0	**OPERATOR CONTROLLER [POSITIONED NEAR WELDING HEAD]**		
4.5.1	Controller Operations	a, Movement of all machine elements b. Pre-setting of all welding parameters c. Display of actual welding parameters. d. Flux Feeding & Recovery	

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.5.2	Machine Operations	a. To & fro Carriage Movement b. Column Rotation with limit switches c. Boom Up & Down Movement d. Boom forward & reverse movements e. Column and Boom clamping action	
4.5.3	Welding Process Parameters	a. Welding Speed (either by carriage movement or 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)*
4.5.4	Type of Controller	Bidder to specify with option for conventional type or micro-processor based	
4.5.5	Compatibility	Compatible to the Data Logging Unit proposed.	
4.5.6	Additional Features for Enhanced Productivity	Bidder to give the details (if available)	
4.6.0	**SEAM TRACKING MECHNAISM**		
4.6.1	Type	A simple and reliable system, is to be offered (suitable for a tough working environment)	
4.6.2	Working Principle	Bidder to give Technical Details	[Bidder to quote for various options]

S. No.	PARAMETERS	SPECIFICATIONS	VENDOR's OFFER [with Technical Details]
4.7.0	**FLUX FEEDING & RECYCLING UNIT**		
4.7.1	Capacity of the Flux Handling System	Bidder to Specify	**(to suit 5 to 6 welding cycles)**
4.7.2	Type of Flux	Agglomerated or Fused	
4.7.3	Flux Grain Size	12 to 65 in Tyler Mesh	
4.7.4	Flux Bulk Density	1.1 to 1.8 kgs./litre	
4.7.5	Air Displacement	6.50 Cubic Mtrs./Min. (Minimum)	
4.7.6	Measure of Vacuum	Bidder to Specify (in mm of water column) , to suit the weld grove depth of 350 mm and length of hoses involved in the recovery and recycling system	
4.7.7	Recovery/Feeding Hose	40mm ID, Synthetic Rubber or Metal Braided / Reinforced Hose to withstand 150 Deg. C.	
4.7.8	Flux Handling Temperature	150 Deg. C	
4.7.9	Filter Area	Around 35,000 sq.cms.	
4.7.10	Fine Dust Storage Capacity	Around 25 Litres in Vacuum Unit	
4.7.11	Flux Storage Capacity	Around 30 Litres in Primary Separator	
4.8.0	**DATA LOGGING UNIT**		
4.8.1	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 propose a suitable Data Logging Unit with Technical Details and Catalogue (if available)
4.8.2	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.	

05. BASIC CONSTRUCTIONAL FEATURES

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
5.1	The base frame, column & boom, 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 suitable 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	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.	
5.10	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.	
5.11	All gears used in the machine are to be hardened and ground	
5.12	A control box for effecting all the machine movements, to be provided at one end of the elevated platform base frame.	
5.13	A portable control panel shall be provided with 10 mtr. long cable with metallic sheathing , with duplicated functions for all the machine operations, except welding, in addition to the ones provided on the elevated platform (ground level) and at the control panel near the welding head.	
5.14	To design carriage travel with two double flanged & two plain wheels to suit machined guide racks and provided with guide rollers.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
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	Suitable clamping mechanism shall be provided for fixing the position of column/carriage on the base frame and the boom on the column, at any desired position within the permitted traversing lengths.	(mechanized rotation is to be quoted as OPTIONAL)
5.17	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.	
5.18	The wire spool shall have the facility for adjustable brake on wire coil.	
5.19	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 weld-groove during welding.	
5.20	A third wire feed unit 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.	
5.21	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.	
5.22	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.	
5.23	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.	
5.24	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.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
5.25	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.	
5.26	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.	
5.27	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.	
5.28	Automatic Dust Cleaning : The dust collected in the filters has to be cleaned automatically by pulse jet actuated by sensing the low vacuum level.	
5.29	The flux feeding conduit and recovery hoses shall ensure no clogging of flux at any junctions, bends, nozzles, etc.	
5.30	Suitable accessories like crevice nozzle, extension pieces, handles, filters etc., shall be offered in addition to the Flux Feeding Hopper near the Welding Head..	
5.31	The sucking and feeding hoses or tubing shall withstand the temperature of 150 Deg. C in continuous duty application with reasonably long life.	
5.32	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.	
5.33	The equipment shall be coated with heat resistant and anti-corrosive paint because of the nature of working environment.	
5.34	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].
5.35	Air Dryer Unit (Optional Item) : The system shall include a refrigerant type air dryer, for removing moisture from the compressed air supplied.	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
5.36	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.	
5.37	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.	
5.38	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features may be enclosed with the offer	

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. IMPORTANT POINTS

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
7.1	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.	
7.2	All electrical equipment shall be Tropicalized and shall have IP 54 degree of protection	
7.3	All electrical control cabinets & panels should be dust and vermin proof	
7.4	All electrical components in the cabinets should be mounted on DIN Rail	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
7.5	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.	
7.6	Motors shall be from M/s Siemens / ABB or other reputed make conforming to IEC Standards and acceptable to BHEL	
7.7	All electrics shall be of reputed make like Siemens, L&T, BCH, Tele-mechanique.	
7.8	Electrical drives shall be of Siemens / ABB / L&T / Eurotherm and PLC of SEW / Allen Bradley / Siemens / Messung / Fanuc	
7.9	All components / devices / terminals are to be incorporated with ferrules.	
7.10	Vendor should ensure the proper earthing for the machine and its accessories.	
7.11	Wiring: All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed cable running in conduits to common terminal block	
7.12	External wiring from / to control panel, control desk, external motors etc shall be by means of armoured multi-core cables	
7.13	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.	
7.14	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	
7.15	BHEL supplied compressed air will be at a pressure of 60 PSI to 70 PSI . 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.	
7.16	The control voltage for all applications shall be less than 110 V	
7.17	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	
7.18	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.	
7.19	A schematic diagram showing the layout of the machine & associated systems with salient dimensions shall be submitted along with the offer.	

08. ENVIRONMENTAL PERFORMANCE OF THE MACHINE

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
8.1	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.	
8.2	The machine shall be suitable for an ambient temperature of +45 ° C and relative humidity of 95 % respectively, but both do not occur simultaneously.	
8.3	If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor.	
8.4	The total machine, including attachments and accessories, shall be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout.	

09. SAFETY ARRANGEMENTS

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
9.1	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.	
9.2	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.	
9.3	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.	
9.4	Emergency Switches at suitable locations as per International Norms should be provided.	
9.5	Enclosures or protective covers shall be provided for the moving parts (either linear or rotary), as a safety measure, as per industry standards.	
9.6	Steel railings shall be provided in the carriage to support the sub-systems or maintenance staff during trouble shooting.	
9.7	Counter-balance & Safety device for holding the boom and the welding head against rope breakage. Offer details to be elaborated.	
9.8	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.	
9.9	An access ladder shall be provided for the maintenance staff to attend to fault in the boom vertical up and down movement mechanism.	

10. MACHINE SPARES

S.No.	DESCRIPTION / PARTICULARS	VENDOR's OFFER [with Technical Details]
10.1	Itemised break-up of mechanical, electrical , Electronic and pneumatic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare shall be offered)	
10.2	Mechanical & Hydraulic Spares: Bearings, clutches, gears and all types of pumps, Valves, pressure switches / transducers, filters, seals, O rings, Hydraulic Hoses, etc.	
10.3	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.	
10.4	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.	
10.5	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.	

11. DOCUMENTATION

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
11.1	THREE sets of following documents (Hard Copies) in English language shall be supplied along with machine	
11.2	Operating Manuals of Machine, Control Panel and Other Accessories	
11.3	Programming Manuals of Machine PLC (if applicable)	
11.4	Detailed Maintenance Manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also	

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
11.5	Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls	
11.6	Maintenance, Interface & Commissioning Manuals for PLC system, if used.	
11.7	Drawings of wear components like bushes, worm-wheel, racks & pinions, nozzle-tips, wire-feed rolls, etc.	
11.8	Catalogues, O&M Manuals of all bought-out-items including drawings, wherever applicable.	
11.9	Specifications of all standard items like Bearings, Chains, Sprockets, Oil-Seals, 'O'-Rings, Cam-Rollers, Belleville Springs, Linear Motion Bearings, Transmission belts, etc. available in the subject machine sub-assemblies viz., Ball Screws and Servo Slides, Hoist drive Unit, Boom Drive Unit, Wire Feed Unit, Welding head, Flux Recovery System, etc.	
11.10	PLC (if any) program print-outs with comments in English.	
11.11	PLC (if any) program/ladder diagram on CD, NC data & PLC data on floppy.	
11.12	Complete Master List of parts used in the machine shall be submitted by the vendor.	
11.13	One additional set of all the above documentation on CD ROM, wherever possible.	

12. TRAINING OF BHEL PERSONNEL

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
12.1	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	
12.2	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	
12.3	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	
12.4	Bidder to quote for training on man / week basis	

13. INSPECTION & MACHINE ACCEPTANCE

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
13.1.0	**MACHINE ACCEPTANCE:** (Tests/Activities to be performed by Vendor at Vendor's works, on the machine, before dispatch:)	
13.1.1	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.	
13.1.2	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	
13.1.3	Demonstration of all features of the machine, control system & accessories	
13.1.4	Welding of sample test plate and the sub-sequent testing for establishing the quality of weld, for performance rating of the machine.	
13.2.0	**Tests / Activities to be carried out at BHEL works while commissioning the machine:**	
13.2.1	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	
13.2.2	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	
13.2.3	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.	
13.2.4	Supervision by vendors of independent operation of machine by BHEL after job prove out during the training period of 5 working days	

14. MACHINE FOUNDATION

S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
14.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for main machine, control panels and any other accessories. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation.	

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 13.2.0** 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 :** Complete anchoring system including foundation bolts, anchoring materials, fixtures, leveling shoes etc shall be supplied along with the Machine.	

16. MACHINE PACKING

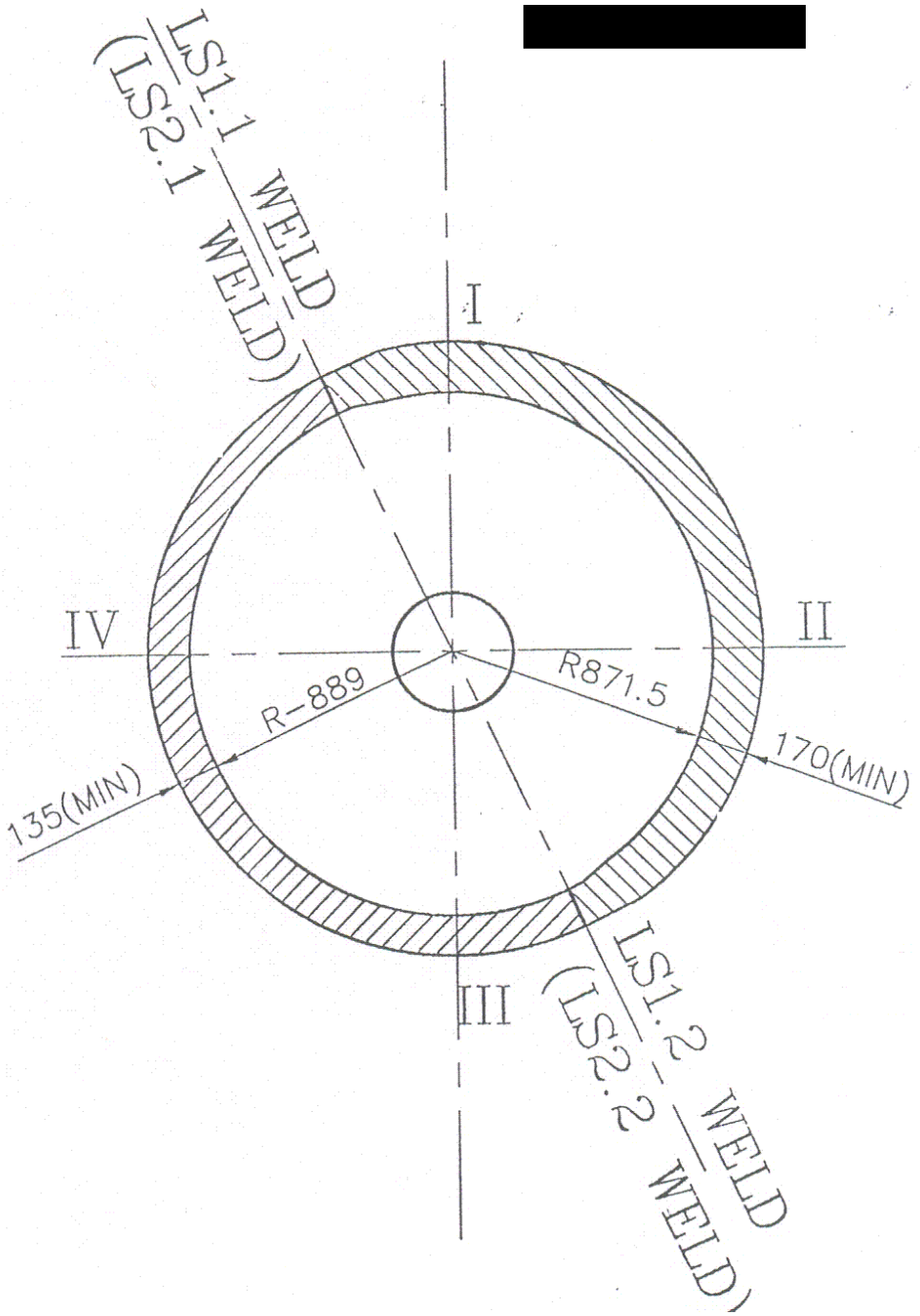
S.No.	DESCRIPTION / PARTICULARS	VENDOR's COMPLIANCE
16.1	Sea worthy & rigid packing for all items of complete machine, control panels , all accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed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

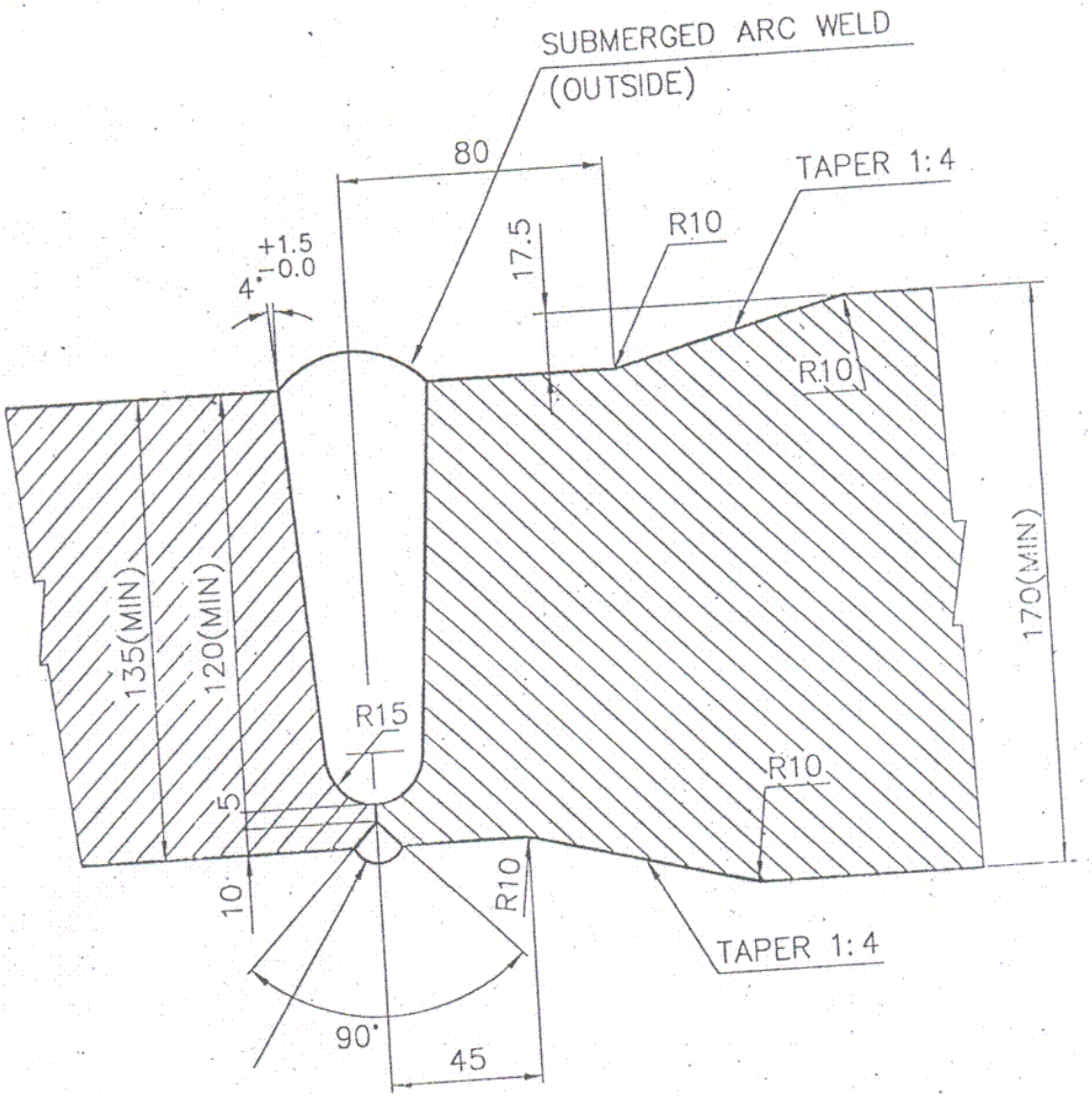
Enclosures : **Annexure – 1, 2, 3 & 4**

ANNEXURE - 1

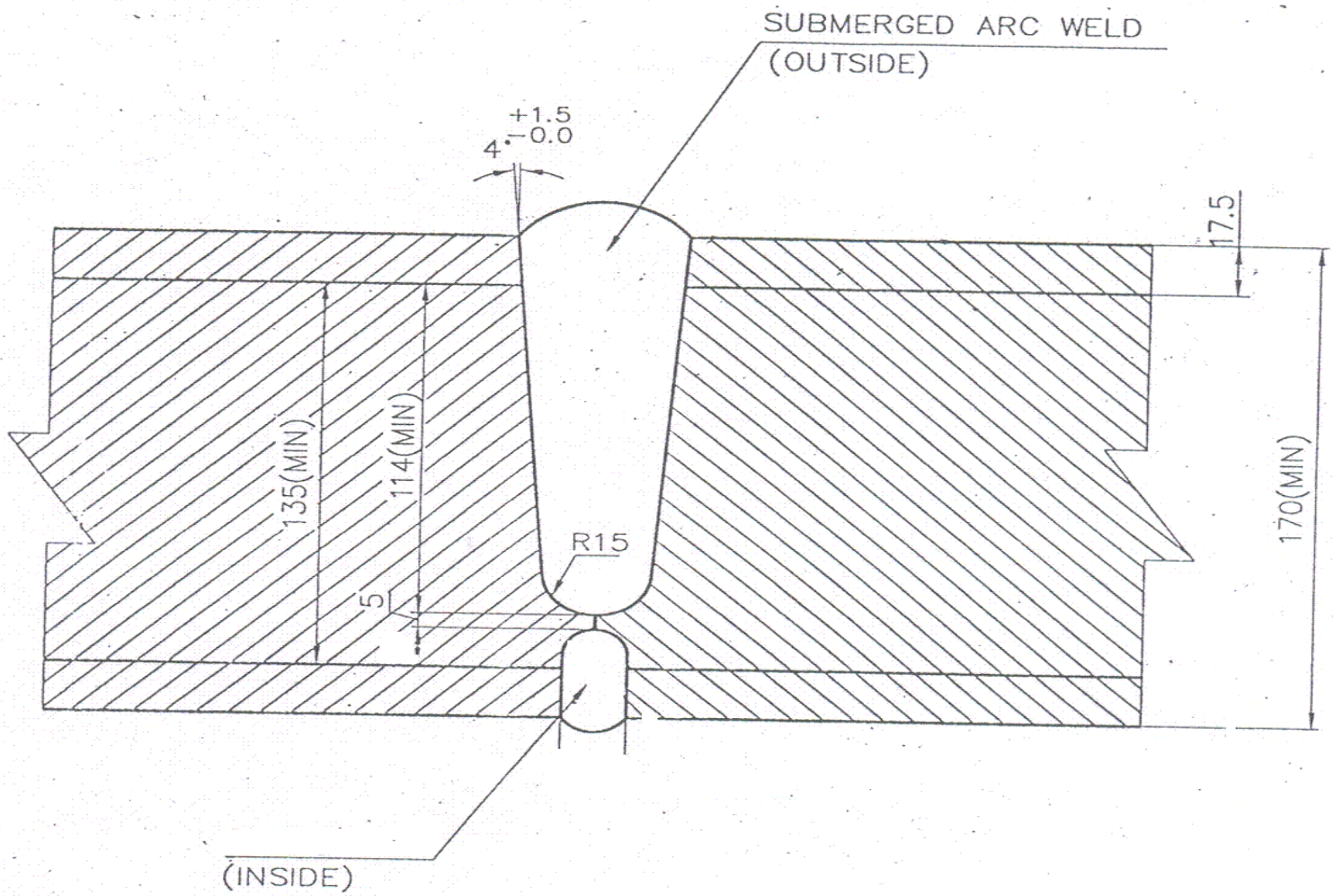


TYPICAL CROSS-SECTIONAL VIEW OF A CYLINDRICAL SHELL

ANNEXURE - 2



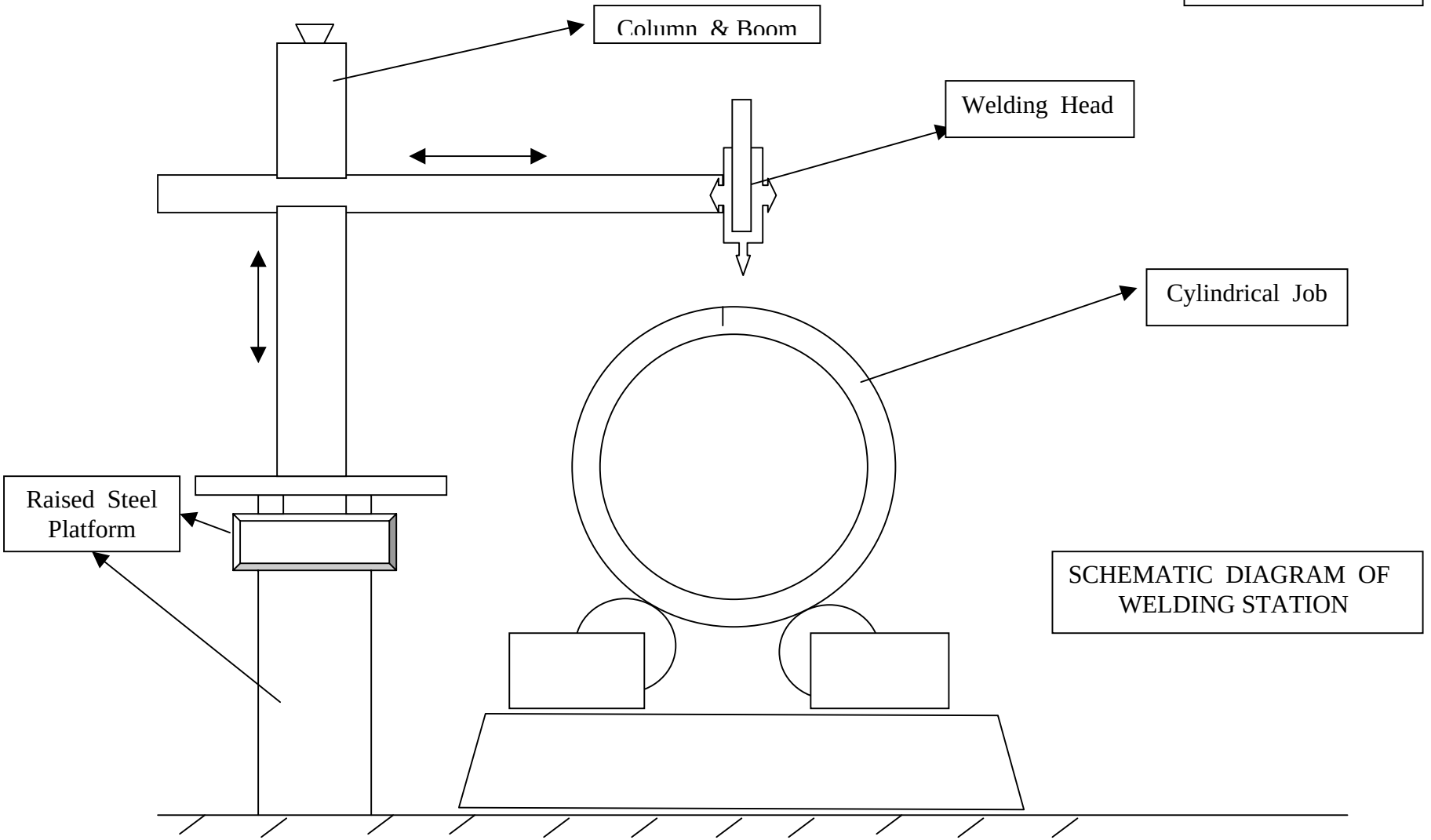
TYPICAL LONGITUDINAL WELD JOINT E P STYLE



TYPICAL CIRCUMFERENTIAL SEAM WELD-JOINT EP STYLE

ANNEXURE - 3

ANNEXURE -4



SCHEMATIC DIAGRAM OF WELDING STATION