



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 7421/7360/7775 Fax : 431 257 6826 Email : vkarna@bhel.in : ajayasalkar@bhel.in : kumar.virendra@bhel.in Web : www.bhel.com
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TWO PART BID	Enquiry Number:	Enquiry Date:	Due date for submission of quotation:
Tender to be submitted in two parts	2601800015	22.06.2018	16.07.2018

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.

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.

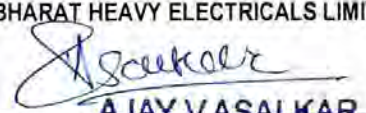
Item	Description	Qty.	(Indigenous Vendors) Matl. Will be Delivered to
10	Procurement of Orbital Hot Wire Pipe to Pipe Welding Machine as per the technical specification, BHEL commercial terms & conditions applicable (to be downloaded from web site www.bhel.com and https://eprocure.gov.in)	03 Nos.	FOR, BHEL, Stores, High Pressure Boiler Plant, Trichirappalli - 620014
20	Procurement of Orbital Hot Wire tube to Tube Welding Machine as per the technical specification, BHEL commercial terms & conditions applicable (to be downloaded from web site www.bhel.com and https://eprocure.gov.in)	03 Nos.	

Important points to be taken care during submission of offer

1. Material shall be delivered to (By indigenous vendors): As stated above.
2. By foreign vendors: CFR /CPT- Chennai Seaport / Airport
3. Delivery required 24 Weeks (Including PDI) from the date purchase order.
4. Erection & Commissioning period required 4 Weeks from the date of intimation by BHEL to vendor for deputation of their Engineers for E&C.
5. EMD for this Tender will be (INR): 2,00,000.00.
6. Compliance Forms. TRY/IMP/01 & TRY/IND/01A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
7. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

BHEL's General guidelines / instructions (Refer MM / CE / GENL /001 – EMD) including bank guarantee formats and list of consortium banks, commercial Terms check list and Integrity Pact can be downloaded from BHEL web site <http://www.bhel.com> or from Central Public Procurement Portal website <https://eprocure.gov.in> under Enquiry reference "2601800015".

Note: this is not an E-tender, hence Vendors are requested to ensure that the offer is reaching physically at our office before 14:00 Hrs. on the date of tender opening.

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  AJAY V. SALKAR Sr. MANAGER MM / Capital Equipment BHEL, Tiruchirappalli - 620 014
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PART A - SPECIFICATION FOR HOT WIRE ORBITAL TIG WELDING SYSTEM FOR
TUBE TO TUBE WELDING AT SITE

**TECHNICAL SPECIFICATIONS FOR
HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE**

PART- A

**QUALIFYING CRITERIA FOR THE SUPPLY OF HOT WIRE ORBITAL TIG WELDING
SYSTEM FOR TUBE TO TUBE WELDING AT SITE**

SECTION – I

The BIDDER/OEM (Original Equipment Manufacturer) is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details, asked for .

S.No.	PARTICULARS	BIDDER's RESPONSE
1	Number of Years of Experience, the BIDDER/OEM has in the field of design, manufacture and supply of 'HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.	
2	YEAR of LAUNCH of the MODEL quoted against this BHEL TENDER / ENQUIRY	
3	BIDDER to indicate the Country of Origin for the supply of the offered HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE..	
4	Number of HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.' supplied to Manufacturing Industries, across the globe and in INDIA - till date and the technical details on such systems, to ascertain the competency.	
5	Details on International Standards followed in Design, Manufacture and Testing of the subject model of 'HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.. - copies of the relevant standards (IEC/EN/ISO) are to be furnished with the TECHNICAL BID compulsorily.	
6	The Machine Manufacturing Firm/OEM should have an ISO 9001:2008 certificate issued by internationally reputed QMS auditing organization.	

**PART A - SPECIFICATION FOR HOT WIRE ORBITAL TIG WELDING SYSTEM FOR
TUBE TO TUBE WELDING AT SITE**

SECTION – II

The BIDDER / OEM has to compulsorily meet the following requirements to get qualified for submitting an offer for the "SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE".

S.No.	PARTICULARS	BIDDER's RESPONSE
7	The BIDDER / OEM shall have a minimum of FIVE Years of Continuous Experience in the Design, Manufacturing and Supplying of HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.	
8	Number of "HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE. supplied, till date in the QUOTED MODEL / NEAR TO QUOTED MODEL, to Premium Class Industries shall be NOT LESS THAN two in the last FIVE years. To furnish the list of those customers with contact details for reference.	
S.No.	PARTICULARS	BIDDER's RESPONSE
9	BIDDER / OEM has to provide Performance Certificate with full contact details of CONTACT PERSON, who are the End Users of the QUOTED MODEL of HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.– (in the suggestive format as given in the ANNEXURE-A on Page No.3).	
10	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centres, for providing technical assistance / spares supply.	
11	BHEL reserves the right to verify the information / data provided by the BIDDER / OEM. In case the information provided by BIDDER / OEM is found to be false / incorrect, the offer shall be summarily rejected.	

**PART A - SPECIFICATION FOR HOT WIRE ORBITAL TIG WELDING SYSTEM FOR
TUBE TO TUBE WELDING AT SITE**

SECTION – III

The BIDDER / OEM has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

S.No.	PARTICULARS	VENDOR's COMPLIANCE
12	The BIDDER / OEM shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial Terms and Price Bid.	
13	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the BIDDER / OEM, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical offer may lead to disqualification of the Technical Offer	
14	The BIDDER / OEM shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works. This will be an undertaking by the OEM at the time of release of Purchase Order on the successful bidder.	
15	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODEL of HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.	
16	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation for the scope of supply – with UNIT RATE.	
17	The expected delivery period (including the time for Pre-Dispatch Inspection clearance by BHEL) for the HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE. is not more than 20 weeks from the date of issue of BHEL Purchase Order.	

Enclosure : ANNEXURE – A (Performance Certificate)

ANNEXURE-A

PERFORMANCE CERTIFICATE

The Performance of the subject model '**HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE**' should be certified by the customer of the OEM/BIDDER on Customer's Letter Head, in the following pattern/format and submitted along with the TECHNICAL OFFER positively.

- 1.0 Name of the Machine Supplier (OEM) :
- 2.0 MODEL/MAKE, Serial No. 'HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE. :
- 3.0 Month & Year of Commissioning of the Equipment :
- 4.0 Details on the Application/Use of the HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE. :
- 5.0 Performance of the 'HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE.'. stated above : Very Good / Satisfactory Not Good
- 6.0 Availability of the 'HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE. stated above : Good / Poor
- 7.0 Service After Sales support given by the OEM / Indian Representative, including spares supply : Satisfactory / Not Satisfactory
- 8.0 Special Remarks / Recommendations :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

Part B

TECHNICAL SPECIFICATIONS FOR HOT WIRE ORBITAL TIG WELDING SYSTEM FOR TUBE TO TUBE WELDING AT SITE

S. No.	Particulars and BHEL Specifications	Bidder's Offer
1	PURPOSE AND APPLICATION	
1.1	a. The welding station is intended to build up tubular coils (used in high pressure steam boilers) by joining simple loops / circuits of tubes (Annexure -3 gives typical loop/circuit and build-up tubular coil) b. The tubular loops or circuits are interconnected by means of butt welding the tube ends by keeping the loops/circuits in horizontally flat position. The welds are to meet BHEL radiographic test requirements c. The welding station is expected to carry out the following operations: i) Butt weld joint fit-up using mechanical fixtures ii) Butt welding of full weld joint by automatic orbital Hot wire GTAW process iii) Weld data logging system and report generation d. All necessary safety conditions, heat resistant, moisture resistant, corrosive resistance materials shall only to be used for the fabrication of the equipment. e. Welding in 2G, 5G & 6G positions for Alloy steel and Inconel materials	Vendor to confirm/Specify
2	WORK PIECE AND JOB DETAILS	
2.1	Tube Dimensions (General) a) Range of diameter [O.D.] ----- 38.1 mm to 76.2 mm b) Range of wall thickness ----- 3.6 mm to 15mm c) Width of coil to be built-up ----- 3350 mm (maximum) d) Length of coil to be built-up ----- 25000 mm (25 m) (maximum)	Vendor to confirm/Specify

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

2.2	Tube Sizes in Details [Note: All are OD (Outer Diameter) controlled tubes with a tolerance of maximum 12 % on tube wall thickness, The equipment shall be suitable to hold in the tolerance limit.] <table border="1"> <thead> <tr> <th>S. No</th><th>OD, mm</th><th>Thickness range, mm</th></tr> </thead> <tbody> <tr><td>1</td><td>38</td><td>3.6 to 10.7</td></tr> <tr><td>2</td><td>44</td><td>4.0 to 8.7</td></tr> <tr><td>3</td><td>48</td><td>4.0 to 9.6</td></tr> <tr><td>4</td><td>52</td><td>4.0 to 12</td></tr> <tr><td>5</td><td>54</td><td>3.6 to 13.5</td></tr> <tr><td>6</td><td>58</td><td>4.0 to 15.0</td></tr> <tr><td>7</td><td>63</td><td>4.0 to 12.5</td></tr> <tr><td>8</td><td>76</td><td>4.5 to 7.1</td></tr> </tbody> </table>	S. No	OD, mm	Thickness range, mm	1	38	3.6 to 10.7	2	44	4.0 to 8.7	3	48	4.0 to 9.6	4	52	4.0 to 12	5	54	3.6 to 13.5	6	58	4.0 to 15.0	7	63	4.0 to 12.5	8	76	4.5 to 7.1	Vendor to confirm/Specify
S. No	OD, mm	Thickness range, mm																											
1	38	3.6 to 10.7																											
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5	54	3.6 to 13.5																											
6	58	4.0 to 15.0																											
7	63	4.0 to 12.5																											
8	76	4.5 to 7.1																											
2.3	Material Specification A). Carbon Steel : SA192, SA210A1, SA210C [ASTM] B). Alloy Steel : SA 209T1, SA213T11, SA 213T22, SA 213T-23, SA 213T91, SA 213T92 C). Stainless Steel : SA 213 TP304H, SA213 TP321H, Super 304H, SA 213 TP347H D). Nickel Based alloys	Vendor to confirm/Specify																											

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

3	WELD JOINT DETAILS a. Style of edge preparation : 'J' style or 'V' Style b. Tube end condition : Machined in automatic end preparation line c. Tube Dia Range : 38.1 mm to 76.2 mm d. Weld joint location : Length of straight portion on either side of weld joint $\geq$ 250 mm e. Preheating temperature : Max. 250 deg C (for alloy steel tubes only) f. Weldment testing modes : Radiography testing g. Weld quality appraisal : As per ASME Section I, V and VIII (Division 1&2) for radiography test	Vendor to confirm/Specify
3.1	Machine output/productivity Vendor has to specify the minimum output of weld joints, possible from the workstation, for the tubes with the following dimensions/details, in single shift of 8 hrs: a) Built-up coil length : $\geq$ 20000 mm b) Width of built-up coil : $\geq$ 3000 mm c) Weld joint style as per the EP sketches : ('J' style edge preparation) Prove out -- - Tube Size: OD 57.2 mm x Th. 15 mm / SA213T22 -- 5 joints using 1 mm/0.8mm dia welding wire d) Productivity Expected Productivity is as follows in one eight hour shift: Tube size: OD 51 mm x Th. 7.6mm / Super 304H ---- 18 joints using 1 mm dia welding wire OD 52 mm x Th. 12 mm / Inconel 617 ---- 10 or more joints using 1 mm dia welding wire e) Welded joints will be subjected to radiography test at BHEL works and should pass the test as per ASME section I, V and VIII (Division 1 & 2) of radiography test.	Vendor to confirm/Specify

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

4.0	ORBITAL TIG WELDING EQUIPMENT Orbital TIG welding sets and accessories consists of the following 1. Orbital power source with control 2. Hot wire power Source 3. Orbital TIG welding head and its related accessories (10m cable length) 4. Welding head control unit 5. Pendant controller Tube butt joints fit-up fixture / job clamping unit Portable tungsten electrode grinder 6. Inter-connecting gables and hoses 7. Torch gas control with flow meter with low flow detection 8. Ground cable. 9. PC laptop window keyboard/touch screen in English with data logger connectivity from power source 10. Gas hoses. 11. Pressure regulator. 12. Adapter for connection standard power source 13. Operating and service tool kit 14. Refrigerant type chiller unit of maximum 0.5 T capacity 15. Spares with unit cost to be suggested for reference 16. Documents	Vendor to confirm/Specify
5.0	WELDING POWER SOURCE AND CONTROLLER	
5.1	Type	Microprocessor controlled, programmable, inverter type- constant current / voltage
5.2	Make and Model	Vendor to specify
5.3	Switching frequency	Vendor to specify

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

5.4	Welding process	Hot Wire GTAW, DCEN with current pulsing option	
5.5	Memory	99 welding programs or more	
5.6	Equipment to have provision to transfer welding programs from and to pen drive (memory stick) through USB port	Vendor to specify	
5.7	Each weld program for a unique combination should allow a minimum of 6 passes each pass with different parameters	Vendor to specify the maximum number of passes that can be written in a program	Vendor to confirm/Specify
5.8	Different parameter values for a minimum of 6 position based levels / sectors within a pass of 360° should be programmable enabling position based level / sector wise parameter change within each pass	Vendor to specify the maximum number of sectors that can be programmed per pass of 360° with in a pass, the latest program / parameters can be set as default for the remaining sectors unless otherwise changed by the operator	
5.9	For each program the following parameters should be programmable common to all passes	Program number	Vendor to specify / confirm with details
		Number of passes	
		At the beginning of welding / start sequence a) Pre-purge time b) Up-slope time c) Wire start delay d) Rotation start delay	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

		At the end of welding / stop sequence	
		a) Post-purge time b) Down slope time c) Wire stop delay	
5.10	Following parameters should be programmable for each pass	a) Pulse on / off time	
		b) Oscillation on / off c) Base & Peak Current, Hot wire Current d) Wire Feed Speed e) Travel Speed f) Oscillation speed g) Oscillation width h) Oscillation dwell in i) Oscillation dwell out j) Base current - % of peak current k) Peak time - % l) Base time - % m) AGC / AVC sensitivity n) AGC / AVC speed o) Synchronised travel with pulsing p) Synchronised wire feed with pulsing	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

5.11	It should be possible to manually override the following parameters during welding with in a pre-set range	a) Electrode Current and Hot wire Filler Current b) Travel speed c) Wire feed speed d) AGC / AVC e) Oscillation speed f) Oscillation amplitude g) Torch cross beam centering	Vendor to confirm the details
5.12	Welding data entry on controller / power source	Through a 'dust & moisture proof membrane key pad – rugged type	Vendor to confirm
5.13	Front panel display (in English)	Vendor to describe	
5.14	Output current range	Min 300A. [DC]	
5.15	Current Duty cycle	250A or more DC @ 100%	
5.16	Current accuracy	±1% of setting	
5.17	Welding voltage range	Vendor to specify	
5.18	Gas pre-flow / gas post flow time	Vendor to specify	
5.19	Current pulse frequency	Vendor to specify	
5.20	Pulse current time	Vendor to specify	
5.21	Current up-slope / down slope time	Vendor to specify	
5.22	Rotation start / stop delay	Vendor to specify	
5.23	Wire feed start / stop delay	Vendor to specify	
5.24	Wire feed start / stop delay	Vendor to specify	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

5.25	Torch rotation speed	Vendor to specify	
5.26	Torch rotation speed regulation	±1% of setting	
5.27	Filler wire feed speed	Vendor to specify	
5.28	Filler wire feed speed regulation	±1% of setting	
5.29	Synchronization of functions with current pulsing should be possible on selection	Wire feed Oscillation dwell AGC / AVC. Torch head rotation	
5.30	Torch oscillation speed	Vendor to specify	
5.31	Oscillation dwell time at both ends (independently adjustable)	Vendor to specify	
5.32	AVC function	±1% regulation	
5.33	Programming increments for welding Current and time parameters	0.5 Amp / 0.1 Sec.	
5.34	Welding parameters override during welding override to be maintained for the remaining segments	Programmable limits (Vendor to specify the range)	
5.35	Arc starting	Vendor to specify details	
5.36	Arc sensing	Vendor to specify means & modes for arc start and sensing	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

5.37	Refrigerant type water chiller	Refrigerant type water chiller having minimum capacity of 0.5T to cool the weld head and torch while welding tubes with 250° C preheat involving 6 continuous passes without stop for inter-pass temperature. Temperature of water in tank to be maintained at around 20°C ±2°C Make shall be: Werner Finley / Rittal / Advanced cooling Vendor to provide details	
5.38	Gas hose with ends fittings – gas cylinder to power source	Length of suit long travel on cable festoon	
5.39	Fault protection sensors	For gas & cooling water flow	
5.40	Maximum number of data log files in memory	Vendor to specify	
5.41	Inbuilt Data logger system and the output shall also be sent to other PC and shall be recorded	Vendor to specify	
5.42	EMI interference suppressor	Vendor to specify the details for EMI suppression for the equipment.	
6.0	ORBITAL HOT WIRE TIG WELDING HEAD		
6.1	Type	Low profile tube hot wire orbital welding head of rugged construction which is capable to run with Super 304H, T92, T23, Nickel alloys with wire dia 1mm. it will also be used with 0.8 mm welding wire. Vendor to specify the wire feeder motor torque	Vendor to confirm/Specify

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

6.2	Rating	250A @ 100% duty cycle Hot Wire Power Source I. Hot wire power source – constant current II. Type – Direct Current III. Duty Cycle – min 140 A at 100 % duty cycle IV. Input power - 240V/415V 50HZ/Single phase/Three Phase		
6.3	No. of passes of welding		Six continuous passes without Interruption	
6.4	Cooling for torch and body		Water cooled	
6.5	Clamping type / weld head mounting mechanism on tube – for easy mounting / dismounting of head		Vendor to provide complete details on clamping system of orbital weld head on the tube. Weld head rotation shall be guided over a guide ring mounted on the tube OD, chain clamping or direct drive over the tube is not acceptable	
6.6	Axial clearance		250 mm	
6.7	Radial clearance (clear gap between the tubes)		100 mm	
6.8	Servo controlled oscillation & dwell stroke length Speed Dwell time – In & out independently variable		16mm (minimum) Vendor to specify the actual stroke Vendor to specify in mm/min Vendor to specify in sec.	
6.9	Servo controlled AVC		Suitable to weld 15 mm thickness tubes. Vendor to specify the stroke	
6.10	Servo controlled rotation motor: Travel speed		Speed ----- Vendor to specify Vendor to provide the motor and gear ratio details	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

6.11	Servo controlled wire feed speed	Speed ---- Vendor to specify Vendor to provide the motor and gear ratio details	
6.12	Cross seam adjustment	Vendor to specify range Vendor to provide the motor and gear ratio details	
6.13	Servo controlled synchronised pulsed or continuous wire feed motor (on board)	Vendor to specify Vendor to provide the motor and gear ratio details	
6.14	Wire size	The equipment to be capable of welding with wire dia 1 mm of max. Tensile strength of 1500 N/mm ² . The equipment shall also be used for welding with 0.8 mm wire. Wire feed rollers & accessories to be provided for both 1 mm and 0.8 mm welding wires. Vendor to confirm.	
6.15	Wire nozzle adjustment (manual)	Vertical, Horizontal & angular	
6.16	Torch lead / lag angle adjustment	Vendor to specify	
6.17	Torch tilt in /out	Vendor to specify	
6.18	Wire nozzle and its mounting arrangement	Shall be capable of withstanding the high temperature without loosening	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

6.19	Wire spool carriers	Head mounted type (on board mounted). The on board mounted wire spool to rotate along with the head during welding. Complete details of mounting wire spool to be provided with drawing / photographs. Wire spool mounting on extended frame is not acceptable.	
6.20	Wire spool size and specification	Weight 1 kg Only these spools will be used Spool mounting	
6.21	Tungsten electrode size	Ceriated tungsten electrode size 2.4 mm	
6.22	Tungsten tip included angle	15 deg. To 30 deg.	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

6.23	Cable and gas hose package	The cable and gas hose package for the welding head shall be adequately sheathed with heat and abrasion resistance material. It shall withstand repeated winding / rewinding while in operation. It is proposed to mount the equipment on a mobile platform and suspend welding head, controller, job clamps etc from top supporting rail. Hence, the length of the cable and hose package should have sufficient length to reach the weld joint location. Length of cable and hose required is 10 meters minimum. Joints not preferable. Vendor to provide details like length and dia of cables.	
6.24	Number of coiling required	Cable and hose winding shall be of sufficient length for continuous operation of 5 passes on the tube without interruption	
6.25	Thermal stability	All the metallic and non-metallic components of the welding head shall be withstand the intense heat radiation during welding for continuous operation of 5 passes on the tube without interruption. It should also have good wear resistance characteristics.	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

7.0	REMOTE OPERATOR PENDANT	
7.1	Features	Vendor to confirm/Specify
		Pendant shall contain the following controls: a) Selector switch: weld / setting b) Welding program access & selection c) Display screen for welding parameters d) Emergency stop e) Sequence start / stop f) Gas flow switch g) Inching operation (by toggle switch control or joystick control) for the following functions: I. AVC function II. Torch oscillation amplitude III. Torch centering IV. Wire feed speed V. Head travel speed VI. Electrode Welding current up/down (manual override) VII. Hot wire current up/down (manual override) h) Ambient operating temperature is around 50 deg. C. heat sink of the pendant should be designed to work at these temperatures.

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

7.2	Cable to remote pendant	The cable to be firmly fixed to the pendant and shall not loosen and disconnect from the pendant during usage in shop floor. Necessary joint protections to be provided. Wires to be soldered in the pendant cable connector instead of crimping with lugs.	Vendor to confirm/Specify
7.3	Heat resistant remote pendent	The remote operator pendant shall have proper cooling provisions so that it does not get heated up due to the electronic components / processors housed inside the pendant. The temperature shall not exceed 5 deg. Above ambient temperature.	Vendor to confirm/Specify
8.0	TUNGSTEN ELECTRODE GRINDER		Vendor to confirm/Specify
8.1	Type	Portable, electric motor operated	Vendor to confirm/Specify
8.2	Electrode to be ground	Ceriated tungsten	
8.3	Tungsten diameter	1.6, 2.0, 2.4 mm	
8.4	Tungsten grinding angle	15 to 30 deg	
8.5	Make & Model	Vendor to provide the details	Vendor to confirm/Specify
9.0	TUBE BUTT JOINT FIT-UP FIXTURE / JOB CLAMPING UNIT		
9.1	Type	Portable – manually operated	
9.2	Clamping	Clamping on outer diameter	
9.3	Tube clamping range	38.1 mm to 76.2 mm	
9.4	Axial alignment	No mismatch at the root for welding	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

9.5	Suspension hook with fixture to carry the full set machine/equipment	Hook for suspending the fixture to be provided	
9.6	Gap	Clear gap suitable to mount orbital weld head and rotation during welding	
9.7	Make & model	Vendor to provide details	
9.8	Fasteners	All fasteners should comply to metric standards	
10	ELECTRICAL & ELECTRONIC SYSTEM		
10.1	415 V $\pm$ 10%, 50HZ $\pm$ 3 Hz, 3 Phase AC (3 wire system without neutral) power supply will be provided by BHEL at a single point near the machine. All cables, connections, circuit breakers etc. required for connecting BHEL's power supply to the machine shall be in the scope of Bidder.		
10.2	Tropicalization: All electrical / electronic equipment shall be tropicalized.	Vendor to confirm	
10.3	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm	
10.4	Control circuit voltage shall not exceed 110V	Vendor to confirm	
10.5	All motors shall be confirming to IEC standards type of motors may be specified	Vendor to specify	
10.6	All electrical & electronic control cabinets & panels should be vermin and dust proof	Vendor to confirm	
10.7	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

11	FAULT DIAGNOSTIC SYSTEM		
11.1	Vendors own diagnostic system with required hardware & software shall be supplied and installed in the control system. This shall include customized auto- diagnostic system, which shows detailed cause and remedy for the fault on the display for faults related to mechanical and electrical maintenance. Software back up can be provided	Vendor to confirm	
11.2	Help guide shall be provided to use both diagnostic systems	Vendor to confirm	
12	IN-BUILT SAFETY ARRANGEMENTS		
12.1	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to confirm	
12.2	A detailed list of all alarms / indications provided on machine should be submitted by the vendor.	Vendor to confirm	
12.3	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor to confirm	
12.4	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

12.5	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded.	Vendor to confirm	
12.6	Emergency Switches should be provided at suitable locations as per International Norms should be provided.	Vendor to confirm	
13	MACHINE SPARES		
13.1	Itemized break-up of mechanical, electrical and electronic spares used in the machine in sufficient quantity as per recommendation of vendor for 2 years of trouble free operation on three shifts continuous running basis shall be suggested by vendor. The list is to include following, in addition to other recommended spares: (Unit Price for each item of spare shall be offered)	Vendor to confirm	
13.2	Mechanical Spares: All types of Pumps, Valves, Pressure Switches, guide rings with linkage sets, rollers, transducers, flow switches, Filters, Seals, O-rings, water cooled hoses, wire feed rollers & wire pressing rollers (5 no's each size), fasteners (5 no's each size), sprockets, gears, cams, bearings etc. Welding consumables: nozzle, gas cup, gas filter, tungsten tip, wire liner etc.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

13.3	Electrical / Electronic: All types of printed circuit boards, relays, contactors, Proximity Switches, Push Buttons, semiconductor fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, indicating lamps, Spares for microprocessor based system, servo motors for feed drives, power module & Control Cards for Drives etc.	Vendor to confirm	
13.4	Recommended set of spares for all attachments (drive motors, program chip etc.) are to be suggested with details.	Vendor to confirm	
13.5	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 Bidder should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	Vendor to confirm	
13.6	Vendor to Confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

14	DOCUMENTATION	
	The following documents in English language should be supplied along with the machine: Hard Copies - 3 Sets Vendor to Confirm In CD form - 1 Set 1. Operating manuals of weld head, controller, welding power source 2. Operating and maintenance manuals of all accessories 3. Programming manuals of the Machine 4. Maintenance manuals with all drawings of machine assemblies / sub-assemblies with parts list. 5. Electrical wiring drawings – power & control circuits. 6. Maintenance & Interface manuals for Machine Control System 7. Microprocessor / complete printed circuit board schematics indicating check points (Test Points) for electronic control. 8. Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the vendor. 9. Specifications / ratings of all brought out items 10. Catalogues, O&M manuals for all bought out items used in the machine. 11. Trouble shooting chart for Main and all sub systems 12. Parameter selection software, file handling and display recording, serial and USB ports to be ensured. 13. Preventive Maintenance check list for Electrical and Mechanical System 14. Complete list of spares for machine, along with item part no /specification / type / model and make & address of the sub-vendor.	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

15	EQUIPMENT INSPECTION & ACCEPTANCE	
15.1	At Vendors works: 1. The orbital TIG welding equipment and accessories shall be tested for its performance prove –out as per BHEL specifications, at the supplier's works prior to despatch. 2. Welding trials have to be conducted on short length sample tubes, in presence of BHEL engineers, at supplier works, for a minimum of 5 joints of the tube sizes given below using 1 mm & 0.8 mm wire dia. a) Tube Dia 50.8 mm × thick 7.6 mm / super 304H b) Tube Dia 57.2 mm × thick 12.2 mm / SA213 T23 The tubes shall be arranged by vendor. Welding consumables are to be arranged by the supplier. The welded samples have to be returned to BHEL along with the equipment for conducting further test. 3. The supplier to program the welding parameters for the above joints and weld samples. 4. Welded joints will be subjected to radiography test and should pass the tests as per ASME section I, V and VIII (division 1 & 2) of radiography test. 5. Supplier to provide necessary arrangements for recording the programmed process parameters.	
15.2	At BHEL works 1) The prove out trials of the welding operation shall be for the tubular coils / circuits with the sizes / specifications mentioned under clauses 15.1. 2) The supplier to program the welding parameters for the above joints and weld samples. 3) The material will be supplied by BHEL. 4) Welded joints should pass through the radio-graphic test as per ASME section I, V and VIII (Division 1 & 2) for radiography test.	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

16	TRAINING		
16.1	The supplier shall train TWO BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and Programming) of the Machine for TWO working days at supplier's works after the pre-dispatch inspection.	Vendor to confirm	
16.2	Vendor to clearly mention whether the training is offered free of cost or chargeable. If chargeable, the vendor has to quote on man-day basis.	Vendor to specify	
16.3	Airfare, board & lodging for the BHEL Engineers who will be visiting supplier's works for pre-dispatch inspection and training, will be borne by BHEL.	Vendor to note	
16.4	The Supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical/ Electronics and PC based control System) during commissioning of the Machine at BHEL works for 5 working days.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

16.5	The training shall include specialized coaching in i) Safety ii) Operation of the machine iii) PC based System & Operation, iv) Trouble-Shooting, v) Software Application vi) All special features of the machine vii) Electrical / Mechanical / Electronics systems	Vendor to confirm	
16.6	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Vendor to confirm	
17	MACHINE ERECTION & COMMISSIONING		
17.1	Vendor to take full responsibility for Supervision of the erection, vendor shall start up, test the machine, its control & all types of other supplied equipment, carrying out welding of test pieces etc.	Vendor to confirm	
17.2	Successful proving of BHEL requirements by the vendor shall be considered as part of commissioning. All tests, as mentioned in clause no. 15.2 shall form part of the commissioning activity.	Vendor to confirm	
17.3	Tools, tackles, test mandrels, instruments and other necessary equipment required to carry out the above activities should be brought by the vendor.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

17.4	The vendor shall bring special tools, tackles, test mandrels, instruments and any other necessary equipment required for erection of the machine. Necessary tools like torque wrench, spanners, keys, etc. for operation and maintenance of the machine should be supplied and offered by vendor.	Vendor to confirm	
17.5	Commissioning spares, required for commissioning of the machine within the stipulated time, shall be brought by the vendor on returnable basis.	Vendor to confirm	
17.6	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 shall supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor to confirm	
18.	THERMAL STABILITY FOR AMBIENT CONDITIONS & ENVIRONMENTAL PERFORMANCE OF THE MACHINE		
18.1	The orbital welding heads pendent controller, main controller and welding power source shall be suitable for an ambient temperature of +50 deg C and relative humidity of 90% respectively, but both do not occur simultaneously.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

18.2	The vendor should ensure trouble free operation of the machine with Thermal Stability of the complete machine and accuracy requirements of BHEL components, keeping in view of ambient conditions as mentioned above.	Vendor to confirm	
18.3	The machine including attachments and accessories, should be suitable for 24 hrs continuous operation to its full capacity for 24 hours a day and 7 days a week throughout the year.	Vendor to confirm	
18.4	If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor.	Vendor to confirm	
18.5	Paint of the machine should be oil / coolant resistant and should not peel off	Vendor to confirm	
18.6	There shall not be any emission from the machine except fumes of welding during butt welding.	Vendor to confirm	
18.7	The machine should confirm the following factor related to environment: Maximum noise level shall be 85 dB (A) at normal load condition, 1 meter away from the machine with correction factor for back ground noise. This will be measured as per international standards like DIN 45635-16. Supplier to demonstrate compliance to noise level, if asked for.	Vendor to confirm	

SPECIFICATION HOT WIRE ORBITAL TIG TUBE WELDING SYSTEM

19	MACHINE PACKING		
19.1	Sea worthy & rigid packing for all items of complete machine, control System, 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	Vendor to confirm	
20.0	GUARANTEE		
20.1	Performance Guarantee to be given for 12 months from the date of commissioning or 18 months from the date of dispatch whichever is earlier.	Vendor to confirm	
21.0	GENERAL POINTS		
21.1	Machine Model Number and other related details.	Vendor to provide	
21.2	Total connected load (in kVA)	Vendor to specify	
21.3	Total weight of the machine and accessories	Vendor to specify	
21.4	General arrangement drawing of the weld head to be submitted with the offer.	Vendor to provide	

**TECHNICAL SPECIFICATIONS FOR
SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF
PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE**

PART- A

**QUALIFYING CRITERIA FOR THE DESIGN & SUPPLY OF SPECIAL PURPOSE ORBITAL
HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO
ELBOW AND PIPE TO DISH END AT SITE**

SECTION – I

The BIDDER/OEM (Original Equipment Manufacturer) is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details, asked for .

S.No.	PARTICULARS	BIDDER's RESPONSE
1	Number of Years of Experience, the BIDDER/OEM has in the field of design, manufacture and supply of 'SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE'.	
2	YEAR of LAUNCH of the MODEL quoted against this BHEL TENDER / ENQUIRY	
3	BIDDER to indicate the Country of Origin for the supply of the offered 'SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE'.	
4	Number of "SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE" supplied to Manufacturing Industries, across the globe and in INDIA - till date and the technical details on such systems, to ascertain the competency.	
5	Details on International Standards followed in Design, Manufacture and Testing of the subject model of 'SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE'. . – copies of the relevant standards (IEC/EN/ISO) are to be furnished with the TECHNICAL BID compulsorily.	
6	The Machine Manufacturing Firm/OEM should have an ISO 9001:2008 certificate issued by internationally reputed QMS auditing organization.	

PART A - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

SECTION – II

The BIDDER / OEM has to compulsorily meet the following requirements to get qualified for submitting an offer for the “SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE’.

S.No.	PARTICULARS	BIDDER's RESPONSE
7	The BIDDER / OEM shall have a minimum of FIVE Years of Continuous Experience in the Design, Manufacturing and Supplying of 'SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE'.	
8	Number of "SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE". supplied, till date in the QUOTED MODEL / NEAR TO QUOTED MODEL, to Premium Class Industries shall be NOT LESS THAN two in the last FIVE years. To furnish the list of those customers with contact details for reference.	
S.No.	PARTICULARS	BIDDER's RESPONSE
9	BIDDER / OEM has to provide Performance Certificate with full contact details of CONTACT PERSON, who are the End Users of the QUOTED MODEL of "SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE" – (in the suggestive format as given in the ANNEXURE-A on Page No.3).	
10	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centres, for providing technical assistance / spares supply.	
11	BHEL reserves the right to verify the information / data provided by the BIDDER / OEM. In case the information provided by BIDDER / OEM is found to be false / incorrect, the offer shall be summarily rejected.	

PART A - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

SECTION – III

The BIDDER / OEM has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

S.No.	PARTICULARS	VENDOR's COMPLIANCE
12	The BIDDER / OEM shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial Terms and Price Bid.	
13	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the BIDDER / OEM, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical offer may lead to disqualification of the Technical Offer	
14	The BIDDER / OEM shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works. This will be an undertaking by the OEM at the time of release of Purchase Order on the successful bidder.	
15	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODEL of "SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE'.	
16	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation for the scope of supply – with UNIT RATE.	
17	The expected delivery period (including the time for Pre-Dispatch Inspection clearance by BHEL) for the "SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE'. is not more than 20 weeks from the date of issue of BHEL Purchase Order.	

Enclosure : ANNEXURE – A (Performance Certificate)

ANNEXURE-A

PERFORMANCE CERTIFICATE

The Performance of the subject model '**SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE**' should be certified by the customer of the OEM/BIDDER on Customer's Letter Head, in the following pattern/format and submitted along with the TECHNICAL OFFER positively.

1.0 Name of the Machine Supplier (OEM) :

2.0 MODEL/MAKE, Serial No. '**SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE**'. :

3.0 Month & Year of Commissioning of the Equipment :

4.0 Details on the Application/Use of the '**SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE**'. :

5.0 Performance of the '**SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE**'. stated above : Very Good / Satisfactory Not Good

6.0 Availability of the '**SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW AND PIPE TO DISH END AT SITE**'. stated above : Good / Poor

7.0 Service After Sales support given by the OEM / Indian Representative, including spares supply : Satisfactory / Not Satisfactory

8.0 Special Remarks / Recommendations :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART – B

SPECIAL PURPOSE ORBITAL HOT WIRE TIG WELDING SYSTEM FOR WELDING OF PIPE TO PIPE AND PIPE TO ELBOW
AND PIPE TO DISH END AT SITE

S. No	Particulars and BHEL specification	Bidder's offer
1.0	Purpose & Application: 1.1. The welding equipment is intended to weld pipe to pipe, pipe to elbow and pipe to dish end at site condition. 1.2. The process used shall be hot wire orbital gas tungsten arc welding process 1.3. The vendor shall ensure the offered equipment shall be suitable at site conditions. 1.4. All necessary safety conditions, heat resistant, moisture resistant, corrosive resistance materials shall only to be used for the fabrication of the equipment.	Vendor to Specify/ Confirm
2.0	2.1. The offered equipment shall be suitable for welding of the following materials with necessary preheated temperatures 1. Carbon steel 2. Alloy steel 3. Grade 91 4. Stainless steel 5. Nickel based alloys 2.2. Pipe diameter: 76 mm to 195 mm 2.3. Pipe Thickness: 10 mm to 30 mm 2.4. Additional torch for Narrow groove up to 80 mm shall be provided 2.5. Welding position: 5G	Vendor to Specify/ Confirm
3.0	Scope of supply Orbital Hot wire GTAW equipments and accessories should consist of the following: 3.1 Orbital TIG Welding Power source 3.2 Hot wire feeder	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	3.3 Hot Wire power source 3.4 Controller unit 3.5 Remote Pendant 3.6 Orbital TIG welding head (open head) and its accessories. 3.7 Orbital TIG welding head upto 80 mm Narrow groove torch 3.8 Water Cooling unit 3.9 Inter-connecting cables and hoses. 3.10 Data logger 3.11 Purging System 3.12 Spares (Mechanical & Electrical)	
4.0	Orbital TIG welding Power Source 4.1 Inverter type constant current power source suitable for TIG welding with continuous current & pulsed current 4.2 Input power supply of 3 PH / 415 V / 50 Hz 4.3 Output current range: 400 Amps max. 4.4 Welding power source duty cycle: min 250 amps @ 100% Duty Cycle 4.5 Suitable voltage stabilizer shall be supplied along with power source; the make model shall be specified.	Vendor to Specify/ Confirm
5.0	Hot wire feeder 5.1 Wire feeder shall have the capacity of feeding wires from 0.8 to 1.0 mm. Optionally 1.2 mm shall also be quoted. 5.2 Less capacity (1kg and 5 Kg) wire feeders shall be mounted on the head to avoid and disturbances during welding. 5.3 Wire speed shall be invariably variable and it shall be digitally fed to the system. 5.4 Separate high capacity (up to 15 kg) wire feeder setup with all the accessories shall also be provided and it shall be suitable for both the torches.	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

6.0	Hot Wire Power Source 6.1 Hot wire power source – constant current 6.2 Type – Direct Current 6.3 Duty Cycle – min 140 A at 100 % duty cycle 6.4 Input power - 240V/415V 50HZ/Single phase/Three Phase	Vendor to Specify/ Confirm
7.0	Controller unit The below mentioned parameters are to be programmable with the offered equipment's. 7.1 Pre-purge time /Post purge time 7.2 Up stop time / down stop time 7.3 Wire start delay / wire stop delay 7.4 Rotation start delay / rotation stop delay 7.5 Pulsing on / Pulsing off 7.6 Oscillation On / Oscillation off 7.7 Oscillation dwell time (in/out) 7.8 Oscillation width & frequency 7.9 Synchronized wire feed with pulsing current 7.10 Segmental parameters setting/programming 7.11 Pulsing frequency 7.12 Inbuilt HF for arc start	Vendor to Specify/ Confirm
8.0	Remote Pendant Remote pendant with high visibility screen and program and trim minimum parameters of pulsed current, arc voltage, pulsed frequency, travel speed, oscillation frequency, oscillation width during welding	Vendor to Specify/ Confirm
9.0	9.1 Orbital GTA welding head (open type) & its accessories a. Orbital Hot wire welding head b. Water Cooled torch c. Welding torch of rating 250 amps @ 100% Duty Cycle d. Wire diameter: 0.8, 1.0/1.2 mm	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	e. Tungsten electrode: diameter 1.6, 2.4 and 3.2 mm f. AVC travel distance g. AVC maximum speed of the movement h. Wire feeder speed range (mm/min) i. Dimensions of welding head j. Estimated weight of the welding head k. Welding head clamping type l. Axial clearance (mm) required m. Radial clearance (mm) required n. Independent left & right Dwell time range o. Oscillation speed range p. Oscillation width range q. Suitcase type wire feeder (floor mounted type) shall be provided for open head torch r. Suitable sensors inbuilt/separate shall be provided for the torch to avoid the hit damage in the side wall of the job. s. The head shall be suitable for minimum clearance of 150 mm from onside for welding elbows 9.2 Orbital TIG welding head up to 80 mm Narrow groove torch a. Orbital Hot wire welding head b. Water Cooled torch c. Welding torch of rating 250 amps @ 100% Duty Cycle d. Wire diameter: 0.8, 1.0/1.2 mm e. Tungsten electrode: diameter 1.6, 2.4 and 3.2 mm f. AVC travel distance g. AVC maximum speed of the movement h. Wire feeder speed range (mm/min) i. Dimensions of welding head j. Estimated weight of the welding head k. Welding head clamping type l. Axial clearance (mm) required	
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PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	m. Radial clearance (min)required n. Independent left & right Dwell time range o. Oscillation speed range p. Oscillation width range q. The 80 mm orbital TIG shall be suitable for welding in 1G position also. r. The 80 mm torch shall be provided with full set of connecting cables , hoses, gas line extra separately. s. Suitable sensors inbuilt/separate shall be provided for the torch to avoid the hit damage in the side wall of the job. t. The head shall be suitable for minimum clearance of 150 mm from onside for welding elbows 9.3 Both the torches shall be heat resistant up to 200 deg Centigrade. Any coating if required shall be durable for two years.	
10.0	Water Cooling Unit The Cooling unit shall be sufficient enough to cool the welding torch during its continuous operation. 10.1 Input power supply: 220 V/single phase/AC 10.2 Cooling tank capacity: min 5.5 L 10.3 Flow rate: min 4 Litre/min 10.4 Pumping pressure or Head: min 4 bar 10.5 All the hoses connections shall be quick release type	Vendor to Specify/ Confirm
11.0	Interconnecting cable 10.1 Sufficient capacity inter connecting copper cable for the rated current shall be supplied. 10.2 40-meter length of both the connecting cables with minimum current drop shall be supplied extra with equipment apart from the original cables.	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	10.3 All the other connecting cables, gas hoses (purging, Trailing, Shielding), interconnecting cables, data logger cables, Hot wire power source cables shall be supplied in 30-meter length along with the equipment. 10.4 Suitable gas flow meters, Pressure gauges shall also be supplied along with the equipment.	
12.0	Data logger 11.1 Data logging system for recording current, voltage, Wire feed speed, gas flow (mass flow meter) and travel speed shall be provided along with machine. 11.2 Separate system and memory disks shall be provided for data logging. 11.3 The data logging system shall have the facility to provide the data in USB memory disk and the data shall also be converted into excel for saving the data. 11.4 All the set values of the welding system shall also be logged in the system.	Vendor to Specify/ Confirm
13.0	Purging System 13.1. Sufficient quantity of heat resistant Purging bags shall be supplied along with the equipment for all the diameter ranges. Unit rate shall be quoted. 13.2 Water Soluble Purging papers/sheets with self-adhesive shall be supplied. Unit rate shall be quoted. 13.3 Brochures for the purging bag and purging paper shall be provided.	Vendor to Specify/ Confirm
14.0	Spares and consumables (Mechanical & Electrical) 14.1 List of spares and consumables with itemized break-up of mechanical, hydraulic, pneumatic, electrical and electronic spares and consumables used in the machine in sufficient quantity as per recommendation of Bidder for 2 years of trouble free operation on three shifts continuous running basis shall be furnished by Bidder along with offer. The list is to include following, in addition to other recommended spares: (Unit Price for each item of spare shall be offered)	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	14.2 Mechanical, Hydraulic, Pneumatic Spares: All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses, hoses, bearings, sprockets, chains etc. 14.3 Electrical / Electronic / PLC Spares: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Spares for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc. 14.4 A set of Service Tools for dismantling and assembling of machine components such as roller sets etc. may be quoted. 14.5 Bidder to Confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	
15.0	Documentation 15.1. The following documents in English language should be supplied along with the machine: Hard Copies - 3 Sets In CD form - 1 Set 15.2. GA Drawing of the complete equipment 15.3. GA Drawing of Individual Mechanisms 15.4. GA & Sub-Assembly Drawings for sub-systems for maintenance purpose. 15.5. Operating and service manuals of Machine & its System 15.6. Programming manuals of Machine & its System 15.7. Maintenance manuals with all drawings of machine assemblies / sub-assemblies with parts list 15.8. All Electrical circuit diagrams with bill of materials 15.9. Pneumatic circuit diagrams with bill of materials 15.10. Maintenance & Interface manuals for Machine Control System 15.11. Preventive Maintenance check list for Electrical and Mechanical System 15.12. Trouble shooting chart for Main and all sub systems	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	15.13. Complete PCB Schematics indicating check points for Electronic controls. 15.14. Catalogues, O&M manuals for all bought out items used in the machine. 15.15. Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories. 15.16. Detailed specification of all rubber items /pneumatic / Lubrication fittings 15.17. Complete back up of hard disk on GHOST CD and clear written Instructions (3 copies) to take back up and reloading of a new hard disk. 15.18. Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the Bidder. 15.19. Complete list of spares for machine, along with item part no /specification / type / model and make & address of the sub-vendors. 15.20. Anything else recommended by the OEM for an effective utilization of the equipment.	
16.0	Pre Dispatch inspection 16.1. Before dispatching the system, the complete pre-inspection will be carried out by BHEL engineer and the welding trials on mock up job of similar application at vendor's place. 16.2. Minimum 2 number of continuous weld joint should be carried out at vendor's work and it shall be qualified as per ASME Sec IX. 16.3. The acceptance criteria for weld quality are as per BHEL quality standards. 16.4. All the necessary Pipe Material Preferably Stainless steel and consumable for the PDI trials shall be the scope of supplier. 16.5. The expenditure towards travel & stay of BHEL engineer will be under BHEL scope.	Vendor to Specify/ Confirm
17.0	Erection and commissioning 17.1. Installation and commissioning of the system to be done at BHEL, Trichy by the bidder. 17.2. Supplier has to take full responsibility for Supervision and Skilled Labour for the erection and for startup, testing and commissioning of machine, its controls and accessories. Supplier shall send suitable qualified Engineers and Erection crew for the Erection and Commissioning at BHEL/TRICHY.	Vendor to specify / confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

	17.3. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by Bidder in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. 17.4. Commissioning spares, required for commissioning of the machine shall be supplied free of cost, by the Bidder / OEM. 17.5. After successfully commissioning of the system prove out welding trials to be carried out to establish the process parameter for actual job. At least five pipe joint should be welded and it shall meet BHEL NDT requirements 17.6. Bidder has to provide training to BHEL engineers & technicians' in operation and maintenance of the system for three days at BHEL Trichy. 17.7. Bidder to clearly mention whether the training is offered free of cost or chargeable. If chargeable, the Bidder has to quote on man-day basis. 17.8. The Supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical/ Electronics and PLC System) during commissioning of the Machine at BHEL works 17.9. Successful proving of BHEL components by the Bidder shall be considered as part of commissioning. All tests, as mentioned (Machine Acceptance) shall form part of the commissioning activity	
18.0	Guarantee Performance Guarantee to be given for 12 months from the date of commissioning OR 18 months from the date of dispatch whichever is earlier, for the total machine or any sub-systems, components forming part of the machine for rendering the prescribed performance / rating values.	Vendor to Specify/ Confirm
19.0	19.0 General points 19.1 Machine Model No. 19.2 Total connected load (KVA): 19.3 Total air volume in cu.m/min 19.4 Floor area required (Length, Width, Height) for complete machine & accessories 19.5 Total weight of the machine (approx)	Vendor to Specify/ Confirm

PART B - SPECIFICATION FOR ORBITAL HOT WIRE PIPE WELDING SYSTEM

19.6 The general arrangement drawing showing the machine & associated systems with salient dimensions shall be submitted along with the offer. The drawing should be clear and legible	
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