



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirapalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY

NOTICE INVITING TENDER

Phone: +91 431 257 74 21

Email : vkaruna@bhel.in

: hari.r@bhel.in

Web : www.bhel.com

TWO PART BID

Tender to be submitted in two Parts

Enquiry
Number:

2622000010

Enquiry
Date:

09.06.2020

Due date for submission
of quotation:

06.07.2020

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer should reach physically on or before 14.00 Hrs(IST) on the Date of tender opening. Tenders received after 14.00Hrs (IST) will not be considered for evaluation.

Item	Description	Quantity	(Indigenous Vendors) Matl. Will be Delivered to
10	Tube to Tube Sheet Welding Machine as per the technical specification & commercial conditions applicable(To be downloaded from web site www.bhel.com or http://tenders.gov.in)	3.00 Nos.	FOR, BHEL,Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014

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 Chennai Seaport / Airport
- 3) Delivery required 5 Months (including PDI) from the date of purchase order.
- 4) Erection & Commissioning period required 1 Week 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. ATP TRY/IMP/02 & ATP TRY/IND/02A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
- 7) BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender.
- 8) 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 / GENL / 001 - EMD) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site www.bhel.com/tender/tender_home.php or from the Government tender website <https://eprocure.gov.in/epublish/app>) under Enquiry reference .

Tenders should be submitted before 14.00Hrs (IST) 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**

V. Karunakaran 9/6/2020.
DGM / Capital Equipment / MM

V. KARUNAKARAN
Dy. General Manager
Capital Equipment / MM
BHEL / Tiruchirappalli - 620 014

TUBE TO TUBE SHEET TIG WELDING MACHINE, Qty. – 3 nos.

PART A

SECTION – 1: Qualifying Criteria

The Bidder has to compulsorily meet the following requirements to get qualified, for evaluation of the technical offer.

S. NO.	PARTICULARS	BIDDER's RESPONSE
1.1	Only those Bidders / OEMs are eligible to quote, who have supplied and commissioned at least 1 no. of TUBE TO TUBE-SHEET WELDING MACHINE with the weld head model quoted in this tender in the last 5 years (as on the first date of tender opening) EITHER in India OR in at least one country other than the country of origin The name and contact addresses of the customers to whom the above said machines were supplied to be furnished with details.	
1.2	Bidder has to submit at least ONE Performance Certificate from their customer, for satisfactory performance of the equipment specified in 1.1 and meeting the following conditions: a) The Equipment must have been supplied within the last 5 years (as on the first date of tender opening) EITHER in India OR in at least one country other than the country of origin b) The Equipment must have performed satisfactorily for at least one year during this period. For obtaining the Performance certificate, a suggestive format is provided in Annexure .	
1.3	BHEL reserves the right to verify the information provided by the Bidder. In case the information provided is found to be false/ incorrect, the offer is liable for rejection.	

Section 2: Information to be provided by the bidder:-

S. NO.	PARTICULARS	BIDDER's RESPONSE
2.1	The BIDDER to furnish Reference List of Customers with Complete contact details where similar machine is supplied.	
2.2	Details of similar Equipment supplied to BHEL units, if any. (Year of commissioning, Application, Type)	
2.3	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in India.	
2.4	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

Section 3: The BIDDER to note:

S. NO.	PARTICULARS	BIDDER's RESPONSE
3.1	The BIDDER / VENDOR shall submit the offer in TWO PARTS. 1. Technical Offer [with PART A & PART B] & commercial offer 2. Price Bid.	
3.2	The Bidder's offer against each clause in PART A & B of the offer should be filled by the BIDDER compulsorily with complete details.	
3.3	The BIDDER shall assure a continuous support for Spares and Service for Ten Years, from the date of commissioning of the equipment at BHEL Works.	
3.4	The Technical Offer shall be supported by Product Catalogue and Data Sheets in original and complete technical details / literature on the quoted model of equipment.	
3.5	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.	

Suggestive Format of Performance Certificate:

The performance certificate to be produced on Customer's Letter Head.

PERFORMANCE CERTIFICATE

1. Supplier of the Equipment/Machine :
Alongwith description/name of the equipment
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application for which Machine is used :
5. Power Source Rating :
6. Performance of the Machine : Satisfactory / Not Satisfactory
(Strike off whichever is not applicable)
7. Service after Sales : Satisfactory / Not Satisfactory
(Strike off whichever is not applicable)
8. Any other Remarks :

Date :

Signature & Seal of the Authority
Issuing the Performance Certificate

TUBE TO TUBE SHEET TIG WELDING MACHINE, Qty. – 3 nos.**PART B - Technical Specification**

S No	BHEL SPECIFICATION		BIDDER’S OFFER with technical details																					
1.0.0	PURPOSE & APPLICATION																							
1.1.0	The proposed welding machine shall be suitable for welding tube to tube sheet joints in Heat Exchanger/Steam Generator as shown in Annexure-1. The tube to tube sheet welding shall be done by pulsed TIG welding process with filler wire, by the use of a semi-automatic welding gun.	BIDDER is expected to give technical write up on welding machine design, construction and operational features to bring out the capability of the proposed equipment, to meet BHEL specification requirements																						
1.2.0	<table><tr><td colspan="2">JOB DETAILS</td></tr><tr><td>Tube Material</td><td>Incoloy</td></tr><tr><td>Tube OD x ‘t’ (mm)</td><td>19 x 1.1 mm</td></tr><tr><td>Tolerance on ‘t’</td><td>± 10%</td></tr><tr><td>Tube sheet material</td><td>Inconel</td></tr><tr><td>Tube sheet diameter</td><td>2570 mm with 4978 holes</td></tr><tr><td>Tube sheet Hole Diameter (mm)</td><td>19.22 -0 / +0.13 mm</td></tr><tr><td>Tube sheet Hole Pitch</td><td>Pattern : Triangular Refer Annexure 1</td></tr><tr><td colspan="2">WELD JOINT DETAILS :</td></tr><tr><td>Style of Edge Preparation</td><td>As given in ANNEXURE 1</td></tr></table>		JOB DETAILS		Tube Material	Incoloy	Tube OD x ‘t’ (mm)	19 x 1.1 mm	Tolerance on ‘t’	± 10%	Tube sheet material	Inconel	Tube sheet diameter	2570 mm with 4978 holes	Tube sheet Hole Diameter (mm)	19.22 -0 / +0.13 mm	Tube sheet Hole Pitch	Pattern : Triangular Refer Annexure 1	WELD JOINT DETAILS :		Style of Edge Preparation	As given in ANNEXURE 1	Bidder to note	
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S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
	Tube End Condition	Edge prepared by special tool having form profile .		
	Production Process	Fusion pass if required and then Automatic single/ multi pass orbital welding. Welding head is to be suitable for either Vertical or Horizontal position during welding.		
	Weldment Testing	Radiography / LPI, Helium leak & Hydro tests.		
	Weld Quality Appraisal	As per ASME Section I, V, VIII Division 1 & 2 for Radiography Test and 100 % RT. ASME Sec III NB		
2.0.0	SCOPE OF SUPPLY: Design, Manufacture, Supply, Installation and Commissioning of the following mentioned items as per the Specification and details provided in subsequent clauses: (a) Welding power source as per S No. 3.0.0 of technical spec (b) Control unit, data recording unit & water cooling system (c) Tube to Tube Sheet Welding Head as per S No. 4.0.0. (d) Portable Trolley with castor wheels to accommodate Power Source, water cooling unit and Argon Cylinders. (e) Suitable Spring Balancer to mount the Welding head in the required position (f) Spares and Consumables required (g) Operating and Service Tool Kit (h) Interconnecting Cables and Hoses (i) Documentation, manuals etc. Bidder to confirm		Bidder to confirm	
3.0.0	POWER SOURCE SPECIFICATIONS			
3.1.0	Type	Microprocessor controlled programmable (IGBT based Inverter) with pulsed GTAW Welding Power source - DC straight polarity.	Bidder to specify	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
3.2.0	Make and model	Any reputed make acceptable to BHEL.	Bidder to specify the quoted make and model	
3.3.0	Operating Current range	3 to 300 Amps with step less variation (300 Amps at 40% duty cycle or better)	Bidder to confirm and provide details	
3.4.0	Output Current Rating	Minimum 200 Amps at 100 % duty cycle	Bidder to confirm and provide details	
3.5.0	Welding Voltage Range	10 to 30 V DC.	Bidder to confirm	
3.6.0	Open Circuit Voltage	70 – 100 Volts	Bidder to specify	
3.7.0	Current Accuracy	± 1% of setting.	Bidder to confirm	
3.8.0	Switching Frequency of the IGBT		Bidder to specify	
3.9.0	TIG Arc Ignition	By means of an in-built high frequency unit.	Bidder to confirm	
3.10.0	Memory	90 to 100 Welding Programs.	Bidder to specify	
3.11.0	Current Pulse Frequency	0.5 to 50 pulses / sec.	Bidder to specify	
3.12.0	Pulse Current Time	0.01 to 2 sec.	Bidder to confirm	
3.13.0	Background Current Time	0.01 to 2 sec.	Bidder to confirm	
3.14.0	Current Up-slope / Down-slope Time required during welding	0 to 3 secs.	Bidder to confirm	
3.15.0	Time setting for each current level required during welding	0 to 3 secs.	Bidder to confirm	
3.16.0	Gas Pre-flow / Gas Post-flow Time& Feature	0 to 99 sec. Gas pre-flow, post-flow in the chamber shall be controlled by programmable mass flow meter with flow safety valve, option for second gas etc.	Bidder to confirm and provide details	
3.17.0	Rotation Start / Stop Delay required during welding	0 to 45 secs.	Bidder to confirm	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
3.18.0	Wire Feed Start / Stop Delay required during welding	0 to 45 secs.	Bidder to confirm	
3.19.0	Precision of movements	+/- 10%.	Bidder to specify	
3.20.0	Filler Wire Feed rate	Around 450 mm/min.	Bidder to specify	
3.21.0	Filler Wire Feed rate variation	± 1 % of setting.	Bidder to confirm	
3.22.0	Programming increments for welding current & time parameters	Current 0.1 amps, Time: 0.1 sec.	Bidder to confirm	
3.23.0	Arc Sensing	Means & modes for arc initiation and sensing.	Bidder to specify	
3.24.0	Arc Voltage Control function	AVC control with ± 1 % variation from setting.	Bidder to confirm and provide details	
3.25.0	Insulation class	F class or better	Bidder to confirm and provide details	
3.26.0	Ingress Protection class	Shall be IP 24/23/23S or better.	Bidder to confirm and provide details	
3.27.0	Auto-Tripping of power source	Tripping facility by means of an automatic circuit breaker, in case of electrical short circuit, overloading, over-heating, single phase protection.	Bidder to specify	
3.28.0	Display Unit	A digital display unit to display the following welding parameters (viz., welding voltage, current, speed, pulsing time, wire feed rate, modified parameters, torch position in deg welding cycle time remaining, etc.). Display shall be colour and size shall be min. 10 inch with graphically assisted welding software.	Bidder to specify	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
		The Digital display unit shall have Brightness & Contrast control.		
3.29.0	Gas Flow Setting	Gas flow meter with gas solenoid operating push button switch for presetting gas flow rate, provided on the Front Panel.	Bidder to confirm	
3.30.0	Gas hose length with end fittings – Gas cylinder to power source		Bidder to specify	
3.31.0	Water Cooling Unit for Torch	Built-in closed loop type cooling unit of suitable capacity for the weld head and torch for continuous operation.	Bidder to confirm and provide details. Coolant details and tank capacity to be specified.	
3.32.0	Inbuilt printer		Bidder to specify	
4.0.0	TUBE TO TUBE SHEET WELDING HEAD			
4.1.0	Type	Tube to Tube sheet Orbital Welding Head, water cooled torch/head with integrated and rotating type wire feeder.	Bidder to confirm	
4.2.0	Make & Model	Any reputed make acceptable to BHEL.	Bidder to specify the quoted make and model	
4.3.0	Current Rating	190-200 Amps at 100 % duty cycle	Bidder to confirm and provide details	
4.4.0	Application -Joint Design	The Welding Head design shall be suitable for orbital TIG welding of tube to tube sheet joints in high duty cycle with or without filler wire with Extended, Flush and Recessed tube ends.	Bidder to confirm	
4.5.0	Welding head features	(a) Constant welding speed and torch prepositioning mechanism in relation to the weld cycle	Bidder to specify	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
		(b) Robust welding head avoiding vibrations during operation under critical application (c) Possibility to use pulsed current with synchronized pulsed rotation (d) AVC height sensing or programmed electrode.		
4.6.0	Weld Orientation	All (Vertical & Horizontal Gravity Positions)	Bidder to confirm	
4.7.0	Electrode Angle adjustment		Bidder to specify	
4.8.0	Torch rotation	Constant / pulsed / variable.	Bidder to specify	
4.9.0	Torch Rotation speed	0.1 to 6.0 RPM approx.	Bidder to specify	
4.10.0	Torch Rotation Speed variation		Bidder to specify	
4.11.0	Rotation of AVC during welding before stop	375 deg position	Bidder to confirm	
4.12.0	Rotation of Wire feed during welding before stop	365 deg position	Bidder to confirm	
4.13.0	Arc gap	The arc gap should be adjustable to 2+/- 0.2mm.	Bidder to confirm	
4.14.0	Torch to Work-piece Distance	Provision for adjusting distance between torch and work-piece during welding.	Bidder to confirm	
4.15.0	Wire Spool Size	Ø 100mm, 0.5 Kg.	Bidder to confirm	
4.16.0	Wire Size	0.6 mm & 0.8 mm Inconel.	Bidder to confirm & give details.	
4.17.0	Tungsten Electrode	Tungsten Electrode 1.6/ 2.0/2.4 mm dia.	Bidder to confirm & give details.	
4.18.0	Torch/Wire Nozzle Adjustment	3 - Axis Adjustment.	Bidder to confirm	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
4.19.0	Wire Spool & Feeder Location	Rotating Wire Spool & Wire Feeder shall be integral with the welding head.	Bidder to confirm	
4.20.0	Cable Length & Type	Length of all the cables, hoses etc. from power source to weld head shall be min. 9m	Bidder to confirm and provide details	
4.21.0	Locator/Collet Assembly/centering mandrel	To position the Tube-to-Tube sheet Welding Head, concentric to the tube to tube-sheet joint to be welded in Vertical/Horizontal position	Bidder to provide details	
4.21.1	Application	To form part of the supply and shall be suitable for Tube OD x 't' and tolerance as specified in S No 1.2 & weld protrusion as indicated in Annexure drawings.	Bidder to confirm	
4.22.0	Mounting and clamping arrangement	Suitable Spring Balancer to mount the Welding head in the required position.	Bidder to provide details	
5.0	Both the offered tube to tube sheet welding head and the welding power source shall be of the same make.		Bidder to note and confirm.	
6.0.0	WELD PROGRAMMING UNIT			
6.1.0	Type	A microprocessor based weld program control unit with digital display unit, key-board, etc., and provided with the option of remote function control through a Remote Operator's Pendant. Display shall be colour and size shall be min. 10 inch.	Bidder to confirm and provide details	
6.2.0	Programming Level	A multi-level programming capability.	Bidder to specify	
6.3.0	Weld Report Generation	The recorder shall be able to store weld programs, the carried out welding cycles. The Weld Programming Unit shall also have a recorder, to print the welding program and online real time welding parameters.	Bidder to confirm and provide the details.	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
6.4.0	Program Processing & Integration	Facility for integrating an external PC (Computer) to the Weld Programming Unit, through an Off-Line Programming software to facilitate editing and storing of weld programs OR Programming loader /Laptop/tablet for storing, backup, modification of parameters etc.	Bidder to confirm	
6.5.0	Auto-diagnostic System/remote diagnostics		Bidder to provide details	
6.6.0	Weld programming	Parameters like pre-gas / post-flow, start / end current, up and down slope, etc. have to be set individually for each program.	Bidder to provide details	
6.7.0	Sectoral Programming	Possibility for setting welding current, voltage, rotation speed, wire speed, pulsing time, etc. for each sector. (one weld cycle has to be split into a minimum of 6 sectors).	Bidder to confirm	
6.8.0	Dry Run	Before welding, a test run has to be performed by using the simulation operation mode.	Bidder to confirm	
6.9.0	Safety Lock	Key lockable switch-Programming /operation /lock.	Bidder to confirm	
6.10.0	Data transfer	USB port for Data Transfer & 2 Nos. of 4 GB pen drive to be supplied.	Bidder to confirm	
7.0.0	REMOTE CONTROL UNIT			
7.1.0	Type	Compact, lightweight & hand-held remote function unit connected to the power source / programming unit with around 15 m long control cable with protective sheathing & quick-fix end connectors.	Bidder to confirm	

S No	BHEL SPECIFICATION			BIDDER'S OFFER with technical details
7.2.0	Display Unit	LCD screen for viewing the welding parameters, machine operational condition, etc.	Bidder to confirm	
7.3.0	Process / Selection Control	(a) Push-buttons to select/control (b) welding program (c) weld cycle start and weld cycle stop (d) emergency stop (e) manual movement control for torch position (f) manual control for wire feeder (g) manual control of start of down slope (h) gas and water flow control (i) real time modification of welding parameters (j) The Digital display unit shall have Brightness & Contrast control.	Bidder to confirm and provide details	
7.4.0	Operating Voltage	The remote control unit shall function on a low voltage (around 24 V).	Bidder to specify	
8.0.0	ELECTRICAL & ELECTRONICS SYSTEM			
8.1.0	415V $\pm$ 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, as per layout recommended by Bidder.		Bidder to note	
8.2.0	Tropicalization: All electrical / electronic equipment shall be tropicalized.		Bidder to confirm	
8.3.0	All electrical & electronic control cabinets & panels should be dust and vermin proof.		Bidder to confirm	
8.4.0	Control circuit voltage shall be 24 V.		Bidder to confirm	
8.5.0	All Electric enclosures shall have suitable IP protection.		Bidder to confirm and provide details	

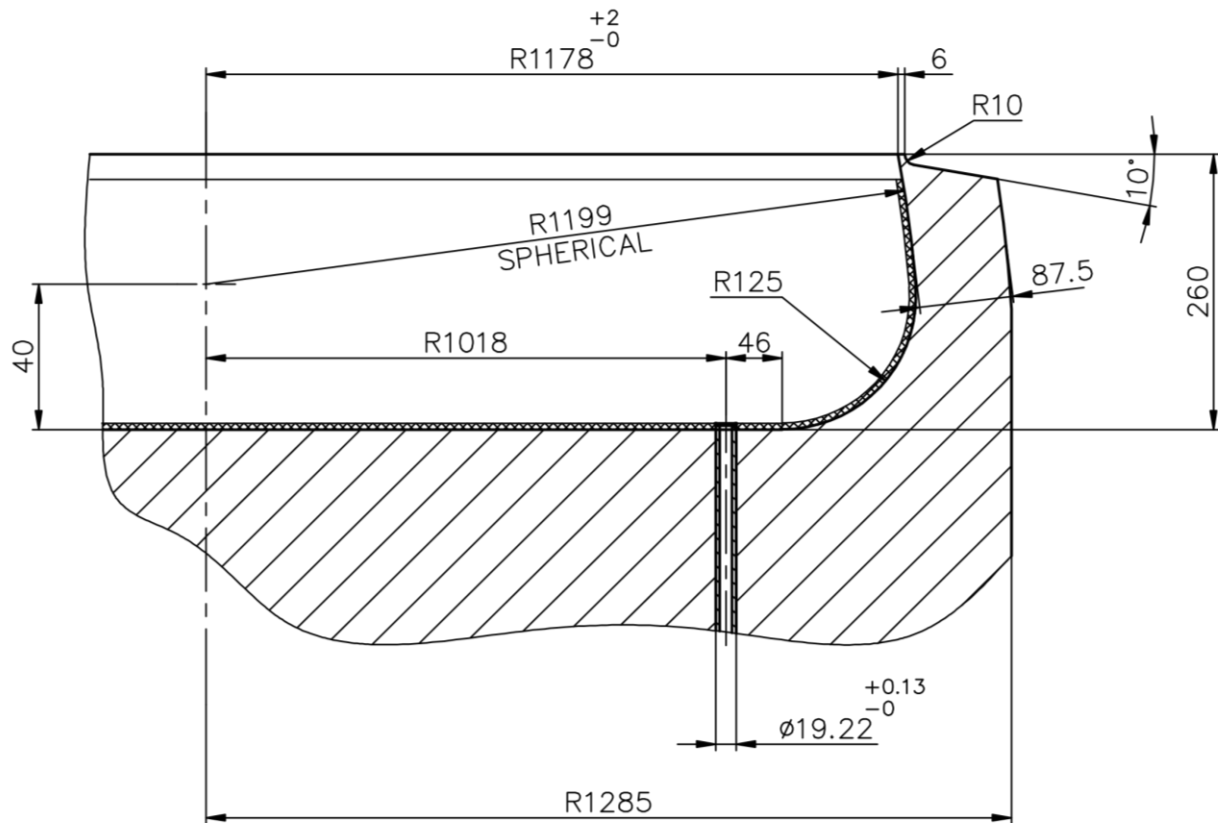
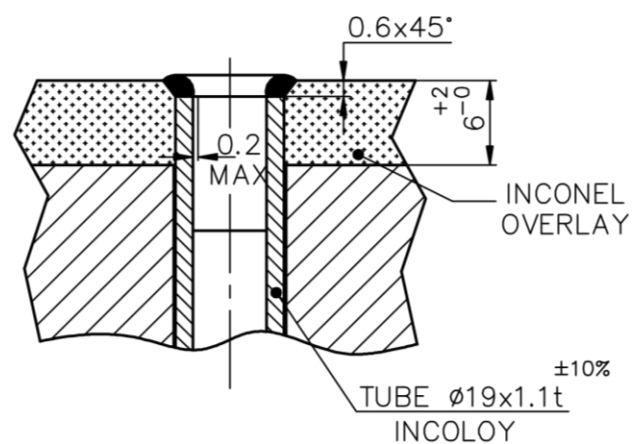
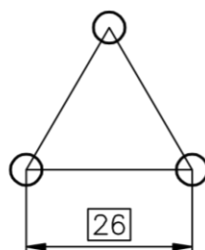
S No	BHEL SPECIFICATION		BIDDER'S OFFER with technical details
8.6.0	Bidder should ensure the proper earthing for the machine and its peripherals.	Bidder to confirm	
8.7.0	Fault diagnostics and remedies.	Bidder to confirm	
9.0.0	IN-BUILT SAFETY ARRANGEMENTS: Following safety features in addition to other standard safety features should be provided on the machine:	Bidder to note	
9.1.0	A detailed list of all alarms / indications provided on machine should be submitted by the Bidder.	Bidder to confirm	
9.2.0	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.	Bidder to confirm	
9.3.0	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	. Bidder to confirm	
9.4.0	Emergency Switches at suitable locations as per International Norms should be provided.	Bidder to confirm	
10.0.0	TOOLS FOR INSTALLATION, OPERATION & MAINTENANCE		
10.1.0	The Bidder shall bring special tools and equipment required for installation of the machine. Necessary tools like Spanners, Keys etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer.	Bidder to confirm	
11.0.0	AMBIENT CONDITIONS & THERMAL STABILITY:		
11.1.0	The Welding Machine with all sub-systems shall be suitable for operation in an ambient temperature of 30 to 45°C and with a Relative Humidity of 85% (both higher values do not occur simultaneously).	Bidder to confirm	
11.2.0	Weather conditions are tropical, Atmosphere may be dust laden. Machine shall be kept in the normal shop floor condition. The ENTIRE EQUIPMENT shall be TROPICALISED in Design and CONSTRUCTION.	Bidder to confirm and provide details	
12.0.0	MACHINE SPARES		

S No	BHEL SPECIFICATION	BIDDER'S OFFER with technical details
12.1.0	Itemized break-up of mechanical, electrical and electronic spares used in the machine in sufficient quantity as per recommendation of Bidder for 2 years of trouble free operation shall be offered by bidder. The list is to include following, in addition to other recommended spares: (Unit Price for each item of spare shall be offered)	Bidder to specify
12.2.0	In addition to the above the following to be quoted in the offer:- Tube ID locator, Inter connection hoses, Ceramic cup, Glass lenz, nozzle, wire liner, wire feed rollers, Remote control unit with interconnecting cables and end connector, Wire feeder assembly, Setting screws for wire feed and tungsten setting, Hard disk with backup (incase the machine is a PC based system).	Bidder to specify
13.0.0	GENERAL POINTS (Bidder to provide the following details) :	
13.1.0	Total Connected Load (in kVA)	Bidder to specify
13.2.0	Floor area required (Length, Width, Height) for complete machine & accessories	Bidder to specify
13.3.0	Total Weight of the Machine & Accessories	Bidder to specify
14.0.0	MACHINE DOCUMENTATION:	
14.1.0	O & M Manuals: (a) THREE Copies of the Operation & Maintenance Manual to be given in Hard Copies with ONE copy in CD / pen drive. (b) One Hard Copy of O & M Manual as per clause 14.2.0 shall be submitted at the time of INSPECTION of the Orbital Welding Machine by BHEL Officials, at the Supplier's Works. to check the sufficiency of documents provided. If any additional details are required, it should be submitted.	Bidder to confirm

S No	BHEL SPECIFICATION	BIDDER'S OFFER with technical details
14.2.0	Documents and Technical Details: (a) Write-up on the Operation and maintenance of the machine. (b) Complete specification of the machine. (c) Preventive maintenance Check list. (d) GA Drawing of the tube to tube sheet welding machine. (e) GA Drawing of Individual Sub-Systems and Mechanisms with major dimensions and weights. (f) Sub-Assembly Drawings with cross sectional details and major/critical dimensions for all sub systems maintenance purpose. (g) Component drawings with complete dimension & material specification for all wearing components. List of wearing components to be submitted during drawing approval. (h) Electrical Wiring Drawings – Power & Control Circuits with BOM (i) Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls in CD. (j) Alarm Log, Error Code, Error Messages & Remedies to be provided. (k) Specifications/Ratings and catalogues of All Bought-Out Items. (l) Warranty / Guarantee Card for all Bought-Out Items. (m) Machine related PC Details – Machine Operating Softwares, Parameters Selection Software, File Handling, and Display Recording. CD Read and Write unit, Serial and USB Ports to be ensured. (n) Total weight of the Machine & Sub-Systems.	Bidder to confirm
15.0.0	TRAINING:	
15.1.0	The supplier shall provide training to BHEL's Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and PLC System) of the Machine at Bidder's works.	Bidder to confirm
15.2.0	All expenses viz. travelling, boarding & lodging etc for the BHEL officials shall be borne by BHEL.	Bidder to note

S No	BHEL SPECIFICATION	BIDDER'S OFFER with technical details
15.3.0	The supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Maintenance after the commissioning of the Machine at BHEL works for not less than 3 working days	Bidder to confirm
15.4.0	Competent, English speaking experts shall be arranged by the supplier during training for satisfactory & effective training of BHEL personnel	Bidder to confirm
16.0.0	MACHINE INSTALLATION & COMMISSIONING	
16.1.0	The supplier to take full responsibility for supervision of the installation, start up, test the machine, its control & all types of other supplied equipment, carrying out welding of test pieces etc. Service requirement like power, air & water and required quantity of shielding gas also will be provided by BHEL at only one point to be indicated by supplier in their layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL.	Bidder to confirm
16.2.0	Successful proving of the equipment on the test block as per BHEL requirements by the supplier shall be considered as part of commissioning. Prove out shall be carried out as specified in Clause 1.2.1 ASME section III NB minimum requirements of:- a) Visual inspection (Weld joints shall be free from visual defects like scaling, excessive distortion, cracks, pores, carter's, lack of fusion, excessive projection into bores, irregular and eccentric welds) b) LPI c) Plug Gauge check d) Destructive test – 5 Nos of welds in a test block shall be cut in two mutually perpendicular plane parallel to tube axis covering weld start and stop position of weld for Mean Leak Path values (refer annexure 2) e) 3 Nos of weld shall be subjected to pull out test for strength of 15 KN f) 3 Nos of weld shall be subjected to push out test for strength of 15 KN	Bidder to confirm

S No	BHEL SPECIFICATION	BIDDER'S OFFER with technical details
16.3.0	Tools, instruments and other necessary equipment required to carry out all above activities should be brought by the Bidder.	Bidder to confirm
16.4.0	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the bidder on returnable basis.	Bidder to confirm
16.5.0	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 bidder. For this purpose, the Bidder shall supply sufficient quantity of touch-up paint of various colours of paint used.	Bidder to confirm
17.0.0	PRE-DESPATCH INSPECTION: The equipment shall be offered for Pre-despatch Inspection by BHEL at supplier's works. The supplier shall carry out prove-out welding trials with the equipment as specified in Clause 1.2.1 ASME section III NB minimum requirements of a) Visual inspection (Weld joints shall be free from visual defects like scaling, excessive distortion, cracks, pores, carters, lack of fusion, excessive projection into bores, irregular and eccentric welds) b) LPI c) Plug Gauge check If required 2 nos of test block (Size 140 x 80mm) comprising of 9 Tubes each (Tube size 19 x 1.1 mm) Inconel material, Ready to weld condition may be sent to supplier works by BHEL.	Bidder to confirm Bidder to specify the number of days required for PDI. PDI charges if any shall be quoted by the bidder separately in their offer.
18.0.0	MACHINE PACKING: 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 despatched in containers, all small loose items shall be suitably packed in boxes.	Bidder to confirm
19.0.0	GUARANTEE: Performance Guarantee for a minimum period of 12 months (for the machine in total and sub-systems or bought-out items in particular) from the date of commissioning of the machine at BHEL works or 18 months from dispatch whichever is earlier.	Bidder to confirm

TUBE SHEETWELD DETAILPITCH PATTERN

a = width of the weld

b = Minimum leak path (MLP) = ~ 1.17mm

C = projection of weld inside the tube

