

	BHARAT HEAVY ELECTRICAL LIMITED		Enquiry No. :		
	UNIT'S ADDRESS		Due Date :		
	UNIT'S PHONE NOS.		Supplier Qtn. No.:		
	CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPTT.)		Date :		
<u>SPECIFICATION OF ORBITAL CLOSED CHAMBER TUBE TO TUBESHEET TIG WELDING MACHINE</u>					
NOTE:-					
	1. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance and lead to disqualification of the offer.				
	2. The offer and all documents enclosed with offer should be in English language only.				
	3. Vendor has to compulsorily meet pre-qualification criteria otherwise his offer would be disqualified.				
ADDRESS OF THE SUPPLIER :		ADDRESS OF THE INDIAN AGENTS :			
TELEPHONE NOS.:		TELEPHONE NOS.:			
FAX NOS.:		FAX NOS.:			
E-MAIL ADDRESS :		E-MAIL ADDRESS :			
SCOPE: SUPPLY, ERECTION & COMMISSIONING OF ORBITAL CLOSED CHAMBER TUBE TO TUBE SHEET WELDING MACHINE WITH SPECIFICATION AS GIVEN BELOW					
Sl. No.	DESCRIPTION	Specified/To be confirmed by	Offered	DEVIATIONS	REMARKS
1.0	PURPOSE : For Closed chamber TIG welding of TUBE to TUBESHEET joints for Carbon steels ,Stainless steels, Titanium alloy, other ferrous and non ferrous metals with Inert gas purging.	Vendor to confirm			
2.0	JOB DETAILS FOR WHICH THE MACHINE SHALL BE SUITABLE .Refer drg no: 4-160-10-09539 Rev.00	Vendor to note and offer.			
2.1	Tube OD x Thick- Ø15.875mm x0.7mm	Vendor to confirm			
2.2	Tube pitch - 20.64mm	Vendor to confirm			
2.3	Ligament - 4.46 mm (Hole Ø16.13 ± 0.05mm)	Vendor to confirm			
2.4	Type of tube pitch - Triangular, Square, and Rotated Square	Vendor to confirm			
2.5	Tube protruding past the tube face - 0.3mm to 0.5mm	Vendor to confirm			
2.6	Edge preparation of tube holes - 0.7 mm x45°	Vendor to confirm			
	TECHNICAL PARAMETERS				
3.0	Power source : MAKE AND MODEL OFFERED	Vendor to specify			
3.1	Type: Programmable Digital micro processor controlled with Inverter Technology based welding equipment with inbuilt HF unit, and AVC.	vendor to confirm			
3.2	Welding current range : 10 - 300A DC	Vendor to confirm			
3.3	Welding current control shall have following two options: 1) Constant 2) Pulsed	Vendor to confirm			
3.4	Torch rotation shall be Clockwise and Anticlockwise with an overlap	Vendor to confirm and specify overlap in degrees.			
3.5	Wire feeding shall have two options: 1) Constant 2) Pulsed.	Vendor to Confirm			
3.6	Arc Voltage control(AVC)	Vendor to Confirm			
3.7	Option for setting time in seconds for pre purging and post purging of shielding gas shall be available. Minimum required range is: 1 sec to 180 sec	Vendor to confirm and specify range offered.			
3.8	Duty cycle @ 100% : 200A minimum at 50 deg C	Vendor to confirm Specify the duty cycle offered			
3.9	Duty cycle @ 60% : 250A at 50 deg C	Vendor to confirm Specify the duty cycle offered			
3.10	Open circuit voltage	Vendor to specify			

3.11	No Load power	Vendor to specify			
3.12	Max. connecting load	Vendor to specify			
3.13	Machine Dimensions (L x W x H)	Vendor to specify			
3.14	Outer body of machine material.	Vendor to specify			
3.15	Weight of the machine	Vendor to specify			
3.16	Protection class (preferably IP23)	Vendor to specify			
3.17	Insulation class (Preferably F)	Vendor to specify			
3.18	Welding current control shall be on : power source & on remote	Vendor to confirm			
3.19	Power factor	Vendor to specify			
3.20	Efficiency	Vendor to specify			
3.21	Standard features	Vendor to specify			
3.22	Power source cooling: Isolated cooling system with forced air for electronics and power parts.	Vendor to specify			
3.23	Special features (Including Service channel indicator for trouble shooting)	Vendor to specify			
3.24	Digital meters are to be duly calibrated with certificate for Ammeter and volt meter. If applicable.	Vendor to confirm			
3.25	Vendor to mention power source testing standards and applicable IS / International standard numbers.	Vendor to Specify			
3.26	Power source & other accessories software licence shall have life time validity. If applicable.	Vendor to Confirm			
3.27	A copy of working data (PC software and welding programs) for the power source to be provided in soft copy in a pen drive.	Vendor to confirm			
3.28	Built in Error diagnostic system or Auto fault detection and user guidance to fix the default	Vendor to confirm			
3.29	Weld data logging, real time data acquisition and Print through integrated printer or printer connected via external port	Vendor to specify			
3.30	If integrated printer is provided, one printer cartridge and one paper roll to be supplied.	Vendor to confirm			
3.31	Possibility of copying (importing or exporting) the programs through USB port /equivalent/ other device	Vendor to specify			
3.32	All Interface cables required for connecting any external device to machine shall be supplied	Vendor to confirm			
4	ORBITAL CLOSED CHAMBER TIG WELDING HEAD	Vendor to note and offer.			
4.1	Make of Power source and Welding head shall be same.	Vendor to confirm and specify make			
4.2.a	To supply one closed chamber welding head to carry out TUBE to TUBESHEET welding without filler wire for titanium material and for job detail in clause no: 2.1 to 2.6	Vendor to confirm			
4.2.b	To supply one closed chamber welding head to carry out TUBE to TUBESHEET welding with filler wire for titanium material and for job detail in clause no: 2.1 to 2.6	Vendor to confirm			
4.3	All the accessories for offered welding head(both with filler wire and without filler wire) in four sets shall be supplied for each head. i.e Four sets of accessories for welding head without filler Four sets of accessories for welding head with filler. To carry out welding for job details mentioned against clause nos: 2.1 to 2.6	Vendor to confirm			
4.4	Expanding and centering mandrels (4nos) for the tube ID of job details mentioned against Clause no. 2.1 to 2.6 to be provided.	Vendor to confirm			
4.5	Shielding Gas :Argon	Vendor to confirm			
4.6	Tungsten Electrode angle adjustment - Manual or automated	Vendor to specify			
4.7	Tungsten electrode Dia - 1.6 to 3.2 mm	Vendor to specify offered electrode dia.			
4.8	All the cables connecting welding head to power source shall be of length 6 meters minimum	Vendor to confirm and specify the length			

4.9	2 nos of see through purge chambers for oxidation free welding of titanium,inconel, other reactive materials and Stainless steel shall be supplied	Vendor to confirm			
4.10	Two options for clamping welding heads (i.e. 1) welding head without filler wire 2) welding head with filler wire) to tube shall be available: 1) Manual(mechanical) 2) Pneumatic. Pneumatic pressure required for clamping shall be <= 4 Kg/Cm2	Vendor to confirm			
4.11	Earthing cable - 5 meters with earth clamp shall be supplied	Vendor to confirm and specify the length			
4.12	Arc Ignition: HF	Vendor to confirm			
4.13	Weld programming shall have the following parameters: 1)Pre purge gas flow/post purge gas flow time 2) start/end of weld cycle 3) current slope up, slope down 4) Auto return to home position after welding, 5) Ready to repeat new cycle 6) Rotation speed, 7) Wire feed 8) <u>Current pulsing time.</u>	Vendor to confirm			
4.14	Trolley(with industrial wheels) for holding machine with support for loading one gas cyclinder shall be supplied. Option for locking of wheels of trolley for stability shall be provided.	Vendor to confirm			
4.15	Regulator for Argon Gas suitable for Indian Industrial Argon cylinder to be supplied Qty: 1 No.	Vendor to confirm			
4.16	Storage and shipping case with wheels for complete machine to be supplied	Vendor to confirm			
4.17	Holding Device/Stand/Balancing arm suitable for holding weld heads (i.e. with filler wire / without filler) during welding, during positioning of welding head, during idle postion to avoid fatigue to welder shall be supplied. Sketch/Image/Drawing of offered holding device/Stand/Balancing arm shall be submitted along with technical offer.	vendor to confirm			
4.18	Sheilding gas hose pipe of 3 meters length with suitable connectors for connecting hose pipe to machine and to Indian industrial Argon gas cylinder shall be supplied	vendor to confirm			
4.19	Time for completing of one layer of welding for OD 15.875mm with filler and without filler	Vendor to specify both times			
4.20	Time required for clamping of welding head before start of welding	Vendor to specify			
4.21	Option for dry run before actual welding shall be available.	Vendor to confirm			
4.22	Welding Head Cooling Medium(Preferred : Water)	Vendor to specify			
4.23	Cooling output (Ltrs/Min)	Vendor to specify			
4.23.1	Coolant Pressure	Vendor to specify			
4.23.2	Tank Capacity	Vendor to specify			
4.23.3	Internal or External unit	Vendor to specify			
4.23.4	Cooling medium for welding head shall be preferably water. If any mixing agent is used with water then sufficient qty of mixing agent to carry out approxiamtely 50 TIG welding joints during commissioning shall be supplied. Shelf Life(if any) of mixing agent to specify. Mixing agent shall be readily avaiable in Indian market.	Vendor to confirm and specify			
5.0	REMOTE CONTROL				
5.1	Compact, light weight &hand held remote function unit connected to power source with min 6 meter long anti twist control cable with protective insulation, safety & quick coupling end connectors shall be supplied.	Vendor to confirm			

5.2	Full function digital display remote control unit with welding programme selection, editing & programme saving facility.	Vendor to confirm			
5.3	Buttons on remote to control the following shall be available: 1)Welding programme selection 2)Weld cycle start and weld cycle stop 3)emergency stop 4>manual command for torch rotation in any direction(clockwise/anti clock wise) 6>manual control for wire feed in both direction(In & Out) 7)Gas &water flow check 8)command for return to home position. Any additional control required for easy operation shall be provided.	Vendor to confirm			
6.0	Detailed catalogue of the machine, Welding heads, Remote and all the other devices offered to be furnished along with the offer	Vendor to confirm			
7.0	AMBIENT CONDITIONS & THERMAL STABILITY				
7.1	Total machine should work under following operating conditions. Temperature5-50 deg. Relative humidity-70% max.	Vendor to confirm			
7.2	Thermal stability of the complete equipment keeping in view specified ambient conditions and trouble free operation of the machine should be ensured by vendor.	Vendor to confirm			
8.0	ELECTRICAL				
8.1	Power supply 415 +/-10%, 50Hz +/-3%, 3 phase AC(3 wire system without neutral) power supply voltage will be provided by BHEL	Vendor to confirm			
8.2	Tropicalaization: All electrical/electronic equipment shall be tropicalized	Vendor to confirm			
8.3	Motors shall conform to IEC/Indian standards	Vendor to confirm			
9.0	SAFETY ARRANGEMENTS				
9.1	Equipment should have adequate and reliable safety valves and interlocks/devices to avoid damage to the machine, work piece and the operator due to malfunctioning or mistakes. Protective covers to be provided where necessary	Vendor to confirm			
10.0	ENVIRONMENT PERFORMANCE OF THE MACHINE				
10.1	Maximum noise level at normal load condition	Vendor to specify			
10.2	If any safety/environmental protection enclosure is required it should be built in the equipment by the vendor.	Vendor to confirm			
10.3	Paint of the machine should be oil resitant and should not peel off.	Vendor to confirm			
10.4	colour of the paint	vendor to specify			
11.0	SPARES				
11.1	All types of spares to be quoted seperately for trouble free operation for two years after gaurantee period. Please ensure to submit a list of such spares with quantity along with offer. Spare list should in format such as spares name, spare part no, unit of measurement, qty, unit rate etc. offer shall be in package or set or lot. This price will not be considered for evauluation of bid(L1 criteria-- Lowest bidder)	Vendor to note and submit along with offer.			
11.2	All types of spares for total machine and accessories should be available for atleast ten years after the supply of the machine. If the machine or control is likely to become obsolete in this period, then vendor should inform BHEL sufficiently in advance and provide drawings of parts /Details of spares and suppliers to enable BHEL to procure them in advance if required.	Vendor to confirm and specify			
11.3	Standard tool kit for machine along with Allen key set to be provided	Vendor to confirm			
12.0	DOCUMENTATION				

12.1	Five sets of following documents (Hard copies in English language only) and soft copy in English language only in USB drive should be supplied along with the equipment. Operating manuals& maintenance manuals with detailed mechanical, electrical and electronics circuit drawings to supplied with the machine	Vendor to confirm			
12.2	Complete master list of parts used in the equipment shall be submitted	Vendor to confirm			
12.3	In case PLC/HMI/ Industrial PC is used in system,then PLC program backup in softcopy as well as hard copy with comments is English shall be supplied. HMI image /Flash card image softcopy shall be supplied.For communicating PLC & HMI necessary softwares and cables to be supplied.In case of industrial PC, then ghost image are to be furnished.	Vendor to confirm			
13.0	INSPECTION, PROVE OUT & TRAINING				
13.1	Inspection at suppliers works by BHEL Employees As part of PDI vendor shall demonstrate Tube to tube sheet welding with vendor material(titanium) and demonstrate all features as per this specification. Vendor to give call to BHEL for PDI only after the machine is ready in all aspects. Vendor to give minimum 15 days advance notice to BHEL for PDI. PDI shall be considered successfully only after the following two conditions are met: 1) DP Test 2) Color of the weld joint : silver/straw.	Vendor to confirm			
13.2	Complete equipment prove out including max load capacity at 100% duty cycle shall be carried out at vendor works and also shall be proved by vendor at BHEL works after complete erection and commissioning	Vendor to confirm			
13.3	Training to be provided to BHEL personnel(Maintenance, welding engineering and Production departments) at BHEL works for 2 days after commissioning.	Vendor to confirm			
14.0	ERECTION AND COMMISSIONING				
14.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, its control and all types of other supplied equipment. Other requirements like crane and helping personnel shall be provided by BHEL. Details of any other requirements should be informed by vendor in advance. Following shall be provided by BHEL for commissioning: 1) Shielding gas Argon 2) Tube sheet material 3) Tube material 4) DM water Titanium wire spool (compatible with offered model) for welding of Titanium tube to tube sheet during prove out shall be supplied along with machine. Any other necessary consumables other than mentioned above for prove out at BHEL Hyd shall be supplied along with the machine.	Vendor to confirm and specify detailed requirements			
14.2	Successful proving of tube to tube sheet welding by the supplier shall be considered as part of commissioning. Job prove out (Machine acceptance) shall form part of the commissioning activity. The following shall be met for successful prove-out: 1) DP Check. 2) Color of weld joint shall be silver/straw	Vendor to confirm			

14.3	Demonstration of all features of the equipment in all respects, control systems and accessories as per this scope of supply.	Vendor to confirm			
15.0	PACKING				
15.1	Sea worthy and rigid packing for all items of complete machine, all accessories and other supplied items to avoid any damag/loss in transit	Vendor to confirm			
15.2	Delivery period	vendor to specify			
16.0	GUARANTEE				
16.1	24 Months from the date of acceptance of the equipment.	vendor to confirm			
16.2	Service beyond guarantee period	vendor to confirm			
17.0	QUALIFYING CONDITIONS :				
17.1	Refer annexure-X for pre-qualification critieria.	Vendor to note			
Waseem Ahmad Dy.Manager/HE&F-Tech J Sivaprasad Dy.Manager/HE&F-Engg. S Srihari Dy.Manager/HE&F-Prod. G Harikrishna Dy.Manager/HE&F-Welding Engineering V .Anil Kumar Reddy Manager/HE&F-M&S V Bharat Kumar Manager/M&S-Electronics N V S Murthy DGM/HE&F-Tech					

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)																
REV.	DATE	ALTERED	CHECKED	APPD.	REV.	DATE	ALTERED	CHECKED	APPD.	ADDITIONAL INFORMATION						
										STATUS OF DRAWING						
										DISTURBUTION OF PRINTS						
TUBE PROJECTION OUTSIDE THE TUBESHEET FACE = 0.5 mm. <u>TUBE TO TUBE SHEET JOINT DETAIL</u> <table border="1" style="border-collapse: collapse;"> <tr> <td>TUBE OD X THK (mm)</td> <td>15.875 x 0.7</td> </tr> <tr> <td>PITCH (mm) / TYPE</td> <td>20.64 / Δ</td> </tr> <tr> <td>TUBE HOLE LIGAMENT</td> <td>4.51 mm</td> </tr> </table> <u>PITCH DETAIL</u>											TUBE OD X THK (mm)	15.875 x 0.7	PITCH (mm) / TYPE	20.64 / Δ	TUBE HOLE LIGAMENT	4.51 mm
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PITCH (mm) / TYPE	20.64 / Δ															
TUBE HOLE LIGAMENT	4.51 mm															
ITEM NO.		DESCRIPTION			DRAWING NO.			MATL. CODE		UNIT Wt.						
								MATL. SPEN.		QTY.						
		BHARAT HEAVY ELECTRICALS LTD.			DRN.		SPJ		15.02.21							
HYDERABAD		CHD.		L K MANTRI		M. Mantri		15.02.21		NO. OF VAR.						
APPD.		SUBRATA		SUBRATA		15.02.21		NA		NO. OF ITEMS						
DEPT. HED		GRADE OF TOL. DIM. C/M/F		SCALE		WEIGHT (KG)		NA		NO.						
CODE 405		NTS		NTS		NA		NA		NA						
TITLE					CARD CODE		DRAWING NO.			REV.						
TUBE TO TUBESHEET JOINT					4-160-10-09539		4-160-10-09539			00						
					SHEET NO.		1		NO OF SHEETS							
					1		1		1							

Orbital Closed chamber Tube to Tube sheet TIG Welding Machine Annexure X**Pre-Qualification Criteria--PART A**

The BIDDER has to compulsorily meet the Qualifying criteria indicated in section 1 to get qualified. Otherwise the technical offer will not be considered.

SECTION: 1

S.NO	Requirement	Vendor's Response
1.1	Only those vendors who have supplied and commissioned at least one similar or better rated Titanium tube to Titanium tube sheet orbital TIG welding machine in the past 10 years and such machine should have completed at least one year satisfactory service as on the date of opening of Tender. NOTE: If any Agent is bidding on behalf of OEM shall furnish Agency Agreement / Authorization Letter from OEM (signed and stamped) . In case of Distributors, Distributor Agreement shall be furnished. Also agent, distributor has to mention the (date up to which the validity is in effect) validity of the agency agreement/authorization letter. Documentary evidence shall be furnished for the same.	
1.2	Name and postal address of the customer or company where similar machine is installed.	
1.3	Name and designation of the contact person of the customer.	
1.4	Phone, and email address of the contact person of the customer.	
1.5	Month and Year of commissioning of the machine.	
1.6	Performance certificate on letter head/by e-mail from the customer regarding satisfactory performance of machine supplied to them.	
1.7	BHEL reserves the right to accept or reject the offer based on the assessment of their technical capability. BHEL reserves the right to verify the information provided by the Vendor for the referred machine at their referred customer's works. It shall be the responsibility of the vendor to facilitate the visit of BHEL's team at their referred customer works. The Travel, Board & Lodging expenses for BHEL Personnel shall be borne by BHEL. In case the information provided by vendor is found to be false / incorrect, the offer shall be rejected.	

Other terms and conditions: -

1. EARNEST MONEY DEPOSIT(EMD): 1,50,000/- should submitted by supplier in favour of BHEL R C Puram Hyderabad .DD may be sent to the below address.

Sreenu K
Sr. officer/CMM
Administrative building
BHEL R.C Puram,
Hyderabad-32, Telangana

2. DELIVERY SCHEDULE FOR INSTALLATION FROM THE DATE OF READINESS OF SITE (WHICH IS TO BE INTIMATED BY BHEL) : 2 -Weeks

3. DELIVERY SCHEDULE FOR SUPPLY FROM THE DATE OF PURCHASE ORDER-

NOT EARLIER THAN : **NOT APPLICABLE**

NOT LATER THAN : 12 Weeks

GRACE DELIVERY PERIOD WITH LOADING FACTOR : **2 Weeks**

MAXIMUM ACCEPTABLE DELIVERY PERIOD: 14 Weeks

4. **CONTRACT EXECUTION BANK GUARANTEE(CEBG):** The successful vendor shall have to furnish a CONTRACT EXECUTION BANK GUARANTEE(CEBG) for 10% (TEN percent) of the Total PO value in the prescribed format within 30 days from the date of PO but before LC opening. CEBG shall be from the one of the consortium banks of BHEL or from a reputed bank and confirmed by any consortium banks of BHEL. All bank charges on account of issuance and confirmation of CEBG whether incurred in India or outside India will have to be borne by the vendor. CEBG shall be kept valid until 30 days after the date of Installation certificate, which will be issued on completion of Installation of equipment which includes Erection, Commissioning, Job proving, Performance tests, Training to operators etc. as prescribed in Pounder all circumstances, CEBG shall be kept valid, till the PBG becomes operational. If the supplier fails to submit the CEBG even within 60 days from the date of PO, BHEL reserves the right to cancel the PO and forfeit EMD given by the supplier. In addition, in such case, action will be initiated in line with extant guidelines for Suspension of Business Dealings with suppliers.

5. **Performance Bank Guarantee (PBG):** The Supplier shall submit a PBG for 10% of the contract value valid for 30 days beyond Warranty / Guarantee period.