

Electron Beam Welding

Compliance Checklist

Points to note:

- 1. Bidder has to completely fill the compliance checklist legibly with details and submit along with Technical offer. Bidder shall sign and seal each page of this Compliance checklist.**
- 2. Bidder has to provide quantitative values wherever it is asked for quantitative values.**
- 3. The details provided in technical offer and compliance checklist herewith by the bidder will be evaluated. VSSC reserves right to verify the same at PDI stage or installation & commissioning stage.**

Sl.No.	DESCRIPTION	Details to be filled /Submitted by bidder
I	Scope	
	Supply, Installation, Commissioning, Training and Performance Demonstration of Electron Beam Welding (EBW) machine and AMC for 3 years as per following technical specifications and terms and conditions.	Yes/No (Specify Make, Model etc.)
II	General description	
	<p>Electron Beam Welding machine with ultimate power 30 kW (or better) for aerospace quality welding with or without filler wire in vacuum. The EBW machine shall be Computer Numerical Controlled (CNC). The system should be capable of welding components within the envelop of 1500mm (in X direction) x 700mm (in Y direction) x 1200mm (in Z direction) or more. The EB gun system shall be movable in X, Y and Z direction inside the vacuum chamber so that gun could travel both in horizontal, transverse and vertical conditions inside the chamber. Also the gun system shall be tiltable from 0-90° to operate both in horizontal and vertical conditions. The work table shall have a minimum size of 2100mm x 1000mm. The machine shall be provided with rotary manipulator, tilt rotary manipulator and tailstock. Process monitoring system and all necessary software for processing & close loop process monitoring, real time recording and data acquisition shall be available. The machine shall be fitted with state-of-the-art CNC control system and drives with user friendly Human Machine Interface (HMI). The system should be capable of welding components in the following category of material but not limited to;</p> <ol style="list-style-type: none"> i. Stainless steel & Stainless steel based alloys. ii. Titanium and Titanium based alloys. iii. Aluminium and Aluminium based alloys. iv. Nickel based super alloys. v. Copper & Copper based alloys. 	Yes/No (Provide offer ref. no.)

		TECHNICAL DESCRIPTION:		
A	Electron Gun and associated systems			
1	ELECTRON GUN	1	There shall be an internal electron gun mounted on a internal movement system (gantry/cantilever movement system)	Accepted/ Not accepted (Provide details)
		2	The EB gun (30kW/60kV) shall be complete with high voltage power supplies, separate vacuum pumping units, beam-focusing systems, beam-deflection systems and sighting via video camera.	Accepted/ Not accepted (Provide details)
		3	Cathode material:	specify
		4	The electron gun shall be able to move in the X,Y & Z direction on a suitable movement system .	Accepted/ Not accepted
		5	It shall be CNC controlled.	Accepted/ Not accepted
		6	Linear motion in X direction : 1500 mm (min)*	Specify
		7	Linear motion in Y direction : ±350 mm (min)*	Specify
		8	Linear motion in Z direction : 1000 mm (min)*	Specify
		9	Linear speed (for X,Y,Z axis movement) : Adjustable from 1 to 50mm/s (or better)	Specify
		10	Positioning accuracy (for X,Y,Z axis movement): ±0.05 mm	Specify
		11	Gun tilting: 0-90° (B axis) (This shall allow adjusting the beam position in front of the welding joint at any job angle. This tilting is for motorized positioning of gun and B axis need not be a welding axis)	Specify
		12	Positioning accuracy for gun tilting : ±0.1°	Accepted/ Not accepted
		13	Necessary closed circuit Water chiller unit shall be provided for cooling of the electron gun.	Accepted/ Not accepted
		14	Gun type : Triode (Directly /Indirectly heated)	Specify
2	High voltage (HV)	1	Accelerating voltage : 60 kV	Specify
		2	Beam power : 0-30 kW	Specify

		3	The following parameter characteristics shall be in accordance with ISO14744:	Accepted/ Not accepted
			a) Voltage stability : $\pm 1\%$	Accepted/ Not accepted
			b) Voltage repeatability: $\pm 1\%$	
			c) Voltage ripple : $\leq 2\%$ (peak to peak value)	Accepted/ Not accepted
3	Beam Current (BC)	1	Beam current : 0-500 mA (Up to 50A adjustable in steps of 0.1 mA or less Above 50A adjustable in steps of 1 mA or less)	Specify
		2	The following parameter characteristics shall be in accordance with ISO14744:	
			a) Beam current stability : $\pm 1\%$	Accepted/ Not accepted
			b) Beam current repeatability : $\pm 1\%$	Accepted/ Not accepted
			c) Beam current ripple : $\leq 5\%$ (peak to peak value)	Accepted/ Not accepted
4	Focus Current (FC)	1	Focus current : Please Specify	Specify
		2	The following parameter characteristics shall be in accordance with ISO14744:	Accepted/ Not accepted
			a) Focus current stability : $\pm 0.5\%$	Accepted/ Not accepted
			b) Focus current repeatability : $\pm 0.5\%$	Accepted/ Not accepted
			c) Focus current ripple : $\leq 1\%$ (peak to peak value)	Accepted/ Not accepted
		3	The focus range (effective distance available between gun and job. i.e. distance between bottom point of gun face/gun cover etc. and impingement point on the part to be welded): 50mm to 400mm (or higher)	Specify
5	Beam Deflection	1	A set of X & Y magnetic coils shall be provided for the deflection and oscillation of the electron beam relative to its position with required software. The specification are as follows: i) maximum X deflection angle : $\pm 6^\circ$ ii) maximum Y deflection angle : $\pm 6^\circ$ iii) Setting of X and Y signals : Independent iv) Beam oscillation frequency : 0.1 Hz to 2000Hz (min) v) Control : Manual & CNC controlled	Provide details

	Function Generator	2	<p>i) The programmable signals on X and Y (independently) channel shall generate sine, square, triangle, circular, elliptical and any trajectory generated by the NC.</p> <p>ii) Two axes sine wave outputs for deflecting the beam in circular pattern.</p> <p>iii) Two axes DC deflection for positioning the electron beam.</p> <p>iv) DC deflection shall be superimposed on the AC outputs to provide for centering the circle during welding operation.</p>	Accepted/ Not accepted
6	Sighting system	1	Each electron gun beam alignment system shall comprise of independent video devices with a color CCD/high definition digital camera and motorized/autofocus system.	Accepted/ Not accepted
		2	The device is equipped with an illumination unit and is integrated in the EB-Generator, to observe the process before, during and after the welding.	Accepted/ Not accepted
		3	The camera and lens assemblies shall be suitable to operate in vacuum environment and the components shall be designed to handle the radiant heat generated during Welding.	Accepted/ Not accepted
		4	Suitable vapour protection arrangements for optics shall be incorporated.	Accepted/ Not accepted
7	Gun Vacuum Level. Pump/gauge	1	Operating vacuum level : 5×10^{-6} mbar (nominal)	Specify
		2	Duration of pumping : 15 minutes (max)	Specify
		3	Ultimate vacuum level : 1×10^{-6} mbar (nominal)	Specify
		4	Pumping system: (Pumping system shall be capable of achieving and holding the vacuum specified against sl.no A.7.1 and evacuation time specified in Sl.No: A.7.2)	Please Specify in detail
		5	Vacuum level shall be measured by Pirani/Penning/Wide range gauge.	Accepted/ Not accepted
		6	The entire vacuum components, pumps, valves of the gun & vacuum system shall be from Leybold/Pfeiffer makes only (single manufacturer only)	Accepted/ Not accepted
		7	Isolation valve shall be provided to ensure that the vacuum level in the electron gun is maintained when the welding chamber is vented.	Accepted/ Not accepted

B	WELDING CHAMBER AND ITS SPECIFICATIONS:			
1	Chamber	1	The machine structure shall have high strength, rigidity and FEM proven design. Entire metal surface should be properly treated/ protected to prevent corrosion during the life of the machine	Accepted/ Not accepted
2	Size(interior dimensions): (mm)	1	Length : Specify*	Specify
		2	Width : Specify*	Specify
		3	Height : Specify*	Specify
3	Thickness	1	The thickness of the chamber walls shall be designed to offer structural rigidity and also for shielding X-ray radiation.	Accepted/ Not accepted
		2	The chamber shielding shall ensure radiation levels <1 µSv/h measured 100 mm from the walls.	Accepted/ Not accepted
4	Chamber door	1	The chamber access door shall be motorized and located on the front face*	Accepted/ Not accepted
		2	Door control switch shall be provide near the machine door for easy and safe handling of the door.	Accepted/ Not accepted
		3	An audio-visual alarm shall be provided during the opening/closing operation	Accepted/ Not accepted
5	Viewing ports	1	Minimum three viewing ports of Ø250 mm or more at suitable locations (location and size of the view ports shall be adequate to view the workspace from outside), Viewport shall be X-ray protected. All chamber windows shall be fitted with glass vapour/spatter shields.	Accepted/ Not accepted (Provide details)
6	Chamber Lighting	1	The welding chamber shall have an illumination system inside for 500 lux illumination level at the floor.	Accepted/ Not accepted
7	Sealing System	1	Door, access ports and pumping system shall have suitable vacuum compatible 'O' ring seals.	Accepted/ Not accepted
		2	All the interfaces in the chamber shall maintain an ultimate vacuum level of 8×10^{-5} mbar.	Accepted/ Not accepted

C	MANIPULATORS			
1	Work table	1	i) Provision shall exist for linear movement of worktable outside the chamber (along X-axis) for enabling trouble-free loading and unloading of jobs. ii) Run out platform for the linear movement of worktable outside the chamber shall be flushed to the floor level*	Accepted/ Not accepted
		2	Horizontal rotary, tilt rotary and tailstock shall be mounted on the worktable.	Accepted/ Not accepted
		3	Loading Capacity: 2000Kg or more. (This loading capacity shall be the weight of the job when rotator and tailstock are positioned on the table. Hence, vendor shall specify above loading capacity as: Loading Capacity = total loading capacity of the table minus weight of rotator and tailstock)	Provide details
2	Table Dimensions Capacity & Control	1	Table dimensions : 2100 mm or more (length in X direction) x 1000 mm or more (Width in Y direction) with suitable 'T' slots of M12 size for the clamping*	Specify
		2	Maximum length to accommodate the job between chuck and tailstock : 1500mm (minimum)*	Specify
		3	Provision to mount and fasten horizontal rotary manipulator centrally, tilt rotary manipulator & tailstock on work table shall also be provided.	Accepted/ Not accepted
3	Rotary Devise	1	Rotating axis position: Shall be suitable to position in both 0° and 90° (Vertical rotary manipulator and horizontal rotary manipulator).	Accepted/ Not accepted (Provide details)
		2	Rotating seed : Continuously adjustable from 0.1 to 20 rpm (Minimum)	Specify
		3	Positioning accuracy : 0.1°	Specify
		4	Face plate diameter : 1000 mm (min) with 'T' slots*	Specify
		5	Height of centre of horizontal rotary manipulator: 800mm above the work table*	Specify
		6	Spindle bore diameter : Ø80 H7 mm	Accepted/ Not accepted

		7	Loading capacity : 1000Kg(min) radial and 1000Kg (min) axial	Specify
		8	Perpendicularity of faceplate with respect to mounting base : 0.05 mm (max)	Accepted/ Not accepted
		9	CNC controlled	Accepted/ Not accepted
		10	Width of the manipulator along X-axis shall be 300 mm (Maximum)*	Accepted/ Not accepted
		11	Provision to mount and fasten on table at different locations shall be provided.	Accepted/ Not accepted
		12	Suitable self centering 3 jaw chucks (Ø250 mm & Ø150 mm) and self centering & independently adjustable 4 jaw chucks (Ø250 mm & Ø150 mm) shall be provided. These chucks shall be non magnetic	Accepted/ Not accepted (Provide details)
4	Tilt rotary manipulator. (W-axis)	1	Tilting angle : 0° to 90°continuously adjustable by motorized system*	Accepted/ Not accepted
		2	Tilting speed range : 0-0.25 rpm (Nominal)	Specify
		3	Tilting positioning accuracy : ±0.1°	Accepted/ Not accepted
		4	Rotating speed : continuously adjustable from 0.1 rpm to 20 rpm(Minimum).	Specify
		5	Positioning accuracy : ±0.1°	Accepted/ Not accepted
		6	Face plate diameter: 800mm dia (or higher) with 'T' slots .	Specify
		7	Height of the face plate when the rotary axis vertical: 800mm above the work table (max)*	Specify
		8	Provision shall be available to increase the tilting axis elevation to 800mm above the work table	Accepted/ Not accepted
		9	Spindle bore diameter : Ø80 H7 mm	Accepted/ Not accepted
		10	Loading capacity : 500 kg	Specify
		11	Base plate with locating tenons for fastening to 'T' slots located on the worktable.	Accepted/ Not accepted
		12	CNC controlled.	Accepted/ Not accepted

5	TAIL STOCK SPECIFICATION	1	Axis accuracy: ± 0.025 mm.	Accepted/ Not accepted
		2	Centre height: 800mm above the work table*	Specify
		3	Spindle stroke: 25 mm (or more) with locking device.	Accepted/ Not accepted
		4	Maximum load : 500 Kg (or higher)	Specify
		5	Spindle traverse mechanism : Hand wheel	Accepted/ Not accepted
		6	Base plate with locating tenons for fastening to 'T' slots on worktable.	Accepted/ Not accepted
		7	Width of the tailstock along X-axis shall be 300 mm (Maximum)*	Accepted/ Not accepted
		8	Provision to mount and fasten centrally on table at different locations shall be provided.	Accepted/ Not accepted
D	CHAMBER VACUUM PUMPING SYSTEM:			
1	Vacuum system	1	All the components in the entire vacuum system shall be from Leybold/Pfeiffer/Agilant makes only.	Accepted/ Not accepted
2	Operating vacuum level	1	3×10^{-4} mbar (Nominal). Operating vacuum level shall be adjustable/suitable to other values also to ensure optimum welding conditions for various material as specified in Sl.No.II	Specify
3	Evacuation time	1	a) 3×10^{-4} mbar or better within 20 minutes for clean dry empty chamber. b) 1×10^{-4} mbar or better within 30 minutes for clean dry empty chamber. c) 5×10^{-5} mbar or better within 40 minutes for clean dry empty chamber.	Specify
4	Ultimate vacuum level	1	5×10^{-5} mbar (Nominal) for clean dry empty chamber.	Specify
5	Vacuum pumps & gauges	1	Please Specify in detail (Pumping system shall be capable of achieving and holding the vacuum specified against sl.no D.2.1 & D.4.1 and evacuation time specified in Sl.No: D.3.1)	Provide details
		2	Vacuum level shall be measured by Pirani/Penning/Wide range gauges.	Accepted/ Not accepted

6	Leak detection	1	Provisions shall be given for leak detection in vacuum pumping line with leak detection ports.	Accepted/ Not accepted
7	Electrical feed through	1	Provisions shall exist for electrical feed through.	Accepted/ Not accepted
		2	One port with suitable provision shall be incorporated in the chamber for integrating temperature-measuring devices.	Accepted/ Not accepted
8	Over-ride	1	Manual over ride provisions for vacuum pumps and valves through man-machine interface shall be provided.	Accepted/ Not accepted
E	GENERAL CONTROL SYSTEM AND CNC SYSTEM:			-
1	Process monitoring software	1	Process monitoring and visualization of the process parameters on the operator's display	Accepted/ Not accepted
		2	Management of gun setting.	Accepted/ Not accepted
		3	The displays of pump units, power supplies for the gun, mechanical movements etc.	Accepted/ Not accepted
		4	Management of faults with history.	Accepted/ Not accepted
		5	Tracking the duration of use of various components, including cathode counters (hours), filament, pumps, etc. in order to facilitate the preventive maintenance.	Accepted/ Not accepted
		6	Troubleshooting with access to each PLC input/output variable.	Accepted/ Not accepted
		7	This system shall have required number of channels which shall record parameters and should permit storage of the data of the actual welding parameters as well plot the curves for each parameter all along the welding cycle.	Accepted/ Not accepted
		8	PC shall be equipped with a software program to record the welding data with a minimum sampling interval of 0.05 seconds. The data recorded for each weld shall be provided in an excel spreadsheet.	Accepted/ Not accepted
		9	Ability to sense the point to point of weld joint and to determine the path of for the beam to follow the joint with linear and circular interpolation weld parameters.	Accepted/ Not accepted

		10	Provision for beam pulsing (Pulse frequency 1 to 1000 Hz)	Accepted/ Not accepted
		11	Software tools shall have wide range of capabilities and not limited to the basic requirements specified above.	Accepted/ Not accepted
		12	Teach in provision shall be provided to sense the point to point of weld joint and to determine the path for the beam to follow the joint with linear and circular interpolation by incorporating weld parameters.	Accepted/ Not accepted
		13	All software shall be provided with single user perpetual license. Delivery of the software should be complete with media, hardware lock / license file.	Accepted/ Not accepted
2	Remote access	1	Provision shall be made for the manufacturer to remotely access the machine in cases where the manufacturer's intervention would be required for solving certain maintenance issues. An industrial PC shall be provided with technical features & software for enabling the manufacturer to remotely access the machine in cases of service support.	Accepted/ Not accepted
3	PLC	1	The PLC shall be from reputed make and shall be responsible for complete motion control, all interlocks & logic operations, machine safety, sequencing of the pumping units and the electron gun configurations for use. There shall be provision available to upload or download PLC software at site	Accepted/ Not accepted
		2	Make shall be of Siemens, Allen Bradley or equivalent internationally reputed make	Specify
4	CNC	1	Siemens make 5 axis CNC Controller- Siemens 840 D equivalent or better (X,Y,Z axis and Tilt and rotation axis of Tilt rotary manipulator shall be fully synchronized)	Accepted/ Not accepted
		2	Dedicated keypad and screen.	Accepted/ Not accepted
		3	A portable electronic hand wheel shall be incorporated for precise adjustment of the CNC axes.	Accepted/ Not accepted
		4	Programming language shall meet relevant standards such as ISO.	Accepted/ Not accepted

		5	Control of mechanical welding axes for worktable /manipulator/gun manipulation.	Accepted/ Not accepted
		6	Electrical settings for the beam, (Accelerating Voltage, Beam Current, Focus Current, shape and amplitude of deflection/oscillation)	Accepted/ Not accepted
		7	The welding programs shall include all the data required to carry out a full welding cycle.	Accepted/ Not accepted
		8	Provision shall exist for downloading programs from the supervisor to PC .	Accepted/ Not accepted
5	Control desk	1	A control desk and an ergonomic operator chair shall be provided so that the operator can sit and operate the machine. The desk shall accommodate the following:	Accepted/ Not accepted
			a) Industrial PC with technical features capable of seamlessly handling the machine control system and softwares. The operating system shall be latest version of windows.	Accepted/ Not accepted
			b) Camera display.	Accepted/ Not accepted
			c) CNC screen.	Accepted/ Not accepted
			d)The display units for high voltage (HV), beam current (BC) and focus current (FC).	Accepted/ Not accepted
			e)Control buttons of the machine.	Accepted/ Not accepted
			f) Suitable colour printer	Accepted/ Not accepted
F	Standard accessories:			
1	MAINTENANCE TOOLS: Necessary tool required for gun maintenance and other systems including multimeter, gaussmeter, cathode ray oscilloscope (CRO), mechanical & electrical tool kit, etc. shall be supplied along with the machine.			Accepted/ Not accepted
2	A laser device shall be installed along the gun and should be protected against metallic vapours. This devise would measure the distance from the gun to weld and the distance shall be displayed on a monitor.			Accepted/ Not accepted

3	Gun consumable viz cathode, anode, heating element etc shall be supplied for 2000 hrs of operation	Accepted/ Not accepted
4	Seam tracking: Measurement of the real position of the joint and automatic correction of the welding path	Accepted/ Not accepted
G	Optional accessories:	
1	Calibration Equipment: Suitable calibration equipment shall be provided with dedicated calibration tools and with calibration procedure to calibrate high voltage, beam current and focus current etc.	Accepted/ Not accepted (Cost split up to be submitted in Price bid only)
H	SAFETY INTERLOCKS AND SECURITY SYSTEM:	
1	The entire machine shall be designed and manufactured in accordance with following standards or equivalent international standards (machine safety, environmental regulations, etc.): - Safety for machines design: ISO 12100 - Safety for electrical components of machines: ISO IEC 60204-1 - Test code for machine tools: ISO 230 - Acceptance inspection of EBW machines: ISO 14744 All critical parts integrated to the machine shall be CE or equivalent certified	Accepted/ Not accepted
2	Noise levels produced by the system shall not exceed 85 dB(A). Detachable noise insulation casing shall be provided.	Accepted/ Not accepted
3	Radiation levels to be measured in accordance with the ISO 14744 or equivalent international standards.	Accepted/ Not accepted
4	The chamber shielding shall ensure radiation levels of less than 1 μ Sv/hour, at a distance of 100 mm from any external surface with a defocused beam of maximum power.	Accepted/ Not accepted
5	Radiation shield in the equipment shall meet the requirement of annual whole-body dose limit of 20 mSv/year (maximum).	Accepted/ Not accepted
6	Chamber door interlock for vacuum system operation shall be provided. Door opening direction shall be finalized after the configuration review with VSSC and vendor as specified in SL. No. V2 after the PO placement.	Accepted/ Not accepted

7	Warning light shall be provided when the high voltage to the gun is on.		Accepted/ Not accepted
8	Suitable water flow, water temperature and air pressure switches shall be provided to protect the vacuum pumping system against failure. Audible warning of failure shall be included.		Accepted/ Not accepted
9	The equipment shall be protected from surge current and the system shall have automatic trips for over Voltage, over current, failure of gun components, failure of utilities and auto-diagnostic system with error messages.		Accepted/ Not accepted
10	All moving parts/guide ways/ball screws/control and measuring systems shall be protected against dust and oil incursion by providing suitable covers/bellows.		Accepted/ Not accepted
11	Emergency off button shall be integrated on the machine at suitable location.		Accepted/ Not accepted
12	The machine shall be equipped with safety devices to protect machine from any malfunction and possible operator errors.		Accepted/ Not accepted
13	All parts integral to the machine shall be CE certified and sourced from OEM only.		Accepted/ Not accepted
14	Audio-visual alarm and the levels of the alarms shall be defined by the manufacturer in order to ensure safety.		Accepted/ Not accepted
I	Environmental conditions		
1	The equipment and all its accessories shall be tropicalized to Indian weather conditions at Trivandrum, India (40 °C & 70-80%RH). Vendor has to confirm the suitability of machine to operate in the specified environmental conditions. Special air conditioning requirements shall be specified explicitly.		Accepted/ Not accepted (Provide details)
J	Electrical		
1	Supply details	415V ±10%, 50Hz (if the party is offering different supply, party shall provide suitable transformer to meet the above mentioned input requirement)	Accepted/ Not accepted (Provide details)
2	Stabilizer	Voltage stabilizer & Isolation Transformer of suitable capacity shall be supplied to handle large voltage fluctuations & also voltage surges, transients & spikes in mains power supply	Accepted/ Not accepted
3	Maximum power consumption, kW	Please specify	Specify
4	Electrical control panels to be confirmed to CE norms		Accepted/ Not accepted

5	Uninterrupted power supply (UPS) system shall be provided for the control system (backup shall be 20min or more)		Specify the UPS Capacity
6	Necessary earthing requirements shall be specified		Accepted/ Not accepted
7	All sensor, actuators and motor labels are to be printed in metal labels and riveted for more reliability and for easy maintenance		Accepted/ Not accepted
K	Coolant/cooling water	Suitable Coolant/cooling water chiller unit shall be supplied for cooling the gun. Chiller unit shall be noise free. There shall be provision available to keep the chiller unit outside the building where the EBW machine will be installed.	Accepted/ Not accepted
L	Compressed Air	Specify in detail	Specify
M	Pre delivery inspection (PDI)		
1	The machine along with ordered accessories are need to be made ready and the same need to intimated to VSSC for pre delivery Inspection. Following inspection will be carried out at manufacturer's site by VSSC team.		Accepted/ Not accepted
	(a)Machine as per the order specification (b)accessories as per the order specification (c) Demonstration of all features of machine and software (d) inspection of documentation, certificates from OEM etc		Accepted/ Not accepted
2	The inspection and calibration certification for compliance to the specified requirements for EB gun system, control system, X-ray radiation safety and other requirements as per the specification shall be conducted in the presence of reputed third-party inspection agency (ISO 14744 or equivalent international standards)		Accepted/ Not accepted
3	Demonstration of all parameters and checking point by point the compliance of the equipment with the technical specification mentioned and performance mentioned		Accepted/ Not accepted

4	<p>Certificate reporting following points shall be provided as per ISO 14744 or equivalent international standards.</p> <p>(a) Maximum beam power (b) Maximum voltage and stability. (c) Maximum beam current and stability. (d) Beam focus range (e) Beam deflection parameters for both AC and DC (f) Mechanical axes accuracies (Gantry, table, rotary movements) (g) X-rays radiation's compliance certificate.</p>	Accepted/ Not accepted
5	<p>PDI of the offered machine shall be at the works of the principals. Performance demonstration in following materials shall be a part of PDI (Party shall arrange the material for the same):</p> <p>1) Stainless steel (45mm) 2) Aluminium (45mm) 3) Ti6Al4V (45mm) 4) Ti6Al4V (80mm) 5) Endurance test of the machine: Continuous gun on trial for 10 minutes at 500mA 6) Endurance test of the machine: Continuous gun on trial for 15 minutes at 400mA 7) Endurance test of the machine: Continuous gun on trial for 20 minutes at 300mA</p> <p>Note: 1) for above Sl.No 1,2 &3 depth of penetration (DOP) shall be achieved with a travel speed between 700mm/min to 800 (mm/min). 2) For Sl.No. 4 depth of penetration (DOP) shall be achieved with a travel speed more than 400mm/min 3) For Sl.No. 5,6 & 7 party shall arrange suitable material for bead on trials.</p>	Accepted/ Not accepted
6	<p>On successful completion of inspection and on satisfactory acceptance of the machine by VSSC team only the machine will be given dispatch clearance</p>	Accepted/ Not accepted
7	<p>The entire inspection tests carried out at pre delivery inspection need to be carried out again at VSSC to confirm the test results</p>	Accepted/ Not accepted
8	<p>Final acceptance of machine will be given after successful inspection & satisfactory acceptance of machine at VSSC site after successful installation and commissioning</p>	Accepted/ Not accepted
N	Installation, Commissioning & Performance Demonstration in Department	

1	Installation and commissioning of the system at VSSC, Thiruvananthapuram shall be done by the supplier.	Accepted/ Not accepted
2	Performance demonstration of the machine shall be done by welding Material sourced by department. VSSC will carry out the acceptance of machine after completion of satisfactory NDE and destructive testing of samples / components.	Accepted/ Not accepted
3	All capabilities of machine as agreed in the offer shall be demonstrated during performance demonstration. Machine will be accepted only after successful demonstration	Accepted/ Not accepted
4	Installation, testing , commissioning and performance demonstration is under the vendor's scope.	Accepted/ Not accepted
5	All handling equipment, tools, tackles etc. required shall be arranged by vendor	Accepted/ Not accepted
6	Movement of the packed cases from its storage location in VSSC-ISRO campus, Trivandrum to the installation site, opening the cases, movement of the machine to the site and installation shall be performed by the supplier.	Accepted/ Not accepted
7	Required manpower shall be organized by the vendor.	Accepted/ Not accepted
8	Civil/ Foundation requirements for the machine shall be submitted to VSSC along with the offer.	Accepted/ Not accepted
9	The overall dimensions of the system, requirements of civil works and material handling system should be informed in advance.	Accepted/ Not accepted
10	Details of machine foot print and all the installation requirements to be specified	Accepted/ Not accepted
O	Qualification Criteria	
1	Supplier shall be Original Equipment Manufacturer (OEM) or only their authorized representative in India.	Accepted/ Not accepted
2	The Vendor should have supplied EBW systems similar or higher capacity (10 CuM minimum) to globally reputed industry/ R&D sector in recent time. The supplier should quote at least one reference to whom the offered machine was supplied. Performance certificate obtained from such references with their contact details and final test certificate of the machines should be submitted in the offer. VSSC reserves the right to verify the authenticity of details submitted. If any discrepancy is found in the details furnished by the party, VSSC reserves the right to reject the offer.	Submitted/ Not Submitted

3	Offered system should be a proven model in the market and should not be a prototype or developmental system. (However the chamber and axis movement systems can be a customized version to meet VSSC requirement)	Accepted/ Not accepted
4	OEM should have adequate Manufacturing Experience to provide support in terms of R&D on parameters, applications, materials and printing of parts.	Accepted/ Not accepted
5	The source of electron gun and high voltage power supply system for the offered EBW system shall be only from the single OEM. In case, if the electron gun, control electronics for high voltage system or high voltage power supply is procured from a third party, then the offer for such assembled EBW system will be straightaway rejected	Accepted/ Not accepted
6	<p>Party who had received purchase order for any EBW machine from any of the ISRO centers in the past, but failed to execute the purchase order (including any of the following reasons) need not to participate in this tender:</p> <p>(i) Was not able to get export license in time (after receipt of PO) from their concerned agency, (ii) Wanted to increase the price of the PO (after receipt of PO), (iii) Could not assemble the machine because of unavailability of components/ parts from their supplier etc.</p> <p>Any offer from such party will be straightaway rejected without any kind of considerations.</p>	Accepted/ Not accepted
7	In case of offer from authorized representative of OEM, authorization certificate from OEM shall be submitted along with offer.	Yes/No (Provide documentary proof)
8	OEM shall provide commitment to provide after sales support up to a period of 10 years even in case of a change of the authorized representative in India	Yes/No (Provide documentary proof)
9	The supplier has to mandatorily submit a clause by clause compliance statement. Quote without this compliance statement will be considered as disqualified.	Submitted/ Not Submitted
p	Training	
1	Training for up to three VSSC engineers at Vendor's premises for seven working days, after completion of pre-dispatch inspection and testing, covering:(1) General use of the machine(2) Use of the NC (programming)(3) General maintenance of mechanical, vacuum & electrical systems.	Accepted/ Not accepted

2	Two week's additional training at the VSSC premises after installation, commissioning & acceptance tests of the machine.	Accepted/ Not accepted
3	Upon completion of training, OEM support engineer should give stand by support	Accepted/ Not accepted
Q	Maintenance & Warranty	
1	Entire machine inclusive of all systems/accessories should be warranted for on site replacement for 24 months (minimum) from the date of installation/commissioning against all the design, material or manufacturing defects	Accepted/ Not accepted
2	<u>AMC</u> : Non comprehensive AMC contract for a period of 3 years after the warranty period shall be submitted along with the bid (Two visit per year, one visit in every six months.). (Cost to be submitted in Price bid only)	Submitted/ Not Submitted
3	Offer for Non comprehensive breakdown maintenance contract for minimum 15 days per year shall be submitted along with the bid (Cost to be submitted in Price bid only) for a period of 3 years after the warranty period. Request for breakdown maintenance shall be attended by trained service personnel within 48 hours from issue of call by email and rectified within the shortest possible time.	Submitted/ Not Submitted
4	Assurance for after sales support and supply of spares for a minimum period of 10 years from date of handing over the machine shall be provided along with the offer.	Submitted/ Not Submitted
5	Provision shall be made for the manufacturer to remotely access the machine in cases where the manufacturer's intervention would be required for solving certain maintenance issues.	Accepted/ Not accepted
6	It is preferred to have after sale service team available in India	Accepted/ Not accepted
7	Software warranty: Warranty for a period of 36 months from the date of installation, shall be provided by vendor. During the said warranty period vendor shall provide all upgrades/ updates, patches without any additional charges and provide software support whenever necessary either by deputing service engineer or through phone / email/ video mode as deemed appropriate by department and as intimated to the vendor	Accepted/ Not accepted
R	Delivery period	

1	The machine shall be delivered, installed, commissioned and performance demonstrated at VSSC, Thiruvananthapuram within a period of 12 months from date of receipt of purchase order.	(Provide details)
S	Spares	
1	The vendor shall recommend and submit list of essential spares (Mechanical/Electrical/Others) required for the machine for trouble free operation of the machine for AMC period after the warranty. Price shall be valid for entire period of AMC. (Cost to be submitted in Price bid Separately. This cost will not be a criterion for evaluation L1)	Submitted/ Not Submitted
2	Complete list of spares for the machine and its accessories along with spares specification/type/model and name & address of the spare supplier shall be submitted along with documentation while supplying the machine	Accepted/ Not accepted
3	Vendor should ensure the availability of spares for the next ten years of operation of the machine with document evidence	Accepted/ Not accepted
T	Documentation (Three sets of the following documents in hardcopy plus one set in soft copy in English should be supplied)	Accepted/ Not accepted
1	Setting/Programming instruction manual	Accepted/ Not accepted
2	Operators instruction manual	Accepted/ Not accepted
3	Spare parts manual for Mechanical, Electric servos and control system	Accepted/ Not accepted
4	Transport/Assembly/Commissioning manual	Accepted/ Not accepted
5	Foundation drawings/Assembly drawings/foot print and installation instructions (with a check list)	Accepted/ Not accepted
6	Machine test charts	Accepted/ Not accepted
7	Calibration certificates for all measurable items with calibration procedure / sources/ periodicity for all the gauges and instruments used in the machine	Accepted/ Not accepted
8	Preventive maintenance check list, troubleshooting charts and guidelines	Accepted/ Not accepted
9	Sub assembly drawings	Accepted/ Not accepted

10	Catalogues / OEM Manuals of all bought out items	Accepted/ Not accepted
11	List of sub suppliers and documents	Accepted/ Not accepted
12	Machine diagram indicating all the service items for easy understanding of location	Accepted/ Not accepted
13	Maintenance, interface & commissioning manuals for CNC system & drives	Accepted/ Not accepted
14	Detailed specification of all rubber items and pneumatic/lube fittings	Accepted/ Not accepted
15	One re-installation pen drive for the PC.	Accepted/ Not accepted
16	Licensed version software CD and replaceable hard disk installed with all the software shall be included	Accepted/ Not accepted
U	Packing	
1	The machine shall be packed in modules to enable it to enter through the entry having 3.3m width and 3.9m height to the installation site	Accepted/ Not accepted (Provide details)
2	The packing of each item should be adequately sturdy to avoid any damage while handling and during transit. The packing should also prevent any prolonged exposure to hostile environment (rain) and it shall be seaworthy.	Accepted/ Not accepted
V	Other instructions	
1	Wherever possible, Detailed price break up shall be provided in the offer(rather than providing lump sum price)	Accepted/ Not accepted
2	After placing the PO, There shall be a configuration review with VSSC and vendor. Configuration of machine sub systems, layout and other facility requirements etc shall be discussed and finalized during the configuration review.	Accepted/ Not accepted
3	*Vendor shall refer drawing attached as 'Annexure II - EBW machine configuration' for details viz. machine configuration, axis directions, maximum job size in horizontal and Vertical axis etc. Vendor shall ensure that the offered machine is matching with the details provided in the drawing (Drawing No: VSSC/MME/RPFF/TFI/EBW-IG/09/2023/R0)	Accepted/ Not accepted
4	Layout of the installation site is attached as 'Annexure III - Floor layout' (Drawing No: VSSC/MME/RPFF/TFI/EBW-IG/FP/09/2023/R0) . Vendor shall ensure that the proposed machine and sub systems are suitably configured to install in the site identified.	Accepted/ Not accepted
5	The total system shall be fully integrated within a robust steel framework with removable covers and accessible panels.	Accepted/ Not accepted

6	Power, control & circuit elements shall be properly labeled as per circuit diagram	Accepted/ Not accepted
7	Supplier shall explicitly quote the technical details wherever it is required/asked. Offers having mere 'Yes' or incomplete answers will be rejected.	Accepted/ Not accepted
8	The quotation shall be comprehensive against specifications and the supplier should state whether the machine offered by them confirm as per specification point by point as listed. If any alternate offers are made, it should be stated as alternative and price to be quoted separately if any.	Accepted/ Not accepted
9	The offer shall be submitted in Two Part basis. Acceptance and responses to the technical and commercial terms specified shall be submitted in the first part and price details including offers for maintenance contract and cost of spares shall be submitted in the second part. No cost details including cost of AMC and spare shall be included in the first part. Offers not meeting the above condition will be summarily rejected.	Accepted/ Not accepted
10	All correspondences and technical details/ documentation shall be submitted in English (UK/US) language only.	Accepted/ Not accepted
11	Metric system of measurement shall be followed in all specifications, drawings, manuals, etc.	Accepted/ Not accepted
12	The supplier shall provide technical literature/catalogues/detailed drawings of the machine and the items offered. Quotations received without these details are likely to be ignored/disqualified for consideration	Accepted/ Not accepted
13	Quote Shall be on FOR, Trivandrum basis	Accepted/ Not accepted