

	<u>BHARAT HEAVY ELECTRICAL LIMITED</u>			Enquiry No. :		
	<u>UNIT'S ADDRESS:</u>			Due Date :		
	<u>CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL</u> <u>(FROM PURCHASE DEPTT.)</u>			Supplier Qtn. No.:		
				Date :		
<u>SPECIFICATION CUM COMPLIANCE CERTIFICATE OF ELECTRO SLAG WELDING MACHINE</u>						
NOTE:-						
1. Vendor must submit complete information against clause no. 17. The offer meeting this clause would only be processed.						
2. 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.						
3. The offer and all documents enclosed with offer should be in English language only.						
NAME & ADDRESS OF THE SUPPLIER :				NAME & ADDRESS OF THE INDIAN AGENT :		
TELEPHONE NOS.:				TELEPHONE NOS.:		
FAX NOS.:				FAX NOS.:		
E-MAIL ADDRESS :				E-MAIL ADDRESS :		
SCOPE: SUPPLY, ERECTION & COMMISSIONING OF ELECTRO SLAG WELDING MACHINE COMPLYING WITH SPECIFICATIONS AS BELOW						

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
1.0	PURPOSE & WORKPIECE MATERIAL				
1.1	Purpose: (Operations/Jobs involved) : The electro slag-welding machine is required for welding of butt joints in vertical position. The process shall be capable of producing radiography/ultrasonic quality welds with high impact strength in the weld and Heat Affected Zone of weldable quality steel. The typical components to be electro slag welded are:- i)Distributor test cone. ii)Cylinder of inlet pipes. iii)RE joint flanges	Vendor to confirm			
1.2	Work Piece Material:	Carbon steel plate.			
1.3	Job Parameters				
1.3.1	Maximum Job Height	5000mm			
1.3.2	Job thickness Range	50 to 300 mm			
1.3.3	Minimum Job Diameter	1000mm			
1.3.4	Gap between butting plates (approx)	30 - 35 mm			
2.0	SPECIFICATION:				

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2.1	Machine Configuration/Features : Column with mechanical drive and guide bars.. -It should be of non-consumable guide type with vertical traveling water-cooled copper shoes along with the latest sensing mechanism for automatic vertical travel of the welding head during welding. -It should have welding head with three-nozzle facility with independent system of wire drives and rectifiers	Vendor to Confirm			
2.2	Welding Power Source				
2.2.1	Number of Welding Power Sources	3			
2.2.2	Type	Thyristorized Bridge			
2.2.3	Characterstic	Constant Voltage			
2.2.4	Make	Vendor to Specify			
2.2.5	Model	Vendor to Specify			
2.2.6	Welding Current Range	Vendor to Specify			
2.2.7	Welding Current (At 100 % duty cycle) of each Power Source	800 A (min)			
2.2.8	Welding Voltage range	Vendor to Specify			
2.3	Welding Head				
2.3.1	Number of Welding Heads	1			
2.3.2	Welding Head should be provided with 3 Nos. manually adjustable nozzles with independent system for wire drives and rectifier. (Details of arrangement should be furnished)	Vendor to confirm			

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2.3.3	Nozzles should be coated with ceramic insulation to avoid short circuit with butting sides during welding. (Details to be furnished)	Vendor to confirm			
2.3.4	Oscillation for Welding Head with adjustable dwell time(Details of arrangement & details of control should be furnished)	Vendor to Specify			
2.3.5	Oscillation Stroke	Vendor to Specify			
2.3.6	Oscillation Speed	Vendor to Specify			

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2.4	Wire Feeder				
2.4.1	Number of Wire Feeders	3			
2.4.2	Type of wire feed motor	Vendor to Specify			
2.4.3	Make of Wire Feeder	Vendor to Specify			
2.4.4	Model	Vendor to Specify			
2.4.5	Controller for Wire Feeder (Vendor to furnish details, and catalog) Microprocessor based digital controller for closed-loop control.	Electronic			
2.4.6	Wire Size	3.15 mm and 4 mm			
2.4.7	Wire feed rate range	Vendor to Specify			
2.4.8	Three Nos of wire reels (with brake hub and adjustable wire tension) of suitable capacity for continuous welding should be provided.	Vendor to Confirm			
2.4.9	Capacity of each wire reel (Kgs)	25- 100 kgs			
2.4.10	Wire Straightener should be provided for each wire.	Vendor to Confirm			
2.4.11	An optional arrangement to be quoted: Drum type wire feeder with Wire conduit, wire conduit attachment,wire conduit connector to feed unit for wire size range 3.15-4.0mm and trolley for drum type wire feeder. Approximate weight of wire in the drum 500 Kg.	Vendor to specify details			
2.5	Drive System for Vertical Travel:				
2.5.1	Type of drive:	Vendor to Specify			

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2.5.2	Control Mechanism:				
	a) automatic vertical travel of the welding head during welding with height sensing mechanism, adjustable with height of the slag pool along with manual override.(Detail to be furnished by vendor including details of sensor).	Vendor to Confirm			
	b) Adjustable presets for setting speed and timers for setting ON/OFF time (Detail to be furnished by vendor).	Vendor to Confirm			
	c) Manual vertical travel.	Vendor to Confirm			
	d) Changeover from automatic to manual mode & vice-versa through selector switch.	Vendor to Confirm			
2.5.3	Mechanism for locking and limit switches.	Vendor to Specify			
2.5.4	Lifting Motor:				
2.5.4.1	Type of lifting motor	A.C			
2.5.4.2	Make, and Rating of lifting motor for giving the welding speed	Vendor to Specify			
2.5.4.3	Controller for motor.(Vendor to furnish details and catalogue.).	Vendor to specify			
2.5.4.4	Welding speed range .	15 - 35 mm/min			
2.5.4.5	Rapid speed, required (minimum)	1000 mm/min			
2.6	Copper Shoes				
2.6.1	Set of copper shoes preferably of adjustable type, suitable for welding jobs of diameter 1500, 2000, 2500 mm	Vendor to Confirm			
2.6.2	Shoe dimensions.	Vendor to Specify			

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2.6.3	Pneumatic adjustment of position of and force on front & back of copper shoes. (Vendor to furnish details and pneumatic pressure)	Vendor to Specify			
2.6.4	Pneumatic pressure available. Compressor to be quoted separately if pressure required is more than pneumatic pressure available.	4 Bar (Minimum)			
2.7	Cooling arrangement for copper shoes				
2.7.1	Closed circuit temperature controlled cooling facility (Details should be furnished)	Vendor to Specify			
2.7.2	System interlocks, so that the machine is tripped in case of insufficient water flow.	Vendor to Confirm			
2.7.3	Cooling water flow rate & pressure.	Vendor to Specify			
2.7.4	Cooling water inlet and outlet temperature.	Vendor to Specify			
2.8	OPERATOR'S PLATFORM:				
2.8.1	Operator's platform of sufficient load carrying capacity should travel along with welding head. Suitable seat for operator should be provided. The controls for Vertical rapid travel and the welding process controllers should be conveniently positioned on the operator's platform. . (Complete details to be furnished)	Vendor to Specify			
2.8.2	Weight carrying Capacity of the Platform should be minimum for 2 operators.	Vendor to Confirm			
2.8.3	Separate ladder for climbing up/down from operator's platform, at any height should be provided.	Vendor to Confirm			

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2.9	OPERATION AND CONTROL SYSTEM:				
2.9.1	Operator's panel having complete machine control system with digital display shall be provided on the operators platform. All switches on the Operator's panel should be within reach of operator of average height (Indian) for convenient, efficient & safe operation. All displays/indications should also be conveniently placed accordingly with maximum visibility. Layout showing complete details of the panel should be submitted.	Vendor to confirm			
2.9.2	Welding Process Controller:	Vendor to confirm			
	1) Electronic Control and Digital Display of Welding Current and Welding Voltage individually for each nozzle.				
	2) Electronic Control and Digital Display of Welding Speed individually for each nozzle.				
	3) Wire inching push buttons.				
	4) Welding start stop control.				
	5) Control and indication of water flow on-off.				
	6) Controlling nozzle travel between the copper shoes.				
	7) Switch from changeover from manual to auto mode and vice-versa				
	8) Water Failure Indication				
	9) Vertical Travel Controls				
	10) Emergency stop switch.				
2.9.3	The complete welding process controller shall be configured on a Programmable logic controller(PLC) platform. Display of operating parameters & fault messages. Complete details to be provided.	Vendor to confirm.			
2.9.4	Make	Vendor to Specify			
2.9.5	Model	Vendor to Specify			

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2.10	MACHINE LIGHTS:				
2.10.1	Lamp for illumination near welding head.	Vendor to confirm			
2.10.2	All light fittings, consumables, adapters/receptacles should have compatibility with Indian/International equivalents	Vendor to confirm			
2.11	ELECTRICAL SYSTEM :				
2.11.1	415V $\pm 10\%$, 50HZ $\pm 3\%$, 3 Phase AC (3 wire system with out neutral) Power Supply Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with required material details is to be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to confirm			
2.11.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Vendor to confirm			
2.11.3	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to confirm			
2.11.4	Electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm			
2.11.5	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power. All adapters/receptacles should have compatibility with Indian/International equivalents.	Vendor to confirm			
2.11.6	Motors shall conform to IEC or Indian Standards	Vendor to confirm			

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2.11.7	All cables moving with traversing axes should not be loose and to be suitably clamped. Cable junction boxes shall be used for distribution of cable wherever required .	Vendor to confirm			
2.11.8	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm			
2.12	SAFETY ARRANGEMENTS:	Vendor to confirm			
	Following safety features in addition to other standard safety features should be provided on the machine:				
	1) .Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator.				
	2) . A detailed list of all alarms / indications provided on machine should be submitted by the supplier.				
	3). All the pipes, cables etc. on the machine should be well supported and protected.				
	4). Emergency Switches at suitable locations as per International Norms are to be provided.				
2.13	ENVIRONMENTAL PERFORMANCE OF THE MACHINE :	Vendor to confirm			
	The Machine shall conform to following factors related to environment :				
	(a) If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.				

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3.0	LEVELING & ANCHORING SYSTEM	Vendor to confirm			
3.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine.	Vendor			
4.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE :				
4.1	Special tools and equipment required for erection of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc.for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer	Vendor			
5.0	OPTIONAL ACCESSORIES :	Vendor to specify			
6.0	SPARES:				
6.1	Itemised breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered)	Vendor to specify			
6.2	a) Mechanical & Hydraulic Spares: All types of pumps, All types of Valves, All types of pressure switches / transducers, All types of filters, All types of seals.	Vendor to specify			

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6.3	b) Electrical /Electronic: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Display Unit, Motors for Feed Drives, & Control Cards etc.	Vendor to specify			
6.4	All types of spares for total machine and accessories should be available for atleast seven years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide details of spares & suppliers to enable BHEL to procure these in advance, if required	Vendor to confirm			
6.5	5 pair of cooper shoes (for 2500 mm diameter jobs) and 5 nozzles of each size to be provided along with the machine.	Vendor to confirm			
6.6	Vendor to confirm that complete list of spares for machine and accessories, along with 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			
7.0	DOCUMENTATION : Five sets of following documents (Hard copies) in English language should be supplied along with the machine	Vendor to confirm			
7.1	Operating manuals of Machine.				
7.2	Detailed Maintenance manual of machine which shall contain System Description, Block diagram, Schematic drawings, Circuit digrams & hardware details of PCB's, parameter list of all drives and user program/ladder diagrams of PLC & MMI. Trouble shooting charts.				

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7.3	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.				
7.4	Detailed specification of all hydraulic/lube fittings.				
7.5	Operating Manuals, Maintenance Manuals & Catalogues for important automatic Systems and Accessories.				
7.6	Complete Master List of parts used in the machine shall be submitted by the vendor.				
7.7	One additional set of all the above documentation on CD ROM, wherever possible.				
8.0	TRAINING:				
8.1	BHEL Persons should be trained at supplier's Works for mutually agreed period in the area of (a) Measuring Systems & supplied accessories etc. (b) Electrical, Electronic maintenance for machine & other supplied equipments (c) Mechanical & Hydraulic maintenance of the machine & other supplied equipments (d) Operation of the machine & other supplied equipments.	Vendor to confirm			
8.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	Vendor to confirm			
8.3	Competent, English speaking experts shall be arranged by the vendor	Vendor to confirm			
8.4	Vendor to quote for training on man / week basis	Vendor to specify			

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9.0	FOUNDATION:				
9.1	Vendor shall submit the layout drawing giving layout of the machine and load points within two month from the date of Letter of Intent (LOI)/ P.O. , whichever is earlier. The Layout should consist of all requirements pertaining to complete machine and all accessories, including space requirement for accessory. The vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for foundation bolts of the machine. Foundation will be designed by BHEL and to be concurred by the vendor. Foundation will be prepared by BHEL under the supervision of the vendor's representative.	Vendor to confirm			
10.0	ERECTION & COMMISSIONING				
10.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control system & all types of other supplied equipment, machining of test pieces etc. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to confirm			
10.2	Successful proving of BHEL components by the supplier shall be considered as part of commissioning.	Vendor to confirm			

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10.3	Tools, and other necessary equipment required to carry out all above activities should be brought by the supplier.	Vendor			
10.4	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to confirm			
10.5	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor to confirm			
10.6	Estimated time of Erection and Commissioning shall be submitted with the offer.	Vendor to specify			
10.7	Charges, duration, terms & conditions for E&C should be furnished in detail	Vendor to specify			

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11.0	AMBIENT CONDITIONS & THERMAL STABILITY :				
11.1	Total machine and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies.	Vendor to confirm			
	Power Supply:				
	Voltage: 415 V - 10%, +10%				
	Frequency: 50 Hz +3%, - 3%				
	No. of phases = 3				
	Ambient Conditions: Temperature = 5 to 40 degree celsius				
	Relative Humidity = 95% max.				
	(Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)				
11.2	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 25 deg Celsius in 24 hours. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)	Vendor to confirm			
11.3	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by vendor. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same should be furnished by Vendor)	Vendor to confirm			

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11.4	The machine, including attachments and accessories, should be suitable for continuous operation to its full capacity for a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Vendor to confirm			
12.0	PROVEOUT OF BHEL COMPONENTS :				
12.1	Typical Drawing no. 32000049014 (Test Cone & Inlet Cone) of proveout components are enclosed. Vendor to submit preliminary process, recommended by them along with the offer. Change in process may be mutually discussed and agreed. Complete welding of prove out components shall be done by Vendor at BHEL works to prove the machine after complete erection, tests & test piece welding etc. Material for the proveout components shall be provided by BHEL as per the job available, which is within machine range at the time of machine proving. . Vendor shall be fully responsible for welding of proveout components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by vendor, regarding requirements of the proveout components, whether specified or not, should be discussed and cleared by vendor during initial technical discussions.	Drawing No. Vendor to offer.			
13.0	MACHINE ACCEPTANCE: (Tests/Activities To be Performed by Vendor)	Should be accepted & confirmed by Vendor			
13.1	Tests/Activities should be carried out at supplier's works on the machine before dispatch :				

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13.1.1	The acceptance test at vendor place shall be conducted on three different test pieces using one nozzle, two nozzle and three nozzle separately. Vendor to clarify regarding the possibility of providing test pieces from their end. The radiography/ultrasonic test will be performed on the Test piece at the suppliers work.				
13.1.2	Demonstration of all features of the machine and all Accessories and attachments.				
13.1.3	The machine should be tested for continuous running of 3 hrs. If any break down occurs during this test, the test should be repeated for 3 hrs twice.				
13.2	Test to be carried out at BHEL works while commissioning the machine :				
13.2.1	Job prove out at BHEL: By welding test pieces / jobs available at BHEL within the machine capacity.				
13.2.2	Two weeks supervision of independent operation of machine by BHEL after job proveout.				
13.2.3	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works				
14.0	PACKING:				

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14.1	Sea worthy & rigid packing for all items of complete machine, CNC 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	Vendor to confirm			

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15.0	GUARANTEE :				
15.1	12 months from the date of acceptance of the machine.	Vendor to confirm			
16.0	GENERAL : The vendor should submit the following information:				
16.1	Machine Model	Vendor to specify			
16.2	Total connected load (KVA):	Vendor to specify			
16.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to specify			
16.4	Painting of the machine as per Indian/International standards	Vendor to specify			
16.5	Total weight of the machine	Vendor to specify			
16.6	Weight of heaviest part of machine	Vendor to specify			
16.7	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify			
16.8	Dimensions of largest part/ subassembly/ assembly of the machine	Vendor to specify			
16.9	Vendor to submit, along with offer, the reference list of customers where similar machines have been supplied	Vendor to confirm			
16.10	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to confirm			
16.11	.All the pipes required for Hydraulic, Pneumatic & oil pipings shall be included in the standard scope of the machine.	Vendor to confirm			

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17.0	QUALIFYING CONDITIONS :				
17.1	Only those vendors, who have supplied and commissioned in the past years at least one Electroslag Welding Machine having minimum two nozzle facility with independent system of wire drive and rectifier (min 800A at 100% duty cycle per rectifier), and capacity to weld jobs upto 3000mm height and 300mm thickness or higher and such machine is presently working satisfactorily for more than one year (more than six months if supplied to BHEL) after commissioning, would be eligible for participating in the tender. The following information is to be submitted by the vendor about the companies where similar machines have been supplied.	Vendor to confirm			
	1. Name of the customer / company where similar machine is installed.				
	2. Complete postal address of the customer.				
	3. Year of commissioning.				
	4. Application for which the machine is supplied with details of accuracies achieved on the job.				
	5. Name and designation of the contact person of the customer.				
	6. Phone, FAX no. and email address of the contact person of the customer.				
	7. Performance certificate from the customers regarding satisfactory performance of machine supplied to them				