

BHARAT HEAVY ELECTRICAL LIMITED, JHANSI

SPECIFICATION NO.	7068 (R8)
ITEM NO.	ME41/1/2696 TO ME-1/1/2725
LOCATION	FABRICATION SHOP
QUANTITY	30 NOS.

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF MIG/MAG CO2 WELDING MACHINE

NOTE :	
1	BIDDER must submit complete information against clause Part – B (Qualifying condition). Only those offers meeting this
2	The "offer by BIDDER" Column and where applicable, the "Deviations" Column of this format shall be filled in by the BIDDER and submitted along with the offer. Technical details also submitted with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specification / requirements shall be treated as non - Compliance.
3	The offer and all documents enclosed with offer should be in English language only.
4	Only those Models to be quoted which are working satisfactorily in rugged environment for continuous operation in heavy duty fabrication shop for more than three years after commissioning and of current capacity 500 A at 60% duty cycle (10 minutes cycle time) or higher capacity. Vendor to submit document supporting the same.
PART - A	
FOR INVERTER CONTROLLED MIG / MAG	
(GAS SHIELDED) WELDING MACHINE	
AA. APPLICATION :	

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
AA.1	Purpose:- (Operations /jobs involved): inverter Microprocessor based Digital Soft switching IGBT/MOSFET MIG welding machine to do spatter free and heavy duty flux cored/solid wire CO2(Mixed gas) Argon welding on mild steel, Alloy steel, stainless steel, and aluminum. The model must be rugged and suitable for continuous work in heavy fabrication shop in rough environment.		
AA.2	The offered equipment shall be portable and suitable for semi-automatic FCAW/MIG/MAG welding process using flux-cored and solid wires of carbon steel, low-alloy steel and stainless steel.		
AA.3	The equipment shall be suitable for welding in all positions with pure argon, carbon-di-oxide or argon plus carbon di-oxide gas mixture as shielding gas and also for welding with self-shielded flux-cored wires.		

BB. MACHINE CONFIGURATION :	[The scope of supply shall consist of the following, for each machine]
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FEATURES/BHEL SPECIFICATION		OFFER BY BIDDER	DEVIATIONS
BB.1	Welding Power source with Transport Trolley and 4 wheels		
BB.2	Wire Feeder Unit		
BB.3	Welding Torch		
BB.4	Remote Control Unit		
BB.5	Gas Regulators for (Ar + CO ₂) Gas Mixture or CO ₂ Gas		
BB.6	CO ₂ Gas Pressure Regulator, Flow-Meter and Heater Unit		
BB.7	Set of inter-connecting cables/hoses with quick-fix end couplings		
BB.8	Consumables & Spares for Welding Torches		
BB.9	Electrical & Mechanical Spares for Power source and Wire-Feeder		
BB.10	Operation & Maintenance Manuals – Three Copies per Machine		
BB.11	Commissioning of Equipment at BHEL Works and Performance Prove-out of the offered equipment by Supplier's		
CC. EQUIPMENT SPECIFICATION : POWERSOURCE FEATURES			
Sl.No.	FEATURES	BHEL SPECIFICATION	DEVIATIONS
	MAKE	Make & Model of the power source should be OTC/ KEMPP/ ESAB/ FRONIOUS/ MILLER/ LINCOLN or any reputed company.	
CC.1.1	Type	Inverter Controlled with IGBT/MOSFET and Constant Potential type, even with a fluctuation of $\pm 10\%$ in the Input Voltage	
CC.1.2	Control	The equipment must be IGBT/MOSFET inverter based with full bridge soft switching technology. It has to be a Digital microprocessor based machine so as to meet the following functions / features: 1-The inverter section must have full bridge configuration 2-IGBT/ MOSFET modules must be used in the inverter section 3-It must also indicate whether any program is already stored in that location to avoid rewriting of a useful program. 4-The equipment must have the adjustment to increase or decrease the molten metal droplet transfer force	
	Switching Frequency	BIDDER has to indicate the make of IGBT/MOSFET used and the Switching Frequency of the Inverter Circuit. It should not be less than 20 KHz.	
CC.3	Current Rating	The equipment has to deliver 500 Amps. @ 60 % Duty Cycle and 387 Amps. @ 100% Duty Cycle (10 Minutes at 40degree C).	
CC.4	Operating Range : Current	50 Amps. to 500 Amps. (continuous control)	
CC.5	Open Circuit Voltage	BIDDER to mention the Open Circuit Voltage for the offered Power source	
CC.6	Current Setting	The variation in the set value of the welding current to the actual value shall not exceed 1 %.	
CC.7	Voltmeter & Ammeter	Factory Installed digital indication (current, voltage and wire speed) on the front panel with easy removal and replacement (i.e., without lifting the top cover of the Power source/ wire feeder) for instrument calibration.	
CC.8	Power Input	415 $\pm$ 10% V AC, 3 Phase, 50 $\pm$ 2% Hz, 3 Wire System [4 th wire for EARTHING] – No Neutral Conductor through 63 Amp four pole M.C.B. (mounted on M/C). with 07 meter main supply lead.	
CC.9	Degree of protection	IP23	
CC.10	Power Factor	should not be less than 0.90 (supported by data)	

Sl.No.	FEATURES		
CC.11	Gas-Heater for CO ₂ - Shielding Gas	Provision of the Single Phase AC tapping point in the Power source, the gas heater input power supply [110 V or 230 V – AC Supply]	
CC.12	Auxiliary Power for Wire-Feeder Unit	Low voltage (like 48 V/110V) auxiliary power tapping point in the Power source	
CC.13	Arc Strike (F.A.S.)	Instantaneous Arc Striking facility (Fresh Arc Strike)	
CC.14	Weld Stop Condition	No globule formation at the wire tip, at the time of weld stopping	
CC.15	Gas Flow Setting	Gas Flow Check Push Button for Gas Solenoid Valve actuation in weld switch in "OFF" position.	
CC.16	Compulsory Features	The Power source shall have Features like a) Gas / Wire Inching Facility b) Spatter Control Facility c) Gas Pre-flow / Post-flow Facility d) Crater Control & Fill e) In built programmed for welding of: Carbon and alloy steel, Stainless steel and ALUMINIUM	
CC.17	Insulation	Class "H"	
CC.18	Machine Cooling	Forced Air Cooling with interlock for tripping of the welding machine.	
CC.19	Protection[BIDDER has to specifically furnish technical details on how these protective measures are addressed in the Machine Design]	a) Inbuilt protection for the IGBT/Power source against Thermal / Overload / Short-Circuit conditions. The machine should have protection against over heat and over current. b) Over heat protection & over current protection, under voltage protection c) All PCBs shall be sprayed with mould coating to prevent damage from dust and grinding particles. d) Machine Design to ensure proper earthing for the machine and its peripherals e) Measures to nullify the effects of EMI (Electro-Magnetic Induction) generated: f) Input surge suppressor must provide for protection against input surge voltage. Under-Carriage with hard rubber lined wheels for portability of the power source by manual pushing The machine must have built in program's to weld MS, SS, AL and other materials with different gas mixtures and selection through touch panel. - Forced Air Cooled - Temp. Variation 3 to 45 degree - 95% relative humidity - Dusty fabrication shop Output variation due to line voltage fluctuation, cable heating or drift due to the use of long cable, to be eliminated. BIDDER to indicate the Maximum Power Rating [in kVA] of the Power source and the NO-LOAD Power Consumption in Watts. To Specify the Model of Power source Offered	
CC.20	Portability		
CC.21	Programme		
CC.22	Ambient Conditions		
CC.23	Load Compensation		
CC.24	Power Rating		
CC.25	Power Source Model		
DD. EQUIPMENT SPECIFICATION : WIRE-FEEDER UNIT FEATURES			

FEATURES		BHEL SPECIFICATION		OFFER BY BIDDER		DEVIATIONS	
Sl.No.	FEATURES	BHEL SPECIFICATION		OFFER BY BIDDER		DEVIATIONS	
DD.1	Make	Make & Model of the wire feeder should be OTC/ KEMPP/ ESAB/ FRONIOUS/ MILLER/ LINCOLN or any reputed company ,suitable for offered power source					
DD.2	Type	-4-Roll Drive [All Powered Drive Wheels] with quick release system. - The wire feeder must be a closed type so that the dusty layer is not formed on the wire spool.					
DD.3	Motor	Motor should be an encoder motor with feed back signal & following features: 1- Drive should be geared motor should be work on feed back for constant wire feed. 2- Wire feeder should be with automatic soft start control. 3- IN built easily accessible wire coil compartment should be provided in wire feeder. 4- Digital display of wire feed rate in meter per minute should be provided on the Power Source/wire feeder. 5- Independent inching of gas and wire. 6- Forward feeding facility Compulsorily to be provided 0.8 mm to 1.6 mm (Solid Wires) 1.2 mm to 1.6 mm (Self-Shielded and Flux Cored Wires also) 1.0 to 18.0 meter / min. Wire feeder should be capable to feed wire through cable length of 4 to 4.5 meter BIDDER has to indicate the Type of Motor used for wire feeding Facility to hold wire spools of 15 to 20 kgs. of weight and spool diameter of 300 mm Shall be of adjustable type.					
DD.4	Burn-Back Control						
DD.5	Wire Sizes/Solid						
DD.6	Wire Sizes/Cored						
DD.7	Wire Feed Speed						
DD.8	Wire Feeder Motor						
DD.9	Wire Spool Weight						
DD.10	Brake Torque on Wire Feeder Hub						
DD.11	2 / 4 Track Facility	Torch latching facility to be provided compulsorily					
DD.12	Feed Rolls & Guides	Suitable for 1.2mm & 1.6mm Solid/ flux Cored wires					
DD.13	Connector for Torch	Euro connection					
DD.14	Inter-connecting cables/hoses assembly	10 metres long power & control cables and gas hose assembly with plug-in and quick fix end connectors to connect the power source and the wire-feeder.					
DD.15	Wire-feeding capacity	Shall be suitable for feeding welding wire through Welding Torches with 4 to 4.5 meter long cables [without the use of additional push or pull motor in the wire-feed line]					
DD.16	Wire Feeder Model	To specify the Wire-Feeder Model & Weight					
EE. EQUIPMENT SPECIFICATION : WELDING TORCH FEATURES							

SI.No.	FEATURES	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
EE.1	Make	Make & Model of welding torch should be OTC/ KEMPII/ ESAB/ FRONIOUS/ MILLER/ LINCOLN or any reputed company suitable for offered power source and		
EE.2	Type	Goose-Neck, Air cooled.		
EE.3	Shielding Gas	Goose Neck 360 DEGREE ROTATABLE CO ₂ , Argon or Mixture of CO ₂ & Argon		
EE.4	Cable & Connector	Polymedium Cable, Euro Connector		
EE.5	Wire Sizes/Solid	0.8 mm to 1.6 mm		
EE.6	Wire Sizes/Cored	1.2 mm to 1.6 mm (Self-Shielded / Flux-Cored Wires)		
EE.7	Wire Material	Carbon & Low Alloy Steel, Stainless Steel, Aluminium		
EE.8	2 / 4 Track Facility	Compulsorily to be provided in the Torch		
EE.9	Current Rating	Current rating of the torch should be 500 amps @ 60% duty cycle and 387 amps @ 100% duty cycle Torch.		
EE.10	Torch length	Length of the torch should be not less than 3 meter.		
EE.11	Torch Models & Weight	To specify the Models and the Torch Weight for 500 Amp. ratings, in the OFFER. It shall meet the following specifications: 1- Torch should be suitable for Steel welding with 1.2 and 1.6 mm dia wire and should work continuously at full rated capacity i.e. 100% duty cycle. 2- Torch should be such that replacement on nozzle, contact tubes, liner, spatters guard etc. is quick and easy from operation and maintenance angle.		

FF. EQUIPMENT SPECIFICATION : REMOTE CONTROL UNIT FEATURES

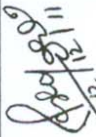
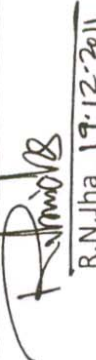
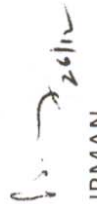
SI.No.	FEATURES	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
FF.1	Make	Make of remote control unit should be OTC/ KEMPII/ ESAB/ FRONIOUS/ MILLER/ LINCOLN or any reputed make suitable for offered power source		
FF.2	Type	Hand Operated with 10 meter long control cable with end connectors		
FF.3	Control	Step less Variation of Welding Current & Voltage		
FF.4	Connection	Remote Control Unit to be connected to the Wire-Feeder		

GG. EQUIPMENT SPECIFICATION : GAS REGULATOR, FLOW METER & HEATER

SI.No.	FEATURES	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
GG.1	Function	To regulate CO ₂ Gas Pressure, Flow Rate and for Heating the CO ₂ Gas, to avoid ice formation.		
GG.2	Power	To draw from Single Phase AC Power Supply from Power source (110 V or 230 V - AC) through a 2 M Cable		
GG.3	Pressure Gauges	Preferred to have 2 Nos. - To indicate independently cylinder pressure and gas delivery pressure		
GG.4	Accessories	Double glass covered flow-meter, power cable with end-connectors, electrical heating unit, gauges, etc.		

HH. SPARES :		BHEL SPECIFICATION		OFFER BY BIDDER	DEVIATIONS
S.No.	ITEMS				
HH.1	Power Source	All type of Spares including IGBTs/MOSFET, PCBs (Printed Circuit Board) Control-Transformers, Cooling Fans, etc. recommended for 2 years of operation on THREE shift basis (for 365 Days) shall be offered. To be LISTED ITEMWISE			
HH.2	Wire-Feeder Unit	Spares such as feed-rolls (suitable for 1.2 and 1.6 mm dia. suitable for Solid & Cored Wires), wire-feed motor, wire guides, control PCB cards, etc. shall be offered. To be LISTED ITEMWISE			
HH.3	Remote Control Unit	Complete Set of Remote Control Unit to be OFFERED			
HH.4	Welding Torch	Consumables & Spares such as Liners & Contact Tip (suitable for 1.2 Wires), Contact Tip Body, Gas Nozzles, Insulator, Orifice, 'O' Ring, etc. shall be offered for the torch (10 Nos. each). To be LISTED ITEMWISE.			
II. O & M MANUALS :		BHEL SPECIFICATION		OFFER BY BIDDER	DEVIATIONS
S.No.	PARTICULARS				
II.1	No. of Copies	3 (Three) for Each Machine			
II.2	Language	English			
II.3	Manual Details :	a. Manual shall contain all instructions for machine installation and welding trial testing, in sequence			
		b. Manual to give general circuit diagrams, showing the interconnection of various elements and also details on PCBs [Printed Circuit Board] like tapping voltages, main electronic elements' specifications and ratings, etc.			
		c. Manual to give other details like trouble shooting chart, weld parameters selection for various base metals, etc.			
		d. Master List of Parts & Spares used in the machine with Make, Model, Rating, etc.			
JJ. GENERAL POINTS :		BHEL SPECIFICATION		OFFER BY BIDDER	DEVIATIONS
S.No.	PARTICULARS				
JJ.1	Inspection	The equipment shall be offered for inspection at supplier's works for performance evaluation by BHEL Engineers prior to despatch.			
JJ.2	Commissioning	The equipment shall be commissioned at free of cost by the supplier's representative at BHEL Works.			
JJ.3	Training	The Supplier's SERVICE ENGINEER shall give training in the Operation and Maintenance (mainly on electric/electronic troubleshooting) of the Machine for BHEL Staff, after the successful commissioning of the Welding Machines.			
JJ.4	Guarantee	The equipment shall be guaranteed for a minimum of twenty-four months from the date of commissioning.			
JJ.5	Bought-Out Items	a) The Bought-Out Items - like Motors, ICs, Relays, Contactors, Switches, Electronic Elements, etc., used in the Power source & Wire-feeder shall be of internationally Reputed Manufacturers only.			
		b) BIDDER has to furnish the MAKE of Bought-Out Items used in the Welding Machine, with the OFFER			

KK. ANNUAL MAINTENANCE CONTRACT : (OPTIONAL)	
Separate bid to be submitted for this option Offer by Bidder Deviations	
BHEL SPECIFICATION	
KK1	The BIDDER has to QUOTE for the Annual Maintenance Contract [AMC] for THREE YEARS, in the following two patterns, after the expiry of the ORIGINAL FREE WARRANTY PERIOD :
KK2	AMC Charges for the whole lot of machines, INCLUDING the Cost of Free REPLACEMENT of the MACHINE SPARES / PARTS within 72 Hours of reporting machine break-down by e-mail or telefax.
KK.3	AMC Charges for the whole lot of machines, EXCLUDING the Cost of REPLACEMENT of the MACHINE SPARES / PARTS within 48 Hours of reporting machine break-down by e-mail or telefax. Machine Spare Parts and Consumables will be supplied by BHEL.
KK.4	The BIDDER has to furnish the Details of the INDIAN AGENT and CONTACT ADDRESS of the nearest SERVICE CENTRE, for reporting the Machine Break-Down.
KK.5	The BIDDER has to CONFIRM the supply of replacement machine or wire feeder in case of prolonged break-down of the welding machine during the AMC Period.
PART- B	
QUALIFYING CRITERIA FOR THE SUPPLY OF INVERTER CONTROLLED MIG/MAG/FCAW WELDING MACHINES	
SECTION – I	
The BIDDER is expected to give complete details against each clause in the table given below and wherever	
S.NO.	PARTICULARS
1	Number of years of experience of the BIDDER (Original equipment manufacturer) in the field of design, manufacturing and supply of ' INVERTER CONTROLLED MIG/MAG/ FCAW- CO2 WELDING MACHINS' for radiographic quality welding applications for Loco parts fabrication. Order will be placed only on OEM.
2	Year of launch of the MODEL quoted against the enquiry
3	Number of 'Inverter controlled MIG/MAG/ FCAW- CO2 welding machines' supplied, till date in the quoted model.
4	Number of 'Inverter controlled MIG/MAG/ FCAW- Co2 welding machines – 500 Amp. rating with 60% duty cycle' supplied and commissioned till date for the following category of CUSTOMERS
	a) High Pressure Boiler Industries
	b) Ship Building Industries.
	c) Heat exchangers/ pressure vessel manufacturing industries.
	d) Heavy Engineering Industries.
5	Details on International standards followed in Design and testing of welding machines.
6	Comprehensive details, on performance testing of welding machines carried out at the Factory, to be furnished with the technical offer.
7	Details of SERVICE- AFTER SALES Set – up in India including the addresses of Agents / service centers in India, to be furnished compulsorily.
8	BIDDER to indicate the country of origin for the supply of welding machines.
SECTION – II	
The BIDDER has to compulsorily meet the following requirements to get qualified for submitting an offer for the Inverter Controlled MIG/MAG/FCAW CO2 welding machine.	

S.NO.	REQUIREMENTS	BIDDER COMMENTS
9	The BIDDER shall have a minimum of ten years of continuous experience in the design, Manufacturing & Supply of Inverter controlled MIG/ MAG/ FCAW – CO2 welding machines. Relevant proof to be submitted	
10	The BIDDER should have supplied a minimum 25 number of Inverter Controlled MIG/MAG/FCAW – CO2 welding machine with rating 500 Amps. (@ 60% Duty cycle or higher rating in a single Purchase order to any Customer within last 05 years (On the date of opening of tender) and such machine performing satisfactory till now for minimum one year (On the date of opening of tender) OR the BIDDER should have supplied a minimum 50 number of Inverter Controlled MIG/MAG/FCAW – CO2 welding machine with rating 500 Amps. (@ 60% Duty cycle or higher rating in any one year with in last five years (On the date of opening of tender) and such machine performing satisfactory till now for minimum one year (On the date of opening of tender)	
11	Reference list of customers and Performance certificate from both customers as applicable referred in sl no-10 with full contact details of CONTACT PERSON, who are the end users of the Model (given under clause No. 10.0) of Inverter Controlled MIG/MAG/FCAW – CO2 welding machines.	
SECTION – III		
The BIDDER has to comply with the following, for accepting the technical offer for security by purchaser:		
S.NO.	REQUIREMENTS	BIDDER COMPLIANCE
13	The BIDDER shall submit offer in TWO PARTS- Technical & Commercial Price Bid	
14	The offer shall contain a comparative statement of technical specifications given by BHEL and the offer details submitted by the Bidder, against each clause. A just CONFIRMED or COMLIES or YES or NO- DEVIATION or similar words in the technical comparative statement may lead to disqualification of the technical offer.	
15	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.	
16	The technical offer shall be supported by Product catalogue and Data sheets in ORIGINAL and complete technical details/ literature on the QUOTED MODELS.	
17	The commercial offer (given with the technical offer) shall contain the scope of supply and the Un-priced part of the Price-Bid for confirmation for the scope of supply.	
18	Earlier performance & field experience (service support) with BHEL (if any) will be a reckoning factor for the technical qualification of the offer.	
19	The expected delivery period (including the time for pre-dispatch inspection clearance by BHEL) for the welding machines is not more than three months from the date of issue of BHEL purchase order/LOI.	
	 V.S. Chauhan Sr. Mgr(FBM)	 Arjun Singh Mgr(WEX)
	 A.K. Shivpuri Sr. Mgr (WEX)	 Y.K. Dhangra Sr.Eng.(WEX)
	 S.J. Chakraborty Sr. DGM(WEX)	 R.N. Jha AGM(FBM)
		 CHAIRMAN