TECHNICAL SPECIFICATIONS FOR INVERTER CONTROLLED GENERAL PURPOSE WELDING POWERSOURCES [500 AMPS.]

AA. APPLICATION :			
Sl.No.	**FEATURES / BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
1.1.0	The proposed Welding Machine is intended for use with Manual Arc Welding Process for Radiographic Quality Welds like Butt Joints, Fillet Welds, and Double Groove Welds coming in High Pressure Vessels using ϕ 2.5 mm to ϕ 6.3 mm basic coated stick electrodes.		
1.2.0	The Offered Welding Machine shall be PORTABLE in Nature and a CONSTANT CURRENT DC Powersource.		
BB. MACHINE CONFIGURATION : [The scope of supply shall consist of the following, for each machine]			
Sl.No.	**FEATURES / BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
2.1.0	Welding Powersource with Transport Trolley and Wheels		
2.2.0	Control Unit Integrated with Powersource (for Hot Start & Arc Dynamics Control)		
2.3.0	Hand Operated Remote Control Unit for Current Variation		
2.4.0	Set of Inter-Connecting Cables, Adapters , etc.		
2.5.0	Welding Cable and Welding Holder (multiples of 5 mtrs. in length)		
2.6.0	Return Current Cable with Screw Type Earth Clamp.		
2.7.0	Electrical & Mechanical Spares for Powersource & Control Unit		
2.8.0	Operation & Maintenance Manuals – Three Copies per Machine		
2.9.0	Commissioning of Equipment and Performance Prove-out of the offered equipment at BHEL Works, by Supplier's Representative, free of cost.		

CC. EQUIPMENT SPECIFICATION: POWERSOURCE FEATURES				
Sl.No.	**FEATURES**	**BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
3.1.0	Type	Powersource shall be Inverter Controlled with IGBT and capable of delivering a smooth Constant Direct Current (in DCEP mode), even with a fluctuation of ±10 % in the Input Voltage		
3.2.0	Switching Frequency	BIDDER has to indicate the Switching Frequency of the Inverter Circuit and the make of IGBT used		
3.3.0	Current Rating	500 Amps. @ 60 % Duty Cycle OR Around 375 Amps. at 100% Duty Cycle.		
3.4.0	Operating Range for Welding Current	25 Amps. to 500 Amps. (with stepless variation)		
3.5.0	Open Circuit Voltage	BIDDER to mention the Open Circuit Voltage for the offered Powersource [Preferred OCV is above 75 V]		
3.6.0	Current Setting	The variation in the set value of the welding current to the actual value shall not exceed 1 %.		
3.7.0	Current Control	Through the LOCAL VARIATOR [with the help of a 3 inch diameter KNOB] provided in the Front Panel of Powersource and the REMOTE CONTROL Unit.		
3.8.0	Power Input	415 ± 10% V AC, 3 Phase, 50 ± 2% Hz, through a 3 Wire System [4th wire for EARTHING] – No Neutral Conductor		
3.9.0	Input Power Cable	A 10 metre long electric input power cable with protective sheathing to be provided with the powersource.		
3.10.0	Control Panel Switches	Power ON/OFF, Remote ON/OFF, Voltage & Ampere Control, Hot Start Control, Arc Dynamics Control		
3.11.0	Voltmeter & Ammeter	Factory Installed Ammeter & Voltmeter on the front panel with easy removal and replacement (i.e., without lifting the top cover of the Welding Powersource) for periodic instrument calibration		
3.12.0	Arc Strike	Selection for Instantaneous Arc Strike with HOT START for SMAW Process.		

CC. EQUIPMENT SPECIFICATION: POWERSOURCE FEATURES			[….contd……..]	
Sl.No.	**FEATURES**	**BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
3.13.0	Arc Dynamics Control - Electronic Inductance Variable Control	To minimise spatter and optimise weld-bead wetting action, during welding of materials special materials like Stainless Steel, T 91/P 91, Inconel, in addition to Carbon and Low Alloy Steels.		
3.14.0	Insulation	Class "H" – to suit Tropical Working Conditions		
3.15.0	Machine Protection	IP 23 – Degree of Protection		
3.16.0	Machine Cooling	The Powersource shall feature a 'state of art' forced air cooling system that ensures adequate cooling of the components while preventing dust and metal particles from being drawn in.		
3.17.0	Functional / Elemental Design Protection	a) Inbuilt protection for the IGBT/Powersource against Thermal / Overload / Short-Circuit / Single or Two Phase Power Input Conditions. b) All PCBs shall be sprayed with mould coating to prevent damage from dust and grinding particles. c) Machine Design to ensure proper earthing for the machine and its peripherals	***[BIDDER has to specifically furnish technical details on how these protective measures are addressed in the Machine Design]***	
3.18.0	EMI Suppression	a) Powersource shall be equipped with a suitable Filter Network connected to the INPUT Power Line, to prevent propagation of EMI either into or out of the Powersource. b) All metal enclosures and internal shields shall prevent radiated EMI. c) BIDDER has to elaborate the DESIGN FEATURES to meet the above requirements.		
3.19.0	Portability	Under-Carriage with hard rubber lined wheels for portability of the powersource by manual pushing		
3.20.0	Ambient Conditions	Temperature upto + 50 ° C ; Humidity upto 90 % but both upper limits do not occur simultaneously.		

CC. EQUIPMENT SPECIFICATION: POWERSOURCE FEATURES [....contd.....]				
Sl.No.	**FEATURES**	**BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
3.21.0	Load Compensation	Output variation due to line voltage fluctuation, cable heating or drift due to the use of long cable, [20 metres long welding cable] to be eliminated.		
3.22.0	Electrode Holder & Return Current Connection	Heavy Duty rugged LUG type terminals to connect 50 mm^2 Welding Cable for SMAW Electrode Holder and Return Current Cable for SMAW Process		
3.23.0	Welding Current Cable	SMAW Welding (current) Cable, 20 mtrs. in length, with one end connected to the Powersource and the free end provided with a FEMALE Connector to connect a MALE Connector with 50 mm^2 Cable of the Manual Welding Electrode Holder.		
3.24.0	Return Current Cable	Welding Current RETURN Cable, 20 mtrs. in length, with one end connected to the Powersource and the other end provided with a Screw Type Earth Clamp		
3.25.0	Power Rating	BIDDER to indicate the Maximum Power Rating [in kVA] of the Powersource and the NO-LOAD Power Consumption in Watts.		
3.26.0	Power Source Model	To Specify the Model of Powersource Offered		

DD. EQUIPMENT SPECIFICATION : REMOTE CONTROL UNIT FEATURES				
Sl.No.	**FEATURES**	**BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
4.1.0	Application	For welding current variation from a distant work place, in addition to that provided in the front panel of the welding powersource.		
4.2.0	Type	Hand Operated with 10 mtrs. long control cable with end quick-fix end connectors		
4.3.0	Current Control	Stepless Variation of Welding Current		

EE. SPARES :

S.No.	ITEMS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
5.1.0	Power Source	All type of Spare Parts including the following items : a. IGBT Kit b. All Types of Fuses c. Control – Transformers d. Printed Circuit Boards / PCBs – All Types e. Rectifiers, Thermistors, Capacitors f. Switches and Knobs g. Cooling Fan Motor h. Ammeter & Voltmeter i. Potentiometer j. Relays & Timers k. Receptacles l. Control Cable with End Connectors n. Filters o. Welding & Return Cable Connectors are to be COMPULSORILY QUOTED (with Unit Rate) for one powersource required for 2 years of operation on THREE shift basis for 365 Days in an year.		
5.2.0	Remote Control Unit	Complete Set of Remote Control Unit and its Spares like Knob, Potentiometer, etc. to be **OFFERED**		

FF. O & M MANUALS :

S.No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
6.1.0	No. of Copies	3 (Three) for Each Machine		
6.2.0	Language	English		
6.3.0	Soft Copy	One SOFT COPY in DC-ROM is to be given for each machine, containing the details mentioned under **Clause Sl. No. FF./6.4.0**		

FF. O & M MANUALS: **[……..contd……..]**

S.No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
6.4.0	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.		

GG. GENERAL POINTS :

S.No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
7.1.0	Inspection	a. The welding machines shall be offered for inspection by BHEL Engineers at supplier's works for performance evaluation prior to despatch. b. Welding Trials are to be taken on 20 mm thick Plate Butt Joints with ϕ 2.5, 3.15, 4.0 and 5.0 mm SMAW Electrodes of Class E 7018-1 and E-9018-B3.		
7.2.0	Commissioning	The equipment shall be commissioned, free of cost by the supplier's representative at BHEL Works.		
7.3.0	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		

GG. GENERAL POINTS:			[……..contd……..]	
S.No.	**PARTICULARS**	**BHEL SPECIFICATION**	**OFFER BY BIDDER**	**DEVIATIONS**
7.4.0	Guarantee	The equipment shall be guaranteed by the vendor for a period of 15 months from the date of Commissioning or 18 months from the date of supply whichever is earlier.		
7.5.0	Bought-Out Items	a) The Bought-Out Items - like Motors, IGBTs, ICs, Relays, Contactors, Switches, Electronic Elements, etc., used in the Powersource & Control Unit shall be of Internationally Reputed Manufacturers only. b) BIDDER has to furnish the MAKE of Bought-Out Items proposed to be used in the Welding Machine, with the OFFER.		