



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

| | |
|-------------------------------|---|
| ENQUIRY | Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com |
| NOTICE INVITING TENDER | |

| | | | |
|--|---|---|---|
| TWO PART BID Tender to be submitted in two Parts | Enquiry Number: 2620900161 | Enquiry Date: 29.08.2009 | Due date for submission of quotation: 14.10.2009 |
|--|---|---|---|

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both **delayed offer** and **late offers** will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of **tender opening**.

| Item | Description | Quantity |
|------|--|---------------|
| 10 | 500 Amps MIG / MAG Welding Power Source as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in) | 5 Nos. |

Important points to be taken care during submission of offer

1. Delivery required 6 months from the date of purchase order.
2. Grace period of 2 months beyond the above delivery period will be considered.
3. Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.

BHEL's General guidelines / instructions (refer MM/CE/GT/001) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2620900161".

Tenders should reach us before 14:00 hours on the due date
Tenders will be opened at 14:30 hours on the due date
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED

Manager / Capital Equipment / MM

PART A

**QUALIFYING CRITERIA FOR THE SUPPLY OF
 INVERTER CONTROLLED MIG/MAG/FCAW
 WELDING POWERSOURCES – 500 Amps.
 [60% Duty Cycle]**

SECTION – I

The BIDDER is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details.

| S. No. | PARTICULARS | VENDOR's RESPONSE |
|---------------|---|--------------------------|
| 1.0 | Number of Years of Experience of the BIDDER (Original Equipment Supplier) in the field of design, manufacture and supply of 'INVERTER CONTROLLED MIG/MAG / FCAW – CO ₂ WELDING MACHINES' for Radiographic Quality Welding Applications for Pressure Parts Fabrication | |
| 2.0 | YEAR of LAUNCH of the MODEL quoted against this ENQUIRY | |
| 3.0 | Number of 'Inverter Controlled MIG/MAG / FCAW – CO ₂ Welding Machines' supplied, till date in the QUOTED MODEL . | |
| 4.0 | Number of 'Inverter Controlled MIG/MAG / FCAW – CO ₂ Welding Machines–500 Amps. Rating with 60 % Duty Cycle' supplied and commissioned till date for the following category of CUSTOMERS a) High Pressure Boiler Industries b) Ship Building Applications c) Heat Exchangers / Pressure Vessels | |
| 5.0 | Details on International Standards followed in Design and Testing of Welding Machines | |
| 6.0 | Comprehensive Details, on Performance Testing of Welding Machines carried out at the Factory, to be furnished with the Technical Offer. | |
| 7.0 | Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished compulsorily. | |
| 8.0 | BIDDER to indicate the Country of Origin for the supply of welding machines. Machines manufactured in Countries like TAIWAN/CHINA/KOREA are not preferred. | |

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 | VENDOR's COMMENTS |
|---------------|---|--------------------------|
| 9.0 | The BIDDER shall have a minimum of TEN Years of Continuous Experience in the Design, Manufacture & Supply of Inverter Controlled MIG/MAG/FCAW– CO ₂ Welding Machines. | |
| 10.0 | The BIDDER should have supplied a minimum of 50 number of Inverter Controlled MIG/MAG / FCAW – CO ₂ Welding Machines with rating 500 Amps. (@ 60 % Duty Cycle) to Customers in India. Indicate the number of such welding machines sold in India. | |
| 11.0 | Reference List of Customers and Performance Certificate from minimum THREE CUSTOMERS [Heavy Engineering Companies] 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 – CO ₂ Welding Machines. | |

SECTION – III

The BIDDER has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser :

| S.No. | REQUIREMENTS | VENDOR's COMPLIANCE |
|--------------|--|----------------------------|
| 12.0 | The BIDDER shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial and Price Bid. | |
| 13.0 | 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 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer. | |

| S.No. | REQUIREMENTS | VENDOR's COMPLIANCE |
|-------------|---|---------------------|
| 14.0 | 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. | |
| 15.0 | The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODELS of Welding Powersources | |
| 16.0 | 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. | |
| 17.0 | Earlier performance & field experience (service support) with BHEL (if any) will be a reckoning factor for the technical qualification of the OFFER. | |
| 18.0 | The expected delivery period (including the time for Pre-Dispatch Inspection clearance by BHEL) for the welding machines is not more than six months from the date of issue of BHEL Purchase Order. In case the quoted delivery period extends beyond six months, an additional grace period of two months is permitted, but with a loading for arriving at the PRICE COMPETITIVENESS of the Offer (if the OFFER is technically acceptable on all accounts). Details are given in the commercial terms of the this tender | |

PART B

**TECHNICAL SPECIFICATIONS FOR INVERTER CONTROLLED MIG / MAG
FLUX CORED ARC (CO₂ GAS SHIELDED) WELDING MACHINE**

| AA. APPLICATION : | | | |
|---|--|------------------------|-------------------|
| Sl.No. | FEATURES /BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| AA.1 | 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.2 | 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] | | | |
| Sl.No. | FEATURES /BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| BB.1 | Welding Powersource with Transport Trolley and Wheels | | |
| BB.2 | Wire Feeder Unit | | |
| BB.3 | Welding Torch (3 Types) | | |
| 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 Powersource 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 representative | | |

| CC. EQUIPMENT SPECIFICATION : POWERSOURCE FEATURES | | | | |
|---|--|--|------------------------|-------------------|
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| CC.1 | Type | Inverter Controlled with IGBT and Constant Potential type, even with a fluctuation of $\pm 10\%$ in the Input Voltage | | |
| CC.2 | Switching Frequency | BIDDER has to indicate the Switching Frequency of the Inverter Circuit and the make of IGBT used | | |
| CC.3 | Current Rating | 500 Amps. @ 60 % Duty Cycle with suitability for working at a minimum of 350 Amps. at 100% Duty Cycle. | | |
| CC.4 | Operating Range : a) Voltage b) Current | 20 Volts to 50 Volts (continuous control) 50 Amps. to 500 Amps. (continuous control) | | |
| CC.5 | Open Circuit Voltage | BIDDER to mention the Open Circuit Voltage for the offered Powersource | | |
| 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 Ammeter & Voltmeter on the front panel with easy removal and replacement (i.e., without lifting the top cover of the Powersource) for instrument calibration | | |
| CC.8 | Power Input | 415 \pm 10% V AC, 3 Phase, 50 \pm 2% Hz, through a 3 Wire System [4 th wire for EARTHING] – No Neutral Conductor | | |
| CC.9 | Gas-Heater for CO ₂ - Shielding Gas | Provision of one Single Phase AC tapping point in the Powersource, for the gas heater input power supply [110 V or 230 V – AC Supply] | | |
| CC.10 | Auxiliary Power for Wire-Feeder Unit | Low voltage (like 48 V/110V) auxiliary power tapping point in the Powersource | | |
| CC.11 | Arc Strike (F.A.S.) | Instantaneous Arc Striking facility (Fresh Arc Strike) | | |
| CC.12 | Weld Stop Condition | No globule formation at the wire tip , at the time of weld stopping | | |

| CC. EQUIPMENT SPECIFICATION : POWERSOURCE FEATURES | | | | |
|---|--|---|------------------------|-------------------|
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| CC.13 | Gas Flow Setting | Gas Flow Check Push Button for Gas Solenoid Valve actuation in weld switch in "OFF" position. | | |
| CC.14 | Compulsory Features | The Powersource shall have Features like a) Gas / Wire Inching Facility b) Spatter Control Facility c) Gas Pre-flow / Post-flow Facility d) Crater Control & Fill | | |
| CC.15 | Insulation | Class "H" preferred – Tropical Working Conditions | | |
| CC.16 | Machine Cooling | Forced Air Cooling with interlock for tripping of the welding machine. | | |
| CC.17 | 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/Powersource against Thermal / Overload / Short-Circuit 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 d) Measures to nullify the effects of EMI (Electro-Magnetic Induction) generated | | |
| CC.18 | Portability | Under-Carriage with hard rubber lined wheels for portability of the powersource by manual pushing | | |
| CC.19 | Ambient Conditions | Temperature upto + 50 ° C ; Humidity upto 90 % but both upper limits do not occur simultaneously. | | |
| CC.20 | Load Compensation | Output variation due to line voltage fluctuation, cable heating or drift due to the use of long cable, to be eliminated. | | |
| CC.21 | Power Rating | BIDDER to indicate the Maximum Power Rating [in kVA] of the Powersource and the NO-LOAD Power Consumption in Watts. | | |
| CC.22 | Power Source Model | To Specify the Model of Powersource Offered | | |

| DD. EQUIPMENT SPECIFICATION : WIRE-FEEDER UNIT FEATURES | | | | |
|--|--|---|------------------------|-------------------|
| SI.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| DD.1 | Type | 4-Roll Drive [All Powered Drive Wheels] | | |
| DD.2 | Burn-Back Control | Compulsorily to be provided | | |
| DD.3 | Wire Sizes/Solid | 0.8 mm to 1.6 mm (Solid Wires) | | |
| DD.4 | Wire Sizes/Cored | 1.2 mm to 2.0 mm (Self-Shielded and Flux Cored Wires also) | | |
| DD.5 | Wire Feed Speed | 1.0 to 18.0 mtrs. / min. | | |
| DD.6 | Wire Feeder Motor | BIDDER has to indicate the Type of Motor used for wire feeding | | |
| DD.7 | Wire Spool Weight | Facility to hold wire spools of 15 to 20 kgs. of weight and spool diameter of 300 mm | | |
| DD.8 | Brake Torque on Wire Feeder Hub | Shall be of adjustable type. | | |
| DD.9 | 2 / 4 Track Facility | Torch latching facility to be provided compulsorily | | |
| DD.10 | Feed Rolls & Guides | Suitable for 1.2mm & 1.6mm Solid/Cored wires Suitable for 2.0 mm & 2.4 mm Self-Shielded Flux- Cored Wires | | |
| DD.11 | Connector for Torch | Euro / Unitized Connector with polymedium cable | | |
| DD.12 | 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 powersource and the wire-feeder. | | |
| DD.13 | Wire-feeding capacity | Shall be suitable for feeding welding wire through Welding Torches with 3.0 metre long, 4.5 metre long and 10.0 mtr. long cables [without the use of additional push or pull motor in the wire-feed line] | | |
| DD.14 | Wire Feeder Model | To specify the Wire-Feeder Model & Weight | | |
| | | | | |

| EE. EQUIPMENT SPECIFICATION : WELDING TORCH FEATURES | | | | |
|---|-----------------------|--|------------------------|-------------------|
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| EE.1 | Make | Only OTC / DAIHEN / DAIDEN (JAPAN) | | |
| EE.2 | Type | Goose-Neck, Gas cooled | | |
| EE.3 | Shielding Gas | CO ₂ , Argon or Mixture of CO ₂ & Argon | | |
| EE.4 | Cable & Connector | Polymedium Cable, Euro / Unitized Connector Adapter to suit DAIHEN/DAIDEN make Torch | | |
| EE.5 | Wire Sizes/Solid | 0.8 mm to 1.6 mm | | |
| EE.6 | Wire Sizes/Cored | 1.2 mm to 2.0 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 | Type A) – Rating | 300 / 350 Amps. @ 60 % Duty Cycle Torch with 3.0 metre long cable. | | |
| EE.10 | Type B) – Rating | 300 / 350 Amps. @ 60% Duty Cycle Torch with 4.5 metre long cable. | | |
| EE.11 | Type C) – Rating | Minimum 350 Amps. @ 60% Duty Cycle Torch with 10.0 metre long cable. | | |
| EE.12 | Torch Models & Weight | To specify the Models and the Torch Weight for Type A, Type B and Type C ratings, in the OFFER | | |
| FF. EQUIPMENT SPECIFICATION : REMOTE CONTROL UNIT FEATURES | | | | |
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| FF.1 | Type | Hand Operated with 10 mtrs. long control cable with end connectors | | |
| FF.2 | Control | Stepless Variation of Welding Current & Voltage | | |
| FF.3 | 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 Powersource (110 V or 230 V - AC) thro' 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 : | | | | |
| S.No. | ITEMS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| HH.1 | Power Source | All type of Spares including IGBTs, 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 0.8, 1.2 , 1.6 and 2.0 mm dia. suitable for Solid & Cored Wires), wire-feed motor, wire guides, control PCB cards, connectors, etc. shall be offered . To be LISTED ITEMWISE | | |
| HH.3 | Remote Control Unit | Complete Set of Remote Control Unit and its Spares like Knob, Potentiometer, etc. to be OFFERED | | |
| HH.4 | Welding Torch | Consumables & Spares such as Liners & Contact Tip (suitable for 0.8, 1.2 , 1.6 and 2.0 mm dia. Wires), Contact Tip Body, Gas Nozzles, Insulator, Orifice, 'O' Ring, Adaptor 'O' Ring, etc. shall be offered for all the three types of Torches. To be LISTED ITEMWISE. | | |

| II. O & M MANUALS : | | | | |
|--------------------------------|--------------------|--|------------------------|-------------------|
| S.No. | PARTICULARS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| 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 : | | | | |
| S.No. | PARTICULARS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| 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 | | |

| S.No. | PARTICULARS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
|-------|------------------|---|-----------------|------------|
| JJ.4 | Guarantee | The equipment shall be guaranteed for a minimum of twelve months from the date of commissioning & performance prove-out at BHEL/Trichy Works. | | |
| JJ.5 | Bought-Out Items | a) The Bought-Out Items - like Motors, ICs, Relays, Contactors, Switches, Electronic Elements, etc., used in the Powersource & 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 . | | |
| | | | | |

PART B

**TECHNICAL SPECIFICATIONS FOR INVERTER CONTROLLED MIG / MAG
FLUX CORED ARC (CO₂ GAS SHIELDED) WELDING MACHINE**

| AA. APPLICATION : | | | |
|---|--|------------------------|-------------------|
| Sl.No. | FEATURES /BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| AA.1 | 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.2 | 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] | | | |
| Sl.No. | FEATURES /BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| BB.1 | Welding Powersource with Transport Trolley and Wheels | | |
| BB.2 | Wire Feeder Unit | | |
| BB.3 | Welding Torch (3 Types) | | |
| 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 Powersource 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 representative | | |

| CC. EQUIPMENT SPECIFICATION : POWERSOURCE FEATURES | | | | |
|---|--|--|------------------------|-------------------|
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| CC.1 | Type | Inverter Controlled with IGBT and Constant Potential type, even with a fluctuation of $\pm 10\%$ in the Input Voltage | | |
| CC.2 | Switching Frequency | BIDDER has to indicate the Switching Frequency of the Inverter Circuit and the make of IGBT used | | |
| CC.3 | Current Rating | 500 Amps. @ 60 % Duty Cycle with suitability for working at a minimum of 350 Amps. at 100% Duty Cycle. | | |
| CC.4 | Operating Range : a) Voltage b) Current | 20 Volts to 50 Volts (continuous control) 50 Amps. to 500 Amps. (continuous control) | | |
| CC.5 | Open Circuit Voltage | BIDDER to mention the Open Circuit Voltage for the offered Powersource | | |
| 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 Ammeter & Voltmeter on the front panel with easy removal and replacement (i.e., without lifting the top cover of the Powersource) for instrument calibration | | |
| CC.8 | Power Input | 415 \pm 10% V AC, 3 Phase, 50 \pm 2% Hz, through a 3 Wire System [4 th wire for EARTHING] – No Neutral Conductor | | |
| CC.9 | Gas-Heater for CO ₂ - Shielding Gas | Provision of one Single Phase AC tapping point in the Powersource, for the gas heater input power supply [110 V or 230 V – AC Supply] | | |
| CC.10 | Auxiliary Power for Wire-Feeder Unit | Low voltage (like 48 V/110V) auxiliary power tapping point in the Powersource | | |
| CC.11 | Arc Strike (F.A.S.) | Instantaneous Arc Striking facility (Fresh Arc Strike) | | |
| CC.12 | Weld Stop Condition | No globule formation at the wire tip , at the time of weld stopping | | |

| CC. EQUIPMENT SPECIFICATION : POWERSOURCE FEATURES | | | | |
|---|--|---|------------------------|-------------------|
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| CC.13 | Gas Flow Setting | Gas Flow Check Push Button for Gas Solenoid Valve actuation in weld switch in "OFF" position. | | |
| CC.14 | Compulsory Features | The Powersource shall have Features like a) Gas / Wire Inching Facility b) Spatter Control Facility c) Gas Pre-flow / Post-flow Facility d) Crater Control & Fill | | |
| CC.15 | Insulation | Class "H" preferred – Tropical Working Conditions | | |
| CC.16 | Machine Cooling | Forced Air Cooling with interlock for tripping of the welding machine. | | |
| CC.17 | 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/Powersource against Thermal / Overload / Short-Circuit 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 d) Measures to nullify the effects of EMI (Electro-Magnetic Induction) generated | | |
| CC.18 | Portability | Under-Carriage with hard rubber lined wheels for portability of the powersource by manual pushing | | |
| CC.19 | Ambient Conditions | Temperature upto + 50 ° C ; Humidity upto 90 % but both upper limits do not occur simultaneously. | | |
| CC.20 | Load Compensation | Output variation due to line voltage fluctuation, cable heating or drift due to the use of long cable, to be eliminated. | | |
| CC.21 | Power Rating | BIDDER to indicate the Maximum Power Rating [in kVA] of the Powersource and the NO-LOAD Power Consumption in Watts. | | |
| CC.22 | Power Source Model | To Specify the Model of Powersource Offered | | |

| DD. EQUIPMENT SPECIFICATION : WIRE-FEEDER UNIT FEATURES | | | | |
|--|--|---|------------------------|-------------------|
| SI.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| DD.1 | Type | 4-Roll Drive [All Powered Drive Wheels] | | |
| DD.2 | Burn-Back Control | Compulsorily to be provided | | |
| DD.3 | Wire Sizes/Solid | 0.8 mm to 1.6 mm (Solid Wires) | | |
| DD.4 | Wire Sizes/Cored | 1.2 mm to 2.0 mm (Self-Shielded and Flux Cored Wires also) | | |
| DD.5 | Wire Feed Speed | 1.0 to 18.0 mtrs. / min. | | |
| DD.6 | Wire Feeder Motor | BIDDER has to indicate the Type of Motor used for wire feeding | | |
| DD.7 | Wire Spool Weight | Facility to hold wire spools of 15 to 20 kgs. of weight and spool diameter of 300 mm | | |
| DD.8 | Brake Torque on Wire Feeder Hub | Shall be of adjustable type. | | |
| DD.9 | 2 / 4 Track Facility | Torch latching facility to be provided compulsorily | | |
| DD.10 | Feed Rolls & Guides | Suitable for 1.2mm & 1.6mm Solid/Cored wires Suitable for 2.0 mm & 2.4 mm Self-Shielded Flux- Cored Wires | | |
| DD.11 | Connector for Torch | Euro / Unitized Connector with polymedium cable | | |
| DD.12 | 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 powersource and the wire-feeder. | | |
| DD.13 | Wire-feeding capacity | Shall be suitable for feeding welding wire through Welding Torches with 3.0 metre long, 4.5 metre long and 10.0 mtr. long cables [without the use of additional push or pull motor in the wire-feed line] | | |
| DD.14 | Wire Feeder Model | To specify the Wire-Feeder Model & Weight | | |
| | | | | |

| EE. EQUIPMENT SPECIFICATION : WELDING TORCH FEATURES | | | | |
|---|-----------------------|--|------------------------|-------------------|
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| EE.1 | Make | Only OTC / DAIHEN / DAIDEN (JAPAN) | | |
| EE.2 | Type | Goose-Neck, Gas cooled | | |
| EE.3 | Shielding Gas | CO ₂ , Argon or Mixture of CO ₂ & Argon | | |
| EE.4 | Cable & Connector | Polymedium Cable, Euro / Unitized Connector Adapter to suit DAIHEN/DAIDEN make Torch | | |
| EE.5 | Wire Sizes/Solid | 0.8 mm to 1.6 mm | | |
| EE.6 | Wire Sizes/Cored | 1.2 mm to 2.0 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 | Type A) – Rating | 300 / 350 Amps. @ 60 % Duty Cycle Torch with 3.0 metre long cable. | | |
| EE.10 | Type B) – Rating | 300 / 350 Amps. @ 60% Duty Cycle Torch with 4.5 metre long cable. | | |
| EE.11 | Type C) – Rating | Minimum 350 Amps. @ 60% Duty Cycle Torch with 10.0 metre long cable. | | |
| EE.12 | Torch Models & Weight | To specify the Models and the Torch Weight for Type A, Type B and Type C ratings, in the OFFER | | |
| FF. EQUIPMENT SPECIFICATION : REMOTE CONTROL UNIT FEATURES | | | | |
| Sl.No. | FEATURES | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| FF.1 | Type | Hand Operated with 10 mtrs. long control cable with end connectors | | |
| FF.2 | Control | Stepless Variation of Welding Current & Voltage | | |
| FF.3 | 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 Powersource (110 V or 230 V - AC) thro' 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 : | | | | |
| S.No. | ITEMS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| HH.1 | Power Source | All type of Spares including IGBTs, 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 0.8, 1.2 , 1.6 and 2.0 mm dia. suitable for Solid & Cored Wires), wire-feed motor, wire guides, control PCB cards, connectors, etc. shall be offered . To be LISTED ITEMWISE | | |
| HH.3 | Remote Control Unit | Complete Set of Remote Control Unit and its Spares like Knob, Potentiometer, etc. to be OFFERED | | |
| HH.4 | Welding Torch | Consumables & Spares such as Liners & Contact Tip (suitable for 0.8, 1.2 , 1.6 and 2.0 mm dia. Wires), Contact Tip Body, Gas Nozzles, Insulator, Orifice, 'O' Ring, Adaptor 'O' Ring, etc. shall be offered for all the three types of Torches. To be LISTED ITEMWISE. | | |
| | | | | |

| II. O & M MANUALS : | | | | |
|--------------------------------|--------------------|--|------------------------|-------------------|
| S.No. | PARTICULARS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| 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 : | | | | |
| S.No. | PARTICULARS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
| 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 | | |

| S.No. | PARTICULARS | BHEL SPECIFICATION | OFFER BY BIDDER | DEVIATIONS |
|-------|------------------|---|-----------------|------------|
| JJ.4 | Guarantee | The equipment shall be guaranteed for a minimum of twelve months from the date of commissioning & performance prove-out at BHEL/Trichy Works. | | |
| JJ.5 | Bought-Out Items | a) The Bought-Out Items - like Motors, ICs, Relays, Contactors, Switches, Electronic Elements, etc., used in the Powersource & 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 . | | |
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