PART A

QUALIFYING CRITERIA FOR THE SUPPLY OF INVERTER CONTROLLED AC/DC PULSED GTAW (TIG WELDING) POWER SOURCE - 350 AMPS RATING – 1 No.

SECTION : I - The BIDDER is expected to give complete details against each clause in the table given below and wherever necessary additional sheets may be attached (giving clear reference number) to cover the requisite details.

S.No.	PARTICULARS	VENDOR'S RESPONSE
01	Number of Years of Experience of the VENDOR (Original Equipment Supplier) in the field of design, manufacture and supply of 'INVERTER/IGBT CONTROLLED AC/DC TIG Welding Machines for Radiographic Quality Welding Applications for Pressure Parts Fabrication	
02	YEAR of LAUNCH of the MODEL quoted against this ENQUIRY - Vendor to Specify	
03	Number of 'Inverter Controlled AC/DC TIG Welding Machines supplied to FABRICATION / MANUFACTURING INDUSTRIES, till date in the QUOTED MODEL	
04	Number of 'Inverter Controlled AC/DC TIG welding Machines (350 Amps. Rating with 60 % Duty Cycle)' supplied and commissioned till date for the following category of CUSTOMERS - to decide upon the acceptance level a) High Pressure Boiler Industries b) Ship Building Applications C) Heat Exchangers / Pressure Vessels	
05	Details on International Standards followed in Design and Testing of the subject model of Welding Machines – copies of the relevant standards (IEC/EN/ISO) to be furnished with the TECHNICAL BID compulsorily.	
06	Comprehensive Details on Performance Testing of Welding Machines carried out at the Factory to be furnished with the TECHNICAL BID compulsorily.	
07	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished compulsorily - to ensure continuous equipment availability.	
08	VENDOR 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 VENDOR's offer need to compulsorily contain the following to get qualified for submitting an offer for the 'Inverter Controlled AC/DC TIG Welding Machine'.

S.No.	PARTICULARS	VENDOR'S RESPONSE
9	The VENDOR shall have a minimum of TEN Years of Continuous Experience in the Design, Manufacture & Supply of 'Inverter Controlled AC/DC TIG Welding Machines (for quoted model).	

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

S.No.	PARTICULARS	VENDOR'S RESPONSE
10	The VENDOR should have supplied a minimum of 50 number of 'Inverter Controlled AC/DC TIG WELDING MACHINES with rating 350 Amps.(@ 60 % Duty Cycle) and above to Customers in India. VENDOR has to furnish the customer list with contact details, giving the number of such Welding Machines supplied to them.	
11	Performance Certificate from minimum TWO CUSTOMERS [Heavy Engineering / Fabrication Companies] with full contact details of CONTACT PERSON (who are the End Users of the WELDING MACHINE MODEL given under the above clause No.10) to be provided with the TECHNICAL OFFER. [A format is enclosed under ANNEXURE-A for use by the vendor's customers, to give the PERFORMANCE CERTIFICATE]	

SECTION : III - The VENDOR has to comply with the following, for accepting the Technical Offer for scrutiny and evaluation by the Purchaser

S.No.	PARTICULARS	VENDOR's COMPLIANCE
12	The VENDOR shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial Terms and Price Bid.	
13	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the VENDOR, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION 'or similar words in the technical offer may lead to disqualification of the Technical Offer	
14	The VENDOR shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works.	
15	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODEL of Welding Powersource.	
16	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	Earlier performance & field experience (service support) with BHEL (if any) will be a reckoning factor for the technical qualification of the OFFER.	
18	The expected delivery period (including the time for Pre-Dispatch Inspection clearance by BHEL) for the welding machine is not more than 20 weeks from the date of issue of BHEL Purchase Order.	

Enclosure : ANNEXURE – A (Performance Certificate)

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

ANNEXURE-A

PERFORMANCE CERTIFICATE

The Performance of the subject model Welding Powersource should be certified by the customer on Customer's Letter Head, in the following pattern/format and submitted along with the TECHNICAL OFFER positively.

1.0	Name of the Machine Supplier (OEM)	:
2.0	MODEL/MAKE of the Welding Machine	:
3.0	Month & Year of Commissioning of the Machine	:
4.0	Brief Details on the Application/Use of the Machine	:
5.0	Performance of the Welding Machine stated above	: Very Good / Satisfactory / Not Good
6.0	Availability of the Welding Machine stated above	: Good / Poor
7.0	Service After Sales support given by the OEM / Indian Representative, including spares supply	: Satisfactory / Not Satisfactory
8.0	Special Remarks / Recommendations	:

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

To

DGM / Purchase

MM / SERVICES

BHEL /TRICHY – 620 014

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

PART B

TECHNICAL SPECIFICATIONS FOR INVERTER CONTROLLED AC/DC PULSED GTAW (TIG WELDING) POWER SOURCE - 350 AMPS RATING – 1 No.

S.No.	SPECIFICATION PARTICULARS	VENDOR's RESPONSE
1.0	**Application :** The proposed Welding Powersource is intended for use in manual welding modes for the processes GTAW (with and without PULSED Mode) and SMAW process for Radiographic Quality Welds like Butt Joints (coming in plates and pipes), Fillet Welds, and Single Groove Welds with 350 Amps power rating	
2.0	**Machine Configuration :** To suit to the below given applications	
2.1	Welding Powersource shall be portable with Transport Trolley provided with rubberised wheels and to have in-built cooling unit (or integrated chilling unit) and facility for carrying Argon Gas Cylinder also.	
2.2	Manual Arc Welding (MMAW) Control Unit Integrated with Power source (For Hot Start & Arc Dynamics Control)	
2.3	Power source shall be suitable for AC & DC pulsed TIG Welding and GTAW Welding with High Frequency unit and also with Scratch Start	
2.4	Hand Operated Remote Control Unit for Current Variation for the above options under Clause 2.3	
2.5	Foot Operated Remote Control Unit for Current Variation (with accelerator type operation)	
2.6	Set of Inter-Connecting Cables, Hoses, Quick-fix connectors, Adaptors, etc.	
2.7	Welding Cable and Welding Holder for Manual Arc Welding for a length of 15 mtrs. from the Welding Powersource	
2.8	Return Current Cable with Screw or Crocodile Grip Earth Clamp with 15 mtr. length	
2.9	Gas Cooled TIG Welding Torch, and Water Cooled TIG Welding Torch with rating not less than 160 amps. and 220 amps. respectively	
3.0	**Powersource Features :** Suitable for SMAW/MMAW, GTAW and Pulsed GTAW in AC and DC modes under selection	
3.1	The Powersource shall be Inverter (IGBT) Controlled having options for plain AC & DC welding and pulsed AC & DC welding (with or without high frequency unit for arc striking) and capable of delivering a smooth Constant Current even with a fluctuation of 10 % in the Input Electrical Power Voltage	
3.2	The make of the IGBT used and the Switching Frequency of the Inverter Circuit have to be furnished. {BHEL has the right to reject the offer, if IGBT of internationally reputed companies are not used in the Powersource)	

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

S.No.	SPECIFICATION PARTICULARS	VENDOR's RESPONSE
3.3	Output Current Rating shall be a minimum of 275 Amp. @ 100 % Duty Cycle and 350 Amps. @ 60% DC	
3.4	Operating Range for Welding Current : For GTAW - 05 Amps. to 350 Amps. and for SMAW - 10 Amps. to 350 Amps. (all with step less variation)	
3.5	The preferred Open Circuit Voltage (OCV) for the offered Powersource is above 65 Volts. The Vendor to specify is the same for the offered model.	
3.6	The Electrical Power Input will be through a 415 ± 10% V AC, 3 Phase, 50± 2% Hz, through a 3 Wire System [4th wire for EARTHING] – No Neutral Conductor	
3.7	Suitability for Materials to be welded : Low & Medium Alloy Carbon Steels, Austenitic Stainless Steel, Aluminium Alloys, Titanium Alloys and Nickel Alloys.	
3.8	The variation in the set value of the welding current to the actual value, shall not exceed 1 %. .	
3.9	Factory Installed Digital Ammeter & Voltmeter on the front panel shall be with easy removal and replacement for periodic instrument calibration	
3.10	Insulation Class "H" – to suit Tropical Working Conditions	
3.11	Powersource shall be provided with an Input Power Cable of minimum FIVE meter in length (power cable to have protective sheathing)	
3.12	Control Panel to have Switches for Power ON / OFF, Remote ON / OFF, Voltage & Ampere Control, Polarity Change, Pulse Control, Weld Sequence Control, Gas Pre and Post Flow Controls, AC Wave form Control , Hot Start Control, Spot Weld Control, GTAW/SMAW Mode Selection, etc.	
3.13	Pulse Control in DC mode : upto 5000 pulses /second Pulse Control in AC mode : up to 500 pulses /second	
3.14	Current Up-slope & Down-slope Control : Up- slope : from 0 to 50 seconds Down-slope : from 0 to 50 seconds	
3.15	Shielding Gas Control : Pre-flow time : from 0 to 25 seconds Post flow time : from 0 to 50 seconds	
3.16	Arc Dynamics Control : Electronic Inductance Variable Control shall be ensured to minimise spatter and optimise weld- bead wetting action, during welding of special materials like Aluminium and Titanium Alloys.	
3.17	Machine Cooling : The Powersource shall have forced air cooling system that ensures adequate cooling of the components while preventing dust and metal particles from being drawn in.	
3.18	Power Rating [in kVA] of the Powersource and the power consumption [in Watts] at NO-LOAD condition to be specified.	

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

S.No.	SPECIFICATION PARTICULARS	VENDOR's RESPONSE
3.19	Functional / Elemental Design Protection - a) In-built protection for the IGBT in 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 and Construction	
3.20	MODEL Number of the Powersource offered	
4.0	**REMOTE CONTROL UNIT FEATURES**	
4.1	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	Hand Operated (for SMAW/GTAW) and Foot Operated (for GTAW) with 10 mtrs. Long control cable with quick-fix type end connectors to be offered. Details to be provided with catalogues.	
4.3	To ensure Step- less Variation of Welding Current through the REMOTE CONTROL Units offered	
5.0	**TIG WELDING TORCHES' FEATURES**	
5.1	Suitable for GTAW Process and for the nature of welding works listed under Clause Sl. No. 1.0 & 3.7 shall be possible with the offered welding Powersource .	
5.2	Reputed international makes such as WELD-CRAFT / LINCOLN ELECTRIC / MILLER of USA, KEMPPI of FINLAND, OTC/PANASONIC of JAPAN to be quoted	
5.3	Torch Configuration preferred : The Torch Head – Gas Lens & Nozzle configuration shall be suitable for performing the following weld joints : a) Tube Butt Welds in close pitched tubular panels with a minimum clear gap of 12 mm between the adjacent tubes [Gas Nozzle end diameter is to be 10 mm for a length of 25 mm] b) Root GTAW pass welding in a 100 mm (wall thickness) Pipe Butt Welds [Gas Nozzle End diameter is to be around 12 mm for a length of 45/65 mm]	
5.4	Protective Sheathing to be provided for the TIG Torch Cables & Hoses, to withstand shop floor rough use for the entire length of the cables / hoses assembly.	

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

S.No.	SPECIFICATION PARTICULARS	VENDOR's RESPONSE
5.5	VENDOR to quote for Water Cooled and Gas Cooled Torches with rating of 220 to 240 Amps. @ 100% Duty Cycle and 150 to 180 Amps. @ 100 % Duty Cycle with Cable Length : Not less than 4.0 Metres	
6.0	**Operation & Maintenance MANUALS**	
6.1	Three Copies in printed formats (HARD PAPER COPY) and One Copy in the CD Form / Pen Drive	
6.2	Language of O&M Manual : English only	
6.3	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 guidelines for various base metals & joint designs, etc. d) Master List of Parts & Spares used in the machine with Make, Model, Rating, etc.	
7.0	**SPARES : <u>The supplier has to compulsorily submit the quote for all the undermentioned spares along with the Powersource Offer</u>**	
7.1	**SPARES FOR Power Source** - All type of Spare Parts NECESSARY FOR 2 YEARS OF TROUBLE FREE OPERATION including the following items 1 IGBT Kit ----------2 Nos. 2 AC/DC Change over Switch ---------- 1 No. 3 Control-Transformers --2 Nos. 4 PCB – complete set ---------1 Set 5 Ignition Device Board---------- 1 Set 6 Controller ---------- 1 Set 7 Rectifiers, Thermistors, Capacitors---- 1 Set 8 Anti-Interference Board ---------- 1 Set 9 Switches & Knobs Main Switch ---- 1 Set	
7.2	**SPARES for TIG Torch :** 01 Tungsten Electrode (Ceriated)- 2.4X150mm - 50 No's 02 Collet 2.4mm ----------20 No's 03 Collet body 2.4mm ---------- 20 No's 04 Ceramic Nozzle 6mm ID ---------- 20 No's 05 Ceramic Nozzle 10mm ID---------- 20 No's 06 Ceramic Nozzle 12mm ID ----------20 No's 07 Torch switch with cable ---------- 05 Nos. 08 Long Cap ---------- 15 No's 09 Short Cap ---------- 15 No's 10 Gas Lenses---------- 15 No's 11 "O-rings---------- 100 No's 12 Torch Body for both models ---------06 Nos. 13 Complete Torch set air cooled ------ 02 Nos. 14 Complete Torch set water cooled ---02 Nos.	

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.

S.No.	SPECIFICATION PARTICULARS	VENDOR's RESPONSE
7.3	**SPARES FOR HAND REMOTE CONTROL UNIT** 01 Potentiometer for Hand remote ---- 2Nos. 02 Potentiometer Knob ---------- 2Nos. 03 Full Hand Remote Control Unit --------1No. (with 3 / 5 mtr. Cable length)	
8.0	**GENERAL INSTRUCTIONS**	
8.1	**Inspection** a) The welding machine shall be offered for (PDI) inspection by BHEL Engineers at supplier's works for performance evaluation prior to despatch. b) Welding Trials are to be taken on butt joints of carbon & alloy steel tubes [size around OD 51.0 mm & 4 mm wall thickness] c} VENDOR to arrange for Tubes & Electrodes of 2.5/3.15 mm of Class E-7018-1/E-9018-B3 for SMAW and 2.4 mm x 1000 mm Filler Wires of Class ER 90 S-G (2.25 % Cr-1% Mo) and ER 80 S-G (½ Mo) for TIG Welding trials.	
8.2	**Commissioning :** The equipment shall be commissioned, free of cost by the supplier's representative at BHEL Works.	
8.3	**Prove out Trails at BHEL :** During commissioning, the commissioning engineer has to prove the capability of power source as per clause 1.0 and 3.7	
8.4	**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 Machine.	
8.5	**Guarantee :** The welding machine in total and the components shall be guaranteed for a minimum of 12 (twelve) months from the date of commissioning & performance prove-out at BHEL/Trichy Works. In case of pre-matured free replacement has to be effected at the cost of the supplier, including freight, insurance, taxes & duties, etc.	
8.6	**AMC Rate :** **The vendor has to quote for the AMC (Annual Maintenance Contract) for the machine for a period of two years, after the guarantee period of 12 months.**	

C.RENGARAJAN
Sr. Development Engineer
Welding Research Institute
BHEL, Trichy - 620014.