Government of India
Bhabha Atomic Research Centre
Laser & Plasma Technology Division
Trombay, Mumbai-400085

REF: LPTD/works/VCM/ 209518

Date: 01/11/2018

Sub : **Minor Fabrication - invitation of quotations.**

Dear Sirs,

1. Quotations are invited for the Supply and Installation of Vertical packaged Fully Automatic, Electrical Steam Generator with specifications and details as per Annexure-D.
2. Bidder shall quote for fabrication of these components with material.
3. Taxes and excise duties shall be quoted separately. Form AF shall be provided where necessary.
4. The quotations must reach, ***Head, Laser & Plasma Technology Division*** by **08.11.2018** and must be sent in a sealed envelope ***super scribed*** with the above reference number and due date given above.
5. The address on the envelope should read :

   The Head,
   Laser & Plasma Technology Division
   Bhabha Atomic Research Centre,
   Trombay, Mumbai - 400 085.
   (Attn.: Vandana C. Misra)
6. The bidder shall have to take an insurance policy against any material issued to him by the purchaser.
7. The fabrication work shall be subject to inspection by our engineer.
8. The bidder shall, complete the work within ***60 days*** from the date the firm work order is issued to the bidder. Installation will be done at **PRIP Shed, Near Engg.Hall-8, BARC, Trombay, Mumbai-400 085.**

9. Head, Laser & Plasma Technology Division, BARC, reserves the right to accept/reject any or all quotations without assigning any reason.

Yours faithfully,

Head, Thermal Plasma Technology Section

वैज्ञानिक अधिकारी (जी) / SO (G)
अध्यक्ष, थ प्ला प्रौ अ / Head, TPTS
ले एवं प्ला प्रौ प्र / L & PT Division,
भा प अ केन्द्र / Bhabha Atomic Research Centre
मुंबई 400 085. / Mumbai 400 085

Encl.: **As above.**

Copy to: Accounts Officer, G.S.S. The quotations will be opened at 3.30 PM on 08.11.2018

Annexure-D

1. Justification and Scope of work:

Thermal Plasma Technology Section of Laser & Plasma Technology Division is involved in design and development of plasma torches for departmental applications. One such work demands the conversion of steam into H & OH radicals. For the same application, the present work involves fabrication of a Steam generator with specifications and details mentioned below. There is no free issue of material. Scope of the work includes procuring material of appropriate dimension, quantity and quality, fabrication of the components as per the specification, assembling of the components to form the final device, delivery of the item and installation at the users place. Welding of the joints as necessary must be performed by certified welders only. Work shall be carried out to Indian Standards and Code of Practices. In absence, latest issue of International Standards shall be followed. Any discrepancies / conflict noticed shall be directed to the Executing Officer for his direction/approval. Required precision and material of construction are provided for proper budgetary estimate. It is clarified that scope of work includes requisite D. M. Plant, storage tank, water & steam line, civil work, electrical wiring up-to panel box, earthing tools & tackles, utilities, consumables, erection & commissioning. For steam line, it must be properly insulated to avoid condensation. Length of the steam line to be provided is 5m±10%. Being an R&D work, the bidder must quote including a maximum of 5% change in the mentioned specifications while fabrication.

2. Design Specifications

1.	Steam generation Capacity @ 100 °C	5.5 Kg/h
2.	Type	Vertical packaged Non –IBR Fully Automatic, Electrical Steam Boiler
3.	MOC a) Plates b) Electrical Heater	 IS 2062 SS 316
4.	Heater Details a) Quantity b) Each heater	 3 Nos. 2kW
5.	Thermal Efficiency	99% or higher
6.	Working Pressure	3 kgs/cm^2
7.	Electrical Load: a) Heaters b) Feed Pump motor	 6 kW 0.5 HP

3. Detail Specifications:

3.1 Working principle & construction:

The boiler should be designed to give a steady supply of dry steam under fluctuating loads. It should be fully automatic with additional provision for manual operation and should be able to generate steam within a very short time after cold start. Dry steam should be generated through heating by the electrical heating elements immersed in water and steam should be released only after appropriate pressure builds up. It should be portable skid mount and readily deployable. Only 3 phase electrical connection in main control panel box and proper separate earthing and inlet water connection to feed pump will be provided at site.

3.2. Steam chamber:

This steam chamber must consist of shell fabricated from IS 2062 Grade plates of requisite thickness. It should be duly insulated with glass wool and cladded with Aluminium sheets to minimise radiation losses. Electrical heaters must be electrically isolated with the main body.

3.3. Feed pump motor and main base frame:

It must include a positive displacement type piston pump coupled with suitable motor and mounted on the main base frame. Main Boiler and control panel should be mounted on the same frame.

3. 4. Mounting & fittings:

The fabricated equipment must include the following fittings:

1. Pressure Switch ….1 NO.
2. Steam stop valve .....1 NO.
3. Air vent / Auxiliary valve .....1 NO.
4. Safety valve .....1 NO.
5. Horizontal Non-return valve .....1 NO.
6. Blow down valve .....1 NO.
7. Water level indicator .....1 NO.
8. 4" dial type pressure gauge with syphon & cock .....1 NO.
9. Strainer in feed pump line .....1 NO.
10. Mobray controller …..1 NO.

3. 5. Instrumentation:

3.5.1 Pressure switch:

Once the steam pressure is built up to the desired pressure level, the pressure switch must cut off electric supply to electrical heater and it must switch the electric supply ON when pressure is below the set value. 'Switch on' mode of pressure switch must be indicated on main panel board.

3.5.2 **Mobray controller**:

Mobray Water level control system must ensure automatic starting & stopping of feed pump to maintain safe water level. It must be regulated by magnetic switches provided for high level, low level & extra low level. Audio alarm system must be incorporated in the control system to ensure everything is `fail safe' in an emergency

3.5.3 Safety valve:

It should be set little higher than normal working pressure and must blow if the pressure exceeds the set limit.

3.6. Control panel:

It must be mounted on the front side and next to the steam chamber. It must be prewired and complete with Main switch, contactors, fuses, O/L relays, Ammeter, Voltmeter, Selector switch, Switches for pumps, heater and indicating lamps.

3. 7. Painting & insulation:

The complete unit must be duly painted with heat resistive paint on the steam chamber and synthetic enamel of primer on the base frame & panel box. It must be insulated with glass wool and cladded with aluminium to prevent radiation losses.

3.8. Battery limits:

Battery limits must be provided for the following:

a) Steam stop valve
b) Air vent / Auxiliary valve
c) Blow down valve
d) RYB connection in panel box
e) Inlet of feed water pump

4. Qualification Test Procedures

The fabricated device will be tested at the supplier's works as per the following details. Equipments/meters/tools/utilities/consumables required for the qualification purpose will be

arranged by the vendor during testing of the machine at the works of the supplier. Representative from the indenting officer will visit the works of the vendor time to time during fabrication and inspect the progress and quality of job. The final qualification test will be done as per the following norms:

4.1. The system will be checked for installed components.
4.2 The system will be checked for safety interlocks, correct set limit of the valves, switches and alarms.
4.3 The system will be checked for its overall function and workmanship
4.4 The system will be checked for rated throughput of steam, power consumption, quality of steam produced and delivery through the fabricated steam line of desired length.