



सत्यमेव जयते

भारत सरकार  
Government of India  
भाभा परमाणु अनुसंधान केंद्र  
Bhabha Atomic Research Centre  
चूर्ण धातु विभाग  
Powder Metallurgy Division

वी.ए.आर.सी वाशी कॉम्प्लेक्स  
BARC Vashi Complex  
नवी मुंबई 400703 -  
Navi Mumbai - 400703  
दूरभाष (Tel): 91-22-2887182

Ref.: PMD/Tender Inv/2022/782

May 17, 2022

**Sub.: Fabrication and supply of heating system for high temperature electrolyser cell along with miscellaneous accessories as per annexure A.**

भारत के राष्ट्रपति की ओर से, धातु चूर्ण विभाग, वाशी कॉम्प्लेक्स, नवी मुंबई- 400 703 में किए जाने वाले निम्नलिखित निर्माण / मरम्मत कार्य के लिए अधोहस्ताक्षरी द्वारा उद्धरण आमंत्रित किया जाता है। For & on behalf of the President of India, quotation is invited by the undersigned for following fabrication / repair work to be carried out at Powder Metallurgy Division, Vashi Complex, Navi Mumbai- 400703.

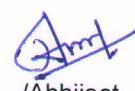
**Fabrication and supply of heating system for high temperature electrolyser cell along with miscellaneous accessories as per annexure A**

सीलबंद कवर में उद्धरण " **Miscellaneous works at PMD Annex building as per annexure A.**" निम्नलिखित अधिकारियोंको संबोधित किया जाना चाहिए, उसे स्पीडपोस्ट/ पंजीकृत डाक द्वारा भारतीय डाक सेवा के माध्यम से निम्नलिखित तारीख या समय से पहले उस तक पहुंचना चाहिए। The quotation in sealed cover superscribed as "**Miscellaneous works at PMD Annex building as per annexure A.**" and addressed to the following officials should reach him/her by **Speed Post/Registered Post** through Indian Postal Service on or before the date and time mentioned below.

<b>Shri. Abhijeet Kalaskar, Scientific Officer 'D' Powder Metallurgy Division, BARC Vashi Complex, Navi Mumbai – 400703</b>	<b>On or before 31/05/2022</b>
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कार्य का दायरा इसके साथ संलग्न है। निविदा कर्ता को शब्दों के साथ-साथ आंकड़ों में भी लिखना चाहिए, उसके द्वारा उद्धृत दर। सभी सुधारों को निविदाकर्ता की दिनांकित आदतोंद्वारा सत्यापित किया जाना चाहिए। The scope of work is enclosed herewith. The tenderer should write in words as well as in figures, the rate quoted by him. All corrections must be attested by the dated initials of the tenderer.

काम / नौकरी के पूरा होने का समय तीन महीने है। कार्य आदेश जारी करने की तारीख से समान किया जाएगा। निविदा की स्वीकृति बिना किसी कारण बताए पूर्ण या भाग में निविदा को अस्वीकार करने के अधिकार के साथ अधोहस्ताक्षरी पर टिकी हुई है। The time for completion of work/job is three months. The same shall be reckoned from the date of issue of work order. The acceptance of the tender rests upon the undersigned with a right to reject the tender in full or part without assigning any reason.

  
अभिजीत कलसकर /Abhijeet Kalaskar  
वैज्ञानिक अधिकारी 'डी'/ Scientific Officer 'D'

## Annexure A

### **Fabrication and supply of heating system for high temperature electrolyser cell along with miscellaneous accessories as per scope of work.**

#### **Scope of work:**

#### **1. Heating system should have following specifications (Quantity = 01 Nos.):**

- 1.1 Construction of furnace should be vertical type with two halves easily amenable to opening and closing.
- 1.2 Dimension:
  - 1.2.1 Hot zone length = 200 mm.
  - 1.2.2 Uniform hot zone length = 120 mm.
  - 1.2.3 Useful working chamber zone: Height = 300 mm, ID = 100 mm
  - 1.2.4 Outer dimension: OD = 300 mm. Height = 400 mm.
- 1.3 No of heating zones = 1
- 1.4 Maximum working temperature = 1100C.
- 1.5 Routine Working temperature = 1000C
- 1.6 Accuracy of temperature should be +/- 1C or better.
- 1.7 Insulation material = high quality fiber alumina. Outer body temperature should not exceed 40C, accordingly double layer of insulation and air gap to be incorporated in proper location.
- 1.8 Heating element = Super grade Kanthal A1, should be able to dissipate heat rapidly for allowing failure free fast heating and cooling and uniformity of temperature though out the useful heating zone.
- 1.9 Temperature controller with programming features for setting heat treatment cycle to be incorporated.
- 1.10 Over temperature controller for safety purpose to be incorporated.
- 1.11 Thermocouple – N-Type thermocouple to be incorporated.
- 1.12 Power controller: Thyristorized power control with safety controller and thyristor unit for phase-angle firing.
- 1.13 Power supply system rated for single phase, 230V AC, 50 Hz, 4.5 KW
- 1.14 Warranty: 1 year from the date of installation.

#### **2. Accessories :**

#### **2.1 Programmable Temperature controller (Quantity = 02 Nos.):**

- 2.1.1 Dimension 48 WX48 H X90 Dmm
- 2.1.2 Panel : 1/16 DIN mounting 45W x 45Hmm cut out
- 2.1.3 Control mode: PID and On/Off
- 2.1.4 Supply voltage: 100-264 AC volts 50 Hz
- 2.1.5 Operating ambient 0-55oC , 0-90% RH

- 2.1.6 Inputs : T/C (K, J, N, R, S, B, L, T, C,) , 3-wire Pt100, mA, mV
- 2.1.7 Output : Relay Normally Open 2A 264 Vac, Logic drive to SSR (12V dc at 40mA), DC 0-20 mA at 500 Ohm load
- 2.1.8 Process value sampling rate 250ms
- 2.1.9 Resolution less than or equal to 0.5 micro volts or better
- 2.1.10 Input impedance 100 Mohm or high
- 2.1.11 Number of loops: 01 or better
- 2.1.12 Operator interface: LCD TN with backlight, 4 digits PV
- 2.1.13 Status beacons: Units, outputs, alarms, active setpoint
- 2.1.14 Controller mounted on sleeve with two panel retaining clips on sleeve
- 2.1.15 IP65 sealing gasket on sleeve
- 2.1.16 Controller should be provided with Snubber for each relay output and resistor for current inputs

**2.2 Temperature calibrator (Quantity = 01 Nos.) :**

- 2.2.1 Temperature range of calibration = 300C to 1200C
- 2.2.2 Accuracy =  $\pm 3^{\circ}\text{C}$
- 2.2.3 Stability  $\pm 0.1^{\circ}\text{C}$  at  $300^{\circ}\text{C}$ ,  $\pm 0.2^{\circ}\text{C}$  at  $700^{\circ}\text{C}$ ,  $\pm 0.35^{\circ}\text{C}$  at  $1200^{\circ}\text{C}$ ,
- 2.2.4 Radial uniformity  $\pm 0.15^{\circ}\text{C}$  at  $300^{\circ}\text{C}$ ,  $\pm 0.25^{\circ}\text{C}$  at  $800^{\circ}\text{C}$ ,  $\pm 0.4^{\circ}\text{C}$  at  $1200^{\circ}\text{C}$
- 2.2.5 Controlling Sensor R type duplex
- 2.2.6 Stabilization time 15 to 20 mins
- 2.2.7 Immersion depth 160mm
- 2.2.8 Insert OD dimensions 37 mm
- 2.2.9 Method of Control Self tuned PID Controller
- 2.2.10 Heating time 1.5 Hrs
- 2.2.11 Resolution  $1^{\circ}\text{C}$
- 2.2.12 Display LCD,  $^{\circ}\text{C}$ , or  $^{\circ}\text{F}$  user-selectable
- 2.2.13 Size (H x W x D) 590(H) x 450(W) x 530(D) mm
- 2.2.14 Power Requirement 230 VAC, 2.0 KW
- 2.2.15 Computer Interface RS – 232
- 2.2.16 Accredited calibration certificate to be provided

**2.3 Thermo-couple connector (Quantity = 02 Nos.):** Connector both male and female type, should be compatible with K, N type thermocouple.

**2.4 K-type thermo-couple (Quantity = 06 Nos.):**

- 2.4.1 Dimension : sheath dia = 0.5 mm, length = 500 mm,
- 2.4.2 Sheath material = Inconel-600
- 2.4.3 Conforming to ANSI MC 96.1 standards.

## Terms and Conditions

1. Safety: All the personnel of the contractor deployed for the work should follow the safety guidelines while working. Any mishap/injury occurring to the deployed personnel due to unsafe work practice shall be contractor's liability.
2. The contractor shall be sole responsible for any labor related dispute and any injury to contractor's worker during execution of the job.
3. FIM is not applicable for the work.
4. Payment: No advance payment will be made. Completion period for the job is three months. Payment shall be made on satisfactory completion of the job. Documentary evidence towards payment of GST (receipt/acknowledgement) may be furnished by the party. Income Tax @2% or as applicable at the time of billing will be deducted from your bill.
5. For any queries the party may contact Shri A. Kalaskar (Tel. No. 2788 7663) / Shri. Naresh Kolli (Tel. No. 2788 7152) on working day between 10:00 Hr. to 16:00 Hr.

