

दूरभाष/ Phone: 25595111
फैक्स/ Fax : +91-22-25505151
ईमेल/ Email : aawasthi@barc.gov.in



सत्यमेव जयते
भारत सरकार
Government of India

ट्रॉम्बे, मुम्बई-400 085
Trombay, Mumbai-400 085

भाभा परमाणु अनुसंधान् केन्द्र
BHABHA ATOMIC RESEARCH CENTRE
पदार्थ संसाधन एवं संक्षारण इंजीनियरी प्रभाग
Materials Processing & Corrosion
Engineering Division

Dr. ALOK AWASTHI
Head, Pyrometallurgy &
Metallurgical Thermodynamics Section

डॉ. आलोक अवस्थी

अध्यक्ष, तापधातुकी एवं
धातुकर्मीय उष्मागतिकी प्रभाग

सन्दर्भ/ Ref: MP&CED/P&MTS/AA/2017/1707

दिनांक/ Date: September 15, 2017

Sub: Invitation of Quotation for Design, fabrication, supply, installation of Data Acquisition and Control System for Thermoanalyser

Due date: **25th October 2017**

For & on behalf of the President of India, quotations are invited by the undersigned for following fabrication work:

“Design, fabrication, supply, installation of Data Acquisition and Control System for purchaser’s thermoanalyser. Detailed specifications and requirements are attached in Annexure 1.”

The prospective bidders are encouraged to see the thermoanalyzer before **October 13, 2017** and understand the complete scope for making it operational. Please contact the undersigned at **least two working days** in advance for arranging necessary entry permits.

The quotation should be sent in a sealed envelope. The envelope shall *clearly be superscribed* with the reference no., due date and with the words “**Quotation: not to be opened**”. It should be addressed to following person and should reach him/her by speed post/ normal post on or before the date mentioned.

Dr. Alok Awasthi
MP&CED
Mod Labs
BARC Mumbai 400085

On or before 25-10-2017

Instructions

1. The quotations are to be in printed letter head/ quotation format which should consist of GST Registration Number, PAN number of the firm, Service Tax Registration Number. Quotations received without signature, over-writing, summation errors etc. will be construed as invalid and thus rejected. The quotation should be sent in a sealed envelope. The envelope shall *clearly be superscribed* with the reference no., due date and with the words “**Quotation: not to be opened**”. It should reach the undersigned within the due date given above. The quotation reached after the due date will not be considered.
2. The contractor shall arrange all equipment and personnel required for the successful completion of the work and the department will not release any free-issue material except electricity and water.

3. Time of completion of job: 180 Days.
4. The offer shall be valid for a period of thirty days and in case of placement of the work order, shall remain firm till the completion of the work.
5. Quotation is to be printed in letter head/quotation format. Computer generated forms are to be construed as invalid and rejected.
6. The price quoted should include GST. Any other taxes, if applicable, should be indicated separately.
7. The prospective bidders are encouraged to see the thermoanalyzer before October 13, 2017 and understand the complete scope for making it operational. Pl contact the undersigned (aawasthi@barc.gov.in/ 022-25595111) at least two working days in advance for arranging necessary entry permits.
8. The installation work will have to be done in our laboratory inside BARC premises at Trombay, Mumbai.
9. Payment would directly be made by Accounts Division of BARC on satisfactory completion certificate from the user.

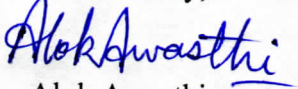
Confidentiality Clause

- A) No party shall disclose any information to any third party concerning the matters under this contract. In particular, any information identified as "proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party. This clause shall apply to the subcontractors, consultants, advisors, or the employees engaged by a party with equal force.
- B) **"Restricted information" categories under section 18 of the Atomic Energy Act, 1962 and "official secrets" under section 5 of the Official secret Act, 1923:**
Any contravention of the above mentioned provisions by any contractor, subcontractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.
- C) **Prohibition against use of BARC's name without permission of publicity purpose:**
The contractor, subcontractor, consultant, adviser or the employees of a contractor shall not use the BARC's name for any publicity purpose through any public media like press, T.V., radio or internet without the prior written approval of BARC.

Security Rules and Regulations

Rules and regulations of BARC Security have to be strictly followed by contractor. Contractor has to get photo passes issued from security for which Police Verification Certificate is a must. Police Verification Certificate is valid for only 3 years and need to be renewed after every 3 years.

Yours sincerely,


Alok Awasthi

Annexure 1

“Design, fabrication, supply, installation of Data Acquisition and Control System for Thermoanalyser”

A simultaneous TG-DTA (thermogravimetry - differential thermal analysis) thermoanalyser is to be made operational by providing a suitable data acquisition and control interface connected to a Linux (kernel 3.0 and above)/ Windows (XP and above) 2GB RAM standard user-provided PC through a USB port. The software required to control the thermoanalyser and produce preliminary results by the analysis of the data acquired is also to be supplied.

A thermoanalyser is an equipment in which the mass change and/or DTA signal of a chemical sample is observed as the sample is heated. DTA signal is generated by heating the sample kept in a DTA rod in which a reference material is also placed next to the sample. The DTA signal is the difference between the temperatures of the sample and the reference materials. The thermoanalyser works in two modes : TG alone (in which only the mass change in the samples is measured with change in temperature) and simultaneous TG-DTA (both the mass change and the DTA signals are recorded with temperature variation).

Following five analogue signals are to be processed.

1. *Furnace temperature*: This signal is generated using R-type (Pt/Pt-13%Rh), B-type (Pt-6%Rh/Pt-30%Rh), W-5%Re/W-26%Re or any other non-standard thermocouple selected by the operator. This signal is also used for the temperature control of the furnace in range of room temperature to 2300 °C.

2. *Sample temperature*: This is the temperature of the sample recorded from the DTA rod. (This is not used for controlling the temperature of the furnace). Provisions for all the thermocouples mentioned under “Furnace temperature” are to be made, of which only one thermocouple would be selected by the operator.

3. *DTA*: This signal is the difference between the temperatures of the sample and the reference. Various DTA rods having individual thermocouples for the sample and the reference would be used. However, one DTA rod would have the same type of thermocouple for the sample and the reference. Thermocouple types will be same as mentioned under “Furnace temperature”.

4. *Relative mass*: The thermoanalyser is equipped with a microbalance, which the beam of the balance is maintained at a constant position by a typical light source/ shutter/ photo cells arrangement. The mass change is instantaneously measured by the current flow in the arrangement required to maintain the beam position. The electronic details of this circuit are not known and will have to be generated by the vendor. The balance has an accuracy of 0.3 µg and records mass change from 200 mg to -200 mg. Thus, the mass gain or loss of up to 400 mg in a sample can be handled in one charge by having suitable tares.

5. *Water flow*: A water flow switch exists in the thermoanalyser giving some analogue signal that has to be assessed. When the water flow falls below a specified flow rate, the power to the heater should be switched off and suitable message should be displayed.

Electronic cold-junction temperature correction is to be provided for both the temperatures (i.e. furnace temperature and sample temperature). Provisions for calibrating the thermocouples by melting standard samples should be made in the software. Besides the above-mentioned five signals, the interface should also accept two additional (0-10V) signals. Sampling rates should be user-selectable between 0.05-1 seconds.

The current values of all the acquired data (i.e. signals converted to °C, mg, μV etc.) are to be displayed numerically in the software. These are also to be plotted graphically (complete graph since the start of the experiment or the current plot) as well on real time basis in the computer. The mass change data is to be differentiated with time (mg/minute) with 20 point smoothing filter and is also to be included in the real time display/ plot. The real time graph should also include the programmed temperature curve, and the operator should be able to display or hide it. All the data (acquired as well as that obtained by differentiation) should be stored in ASCII format. Besides the software should also allow displaying the stored data and its overlapping with the data currently being acquired. The user should be able to select the data to be displayed. It should be possible to plot the stored data with respect to time or temperature.

The same furnace is used with different thermocouples for reaching various temperatures. Control of temperature (i.e. the difference between the programmed temperature and the current furnace temperature being read) within ± 1 °C from room temperature to 2400 °C should be possible. The accuracy and the range of temperature achieved depends on the type of the thermocouple being used and the operating temperature.

The operator should be able to change the PID parameters for different thermocouples. Auto tuning of PID parameters should be possible. The software should also display the percentage of power being consumed at an instance and plot it graphically.

At least twenty stages of ramp and soak should be provided in the program with ten times cycling selectable by the operator. The control should support ramp rates between 0.5 °C/min to 100 °C/min in increments of 0.1 °C/min. It should be possible to override the programmed final temperature, soak time or the ramp rate (°C/min) of the currently running or a future sequence of the program in operation.

Three different amplifications may be used for the mass change data: upto 5 mg, upto 50 mg and upto 400 mg. Similarly, different amplifications may be used for the DTA signal: upto 50 μV, upto 500 μV and upto 5 mV. However, automatic change over to the next range should occur if the signal exceeds the initially programmed range.

Suitable software, all data and power cables and adaptors connecting the thermoanalyser through interface to PC also within the present scope.

SCR, firing circuit and the transformer is available and expected to be functional. However, the prospective bidders are encouraged to see the thermoanalyzer before October 13, 2017 and understand the complete scope for making it operational. Pl contact Dr. Alok Awasthi (aawasthi@barc.gov.in/ 022-25595111) at least two working days in advance for arranging necessary entry permits.