



Enquiry No.: MSE/SI/2015-16/IGSTC/heating/01

Enquiry Date: September 24, 2015

Closing Date: 5 PM, October 7, 2015 **Closing Date extended to 12/10/15, 5PM**

Quotations are invited for supplying an Infrared(IR)-heating based horizontal split tube furnace along with supporting units for a Selenization/Sulfurization set-up complying with or better than all of the specifications mentioned in **Appendix A**. The prospective suppliers are required to send quotation in two parts, each part sealed in a separate envelope. One part will be "Technical Bid" and second part will be "Financial Bid".

### Terms and conditions

1. Bidder must provide technical-bid using the file in **appendix B**, and financial-bid using the file in **appendix C**. Do not omit or rephrase any part of it. You may provide additional technical information which may be helpful in technical evaluation of the offered system. If a bidder doesn't provide technical specifications and pricing in the provided format the corresponding bid will be rejected.
2. In the price bid do mention the ex-works prices. Note that IIT Kanpur is registered with The Department of Scientific & Industrial Research (DSIR) for purposes of availing Central Excise duty exemption in terms of Government Notification No. 10/97-Central Excise dated 1 March, 1997 as amended from time to time.

In the case of incomplete information or missing information in the technical-bid and/or financial-bid, the offer from the corresponding bidder will be rejected.

3. Along with the technical-bid, the bidder must provide copy of PO it received from at least 3 academic institutions or research labs within India, along with the contact address, e-mail and phone number where, during 2012 – 2015 it has supplied and successfully installed an IR-heating horizontal split tube furnace capable of 1000°C or higher continuous operating temperature.
4. If the bidder has supplied similar product at IIT Kanpur during 2010 – 2015, then it must provide the name of contact person(s) corresponding to those labs/centres, complete mailing address, e-mail address, and contact phone number.
5. The Institute reserves the right to visit the site of any of the previous customer(s) where a similar unit has been installed by the bidder participating in the present enquiry and take decision based on the evaluation of that system. If required, the bidder should make arrangements for the site visit. The cost for the same will be borne by the indenter.
6. The offered system should have at least one year on site comprehensive warranty for all the parts.
7. The price bid must also show taxes, cost of packaging, insurance, delivery, installation and training at IITK, if any.
8. Validity of quotation should be at least for 60 days from the date of closing of the bid.
9. Quotation should carry proper certifications like agency certificate, authorization certificate, proprietary certificate etc. wherever applicable.
10. The bidder getting the purchase order will have to confirm the final details of the design, wherever applicable, before commencing the production.

11. The technical-bid must have a statement comparing the specifications of the offered system against the required specification in the present enquiry.
12. Installation, Commissioning and Training:
  - a) The delivery will be considered complete only after successful commissioning of the instrument and when all indented parameters are met.
  - b) The pre-installation requirements should be communicated to IIT Kanpur well in advance of the installation.
  - c) The supplier should provide training to at least two persons belonging to the installation site to make them familiar with smooth operation of the instrument.
  - d) Documents: User manuals and technical documentation available from the OEM of all the individual unites which are the part of the offered system should be provided.
13. For the indigenous parts the payment terms of 90% on delivery and 10% after installation and acceptance will be strictly followed irrespective of the terms mentioned by the bidder.
14. The technical bid will be opened on October 8 (Thursday), 2015 at 3PM in the Meeting Room of Stores and Purchase Section of IITK. Interested bidders are welcome to participate. In the case of change of venue due to unforeseeable reason it will be displayed on the website next to the link for the tender notice. No separate intimation will be given.
15. The date of opening of financial bid will be displayed on the website. Interested bidders are welcome to participate.
16. The indenter will be available for in-person discussion about the inquiry related matter on September 30 2015 during 2PM – 4PM at the address given below.

The Technical and Financial bids may be sent in sealed envelopes to

Dr. Sarang Ingole

Room No. 204, Western Labs Building

Department of Materials Sciences and Engineering

IIT Kanpur, U.P. 208016, India.

## Appendix A

Essentials			
Sr. no.	Part name	Description	Qty
1	Furnace	<p>An Infrared-heating based horizontal split-tube furnace to heat a planar substrate of maximum 1.5 inch x 1.5 inch surface area and about 3 mm thickness.</p> <p><u>Heating zone</u></p> <ul style="list-style-type: none"> <li>(a) Heated length of at least 10 inch</li> <li>(b) Uniform heating zone should be a cylindrical region of at least 1.5 inch diameter and 5 inch length along the axis of the tubular furnace.</li> <li>(c) Temperature uniformity of set-point <math>\pm 10^{\circ}\text{C}</math> in a uniform material placed in the heating zone when holding at <math>1000^{\circ}\text{C}</math>.</li> </ul> <p><u>Heating method, IR lamps, and reflecting mirrors</u></p> <ul style="list-style-type: none"> <li>(d) Heating method in this furnace would be through parallel beam of infrared light reflected using mirrors and directed on a substrate placed in the uniform heating zone (as described above).</li> <li>(e) It should have sufficient number of infrared lamps with adequate power rating to obtain the required high temperature and specified uniform temperature zone.</li> <li>(f) The mirrors and the reflective coating on them should be chemically and structurally stable up to the highest rated temperature of the furnace.</li> <li>(g) The mirrors should be highly reflective to direct maximum energy onto the object being heated.</li> </ul> <p><u>Compatible work tubes</u></p> <ul style="list-style-type: none"> <li>(h) It should accept quartz (<math>\text{SiO}_2</math>) work tubes with outer diameters (OD) ranging from 1.5 inch to at least 4 inch using the tube adapters.</li> </ul> <p><u>Temperature</u></p> <ul style="list-style-type: none"> <li>(i) Temperature should be controlled using the temperature controller.</li> <li>(j) Type-R thermocouple for temperature measurement as well as providing feed back to the controller should be supplied. Thermocouple including any extension to it should be of appropriate length such that while spanning the distance between the temperature controller and the susceptor platform (sample mount) there is enough slack for accommodating the movement of susceptor in and out of the furnace.</li> <li>(k) Furnace should be capable of achieving process temperature of at least <math>1000^{\circ}\text{C}</math> and capable of continuously holding at this temperature for at least 2 hours.</li> <li>(l) The maximum achievable temperature should be <math>1200^{\circ}\text{C}</math> or more.</li> <li>(m) Maximum heating rate to achieve a process temperature within the applicable temperature range for the furnace should be at least <math>50\text{degC/sec}</math> as measured by the thermocouple.</li> <li>(n) The controlled heating as well as cooling rate should be as low as <math>1\text{ degC/min}</math>.</li> </ul> <p><u>Safety features</u></p> <ul style="list-style-type: none"> <li>(o) All the necessary interlocks should be in place so that furnace could be stopped if necessary parameters for its safe operation are not met during the operation.</li> <li>(p) When water flow rate/pressure is/drops below the setting rate/pressure then the heating will not start/stop immediately.</li> <li>(q) When the furnace wall is over <math>50^{\circ}\text{C}</math> then the heating will not start/stop immediately.</li> </ul> <p><u>Compliance</u></p> <p>The OEM of the furnace should be certified for ISO9001.</p>	1

2	Temperature controller	<p><b>Temperature controller:</b> The furnace will have a separate temperature controller with following required specifications.</p> <ol style="list-style-type: none"> <li>Easy control of 100°C/s or higher temperature ramp rates at high speed sampling (50 ms)</li> <li>It should allow having a programmed heating and cooling rate as low as 1°C/min.</li> <li>Should be adaptable for thermocouples: JIS, K, S, B, R, E, J, T, W. It should also be capable of controlling the temperature using platinum resistance elements.</li> <li>It should accept both time and temperature.</li> <li>It should be capable of storing at least 8 programs with each program having at least 32 segments.</li> <li>It should come along with software program for temperature program settings and external signal input from a computer.</li> <li>The controller and the cable interfacing it with the furnace should support high data flow rate to support control and measurement of temperature during high heating rate.</li> </ol>	
3	Chiller	<p>A close loop water circulation based chiller to support the cooling requirement of the offered IR furnace.</p> <ol style="list-style-type: none"> <li>Cooling capacity: 6KW</li> <li>Flow rate &amp; pressure : 10LPM, 0.3MPa</li> <li>All the parts inside the water tank, even the screws that come in contact with the circulating water should be corrosion free.</li> <li>It should have microprocessor based controller with front panel display to show temperature set value, current value, voltage etc.</li> <li>It should be equipped with ball-valves on water outlet, inlet, and drain ports.</li> <li>Water outlet port should have appropriate pressure gauge and flow meter to read the required flow-rate and pressure.</li> <li>It should have knob to adjust the pressure of outlet water.</li> <li>Temperature Stability : ± 2°C</li> <li>Cooling Media : Distilled water</li> <li>Ambient Temperature for operation: 5°C - 45°C</li> <li>Inbuilt water reservoir with capacity of at least 35 liters</li> <li>Allowable voltage variation : ± 10%</li> <li>All water plumbing done with SS304 parts</li> </ol> <p>Following <b>safety interlocks are must:</b></p> <ol style="list-style-type: none"> <li>HP and LP trip</li> <li>AFT and SPP trip</li> <li>LT/HT alarm</li> <li>Potential free contact</li> <li>Over current trip.</li> </ol>	
4	Any other part	<p>The bidder should indicate if there is any other necessary unit(s) essential for the operation of the offered furnace. In that case the bidder must provide information about the make, and technical specifications of these supporting units.</p>	

- For the offered items the bidder must supply the technical specification as available with the OEM, wherever applicable.
- Parts in the offered units must not be a discontinued item by the OEM at the time of bidding. The offered model must be displayed in the products category on the website of OEM.

-----End of Appendix A-----

## Appendix B

### Format in which the Technical Bid must be submitted

**Enquiry No.: MSE/SI/2015-16/IGSTC/heating/01**

**Provide the technical information for the offered system by completing the questioner below.**

**Note:**

- A cell in the following Form may be resized in order to accommodate the required information.
- A space has been provided to supply additional information.

Sr. no	Part name	Technical specifications/details		Qty
<b>Essential Items</b>				
1	Furnace	Furnace outer dimensions	Make of the furnace → Model No. of the furnace → Outer dimension of the furnace →	1
		Heating zones	1. Total heated length Response from bidder →  2. Uniform heating zone Response →  (Add more entries as per the requirement)	
		Heating method, IR lamps, and reflecting mirrors	IR Lamps: 1. Number of lamps → 2. Does the reflected IR form parallel beam?(yes/no) → 3. Length of an individual lamp → 4. Mirror shape: (cylindrical, parabolic) → 5. What is the coating material on mirrors → 6. Are the mirrors and the coating material structurally, chemically stable at high temperature? →	

		Compatible tubes	Indicate the minimum and maximum tube diameters (OD) that the furnace can accommodate→		
		Temperature	<ol style="list-style-type: none"> <li>1. Is there a temperature controller for controlling the temperature(yes/no)→</li> <li>2. What is the Type of thermocouple offered→</li> <li>3. Is the thermocouple of appropriate length so as to span the distance from middle of the furnace and the temperature-controller?→</li> <li>4. Indicate the maximum temperature attainable by the furnace→</li> <li>5. How long (hours) can the furnace be operated at his temperature→</li> <li>6. What is the continuous working temperature→</li> <li>7. What is the maximum heating rate possible→</li> <li>8. What is the minimum heating rate possible→</li> <li>9. What is the minimum cooling rate possible→</li> </ol>		
		Safety features	<ol style="list-style-type: none"> <li>1. Is there an Interlock to check the cooling water flow rate and pressure? →</li> <li>2. Is there over heating protection→</li> </ol>		
		Compliance to standards	Is the OEM of the offered IR furnace ISO9001 certified? →		
		In the space provided below list any additional information about the chamber, or the related document that you have provided as a part of the technical-bid			
2	Temperature controller	Make of the temperature controller →			
		Model No. of the controller →			
		Is the temperature controller programmable and equipped for computer control	(Yes/No)		
		Number of programs that can be created and saved in the temperature controller			
		Number of segments possible in each programme			
		Does it allow controlling the heating and cooling rate of the furnace down to 1 deg C/min?	(Yes/No)		

		Does it allow controlling the heating rate as high as 50C/min?	(Yes/No)
		What is the highest sampling rate (baud rate) for data collection by the controller and interfacing cable between the furnace and controller?	
		Is the software to operate this controller included in the offer?	
		Does it allow temperature and time to be used as parameters for controlling the heating of furnace?	(Yes/No)
		Indicate the type of thermocouples that can be used with the controller	
		In the space provided below, list any additional information about the sputter guns, or related document that you have provided as a part of the technical-bid.	
3	Chiller	<p>Make of the chiller:</p> <p>Cooling capacity :</p> <p>Maximum controllable pressure for chilled water output:</p> <p>Minimum controllable pressure for chilled water output:</p> <p>Maximum controllable flow rate:</p> <p>Minimum controllable flow rate:</p> <p>Temperature stability:</p> <p>Water tank capacity:</p> <p>Material of construction for water tank including every other part that is submerged in this tank:</p> <p>Power supply applicable:</p> <p>Is the water plumbing material SS304:</p> <p>Make of the motor:</p> <p>Make of the pump:</p> <p>Make of the fan motor:</p>	

	<p>Does it have ball valve on all the water transfer ports:</p> <p>Does the water outlet port have pressure gauge and the flow meter?</p> <p>Does it have microprocessor based temperature controller?</p> <p>Does it have following safety interlocks?</p> <p>19. HP and LP Trip →</p> <p>20. AFT and SPP Trip →</p> <p>21. LT/HT Alarm →</p> <p>22. Potential free contact →</p> <p>23. Over current trip →</p>	
<p><b>If there is any other part/accessory essential for the operation of the furnace, give its full technical specification.</b></p>		

**List of the document that have been sent in the envelop titled Technical-bid**

1. Appendix B
2. Copies of the PO from at least three reputed academic institutes or research labs within India as per the **Terms and Conditions** mentioned in the inquiry letter.
- 3.
- 4.

(Add more entries as required)

----- **End of Appendix B** -----



**Appendix C**  
**Format in which the financial bid must be submitted**

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Sr. no.	Part name	Qty	If offering a part as an indigenous item, mention the price in this column	If imported item, mention the cost in this column on CIP New Delhi term
1	IR furnace	1		
2	Temperature controller	1		
3	Thermocouple	1		
4	Chiller	1		
Mention below the cost of any other items/parts that is essential for the operation of the furnace (write NA in the cells wherever not applicable). Add more rows if required.				
5				
6				
<b>Subtotal (A)</b>				
7	Taxes			
8	Packaging			
9	Delivery at IITK			
10	Insurance			
11	Installation			
12	Training			
If there are any other costs, indicate them in the rows below. If required add more number of rows.				
13				
14				
15				
<b>Subtotal (B)</b>				
<b>Grand Total (A+B)</b>				

-----End of Appendix C-----