

दूरभाष :
TELEPHONE :
नगर : मुंबई, चेन्नई.
TELEGRAMS : BARC MUMBAI, CHEMBUR
टेलिक्स : ०११-६१०१७/०११-६१०२२ बार्क इन
TELEX : 011-61017/011-61022 BARC IN
फैक्स संख्या : ११-२२-५५६०७५०
FAX NUMBER : 01-22-5560750



दूरभाष,
मुंबई-४०० ०८५,
TROMBAY,
MUMBAI-400 085

भारत सरकार
GOVERNMENT OF INDIA
भाभा परमाणु अनुसंधान केंद्र
BHABHA ATOMIC RESEARCH CENTRE

Radioanalytical Chemistry Division

RACD/5/10/3(a)/I/4929/2021

5/11 /2021

Tender Enquiry

- Tender No. : RACD/5/10/3(a)/ dt. /2021
- Name of the Item 1. Compact, Cylindrical, Tubular, Split, and horizontal Platinum wound high temperature furnace with provision to cool the body with running water for glove box adaptation as per attached drawing (RACD/MS/02) and specifications in Annexure-1, Qty=1no
- a) Sketch/ Dwg. No : RACD/MS/02
b) Description : As per Annexure -1
- Due Date : 26/11 /2021
- Mailing Address : Shri M.K. Saxena
Head, Radioanalytical Chemistry Division
Bhabha Atomic Research Centre,
Mumbai 400085
- Person to be contacted for any clarifications : Dr.(Smt) Manjulata Sahu
Radioanalytical Chemistry Division,
B.A.R.C., Mumbai 400085
Tel : 25596332, 25592417
- Terms of submission : Quotations should be submitted in sealed envelopes superscribing the
i) Tender No. and
ii) Due date

M 21/10/2021

मनोज कुमार सक्सेना / Manoj Kumar Saxena
अध्यक्ष, रे.वै.रा.प. / Head, RACD
रे.वै.रा.प. / Radioanalytical Chemistry Division
भारत सरकार / Government of India
भा.प.अ.केंद्र / B.A.R.C.
ट्रॉम्बे, मुंबई-85 / Trombay, Mumbai-400 085.
संगणक कोड सं.-जी / CC No. G / 527 / 25

P.K. Pujari
(Director, Radiochemistry and Isotope Group)

डॉ. प्रदीप कुमार पूजारी
Dr. Pradeep Kumar Pujari
Director / निदेशक
रेडियो रासायनिक एवं आइसोटोप ग्रुप
Radiochemistry & Isotope Group.
भाभा परमाणु अनुसंधान केंद्र,
Bhabha Atomic Research Centre
Trombay, Mumbai - 400085.

N:B The technical & commercial bid should be sent separately in sealed envelopes superscribing the tender No and due date.

M.K.

Annexure-1

Specifications of Compact Cylindrical Tubular Split horizontal Platinum High temperature Furnace for Glove Box adaptation.

1. The maximum temperature of operation will be 1400°C with heating and cooling rate of 5 °C/min to 20°C/min.
2. The skin temperature should not exceed more than 40°C at the maximum operation temperature of 1400°C as it will be kept inside radioactive glove box.
3. The shape of the furnace should be cylindrical and it should be of split type such that heating element can be replaced in case of any failure inside the glove box with all operation through neoprene gloves. It should be possible to split the body of the furnace to two equal half for maintenance in future. Both the half should be joined through hinge at the rear and clamp at the front as shown in the drawing attached. The dimensions of the spare parts should be such that the entry and exit of required spare parts into and out of glove box can be done through the only window which is circular with ID=8". In opened condition the top half body should not fall in the ground to preserve the working space.
4. The cylindrical and impervious reaction tube should be made from recrystallised high purity alumina. The reaction tube should have OD=60mm, ID =50-52mm and length = 460mm. It should withstand vacuum as well as various gas atmospheres at highest temperature of operation of 1400°C. One number of additional reaction tubes should be provided as spare.
5. The dimension of the furnace body should not exceed from diameter of 300mm and length of 300mm.
6. High purity alumina ceramics fiber boards and high purity recrystallised alumina bricks having good thermal shock resistance should be provided as insulation material to ensure skin temperature below 40° C at the operation temperature of 1400°C. The insulation material should have thermal conductivity less than or equal to 0.28W/mK at 1200°C and the grade should be better than or similar to 174/400. The certificate for insulation material/board should be provided.
7. The body of the furnace should be cooled by providing jackets for chilled water circulation from a chiller. Water tight weld joints should be leak tested at pressure of 2bar (Hydrotest) or by Die Penetration Test.
8. Pt-30% Rh wire of diameter 0.61mm should be used in the furnace as heating element.
9. The test certificate of the precious materials used along with the quantity used should be sent by the firm in their letter head during delivery of the furnace.
10. A compact tray to be provided at the bottom of the furnace for preserving 6 litres of water in case of leakage of chilled water. The furnace should exactly sit on the tray for accommodating the leaked water in accidental conditions. The construction material of the tray should be of SS 304. The height of the stand for the furnace should be 10-20mm more than the height of the tray. The corner of the tray should be rounded and smooth to avoid tearing of rubber gloves through which all the operation inside the glove box will be carried out. All the edges should also be taken care due to the above reasons.
11. The electrical connections and thermocouple connection should be at the bottom or on any sides(Left/Right). It should not be in the front or back side.
12. All the edges should be ground and smoothed. No sharp edges are allowed.
13. The material of construction of the furnace body should be of SS316.
14. The furnace should work on 230V, 50 Hz, single phase AC.
15. The total power of furnace should be 3kW.
16. Heat shields /insulation plugs of proper dimensions should be provided at both ends to avoid heat radiation coming directly out from the reaction tube. Total four numbers of plugs should

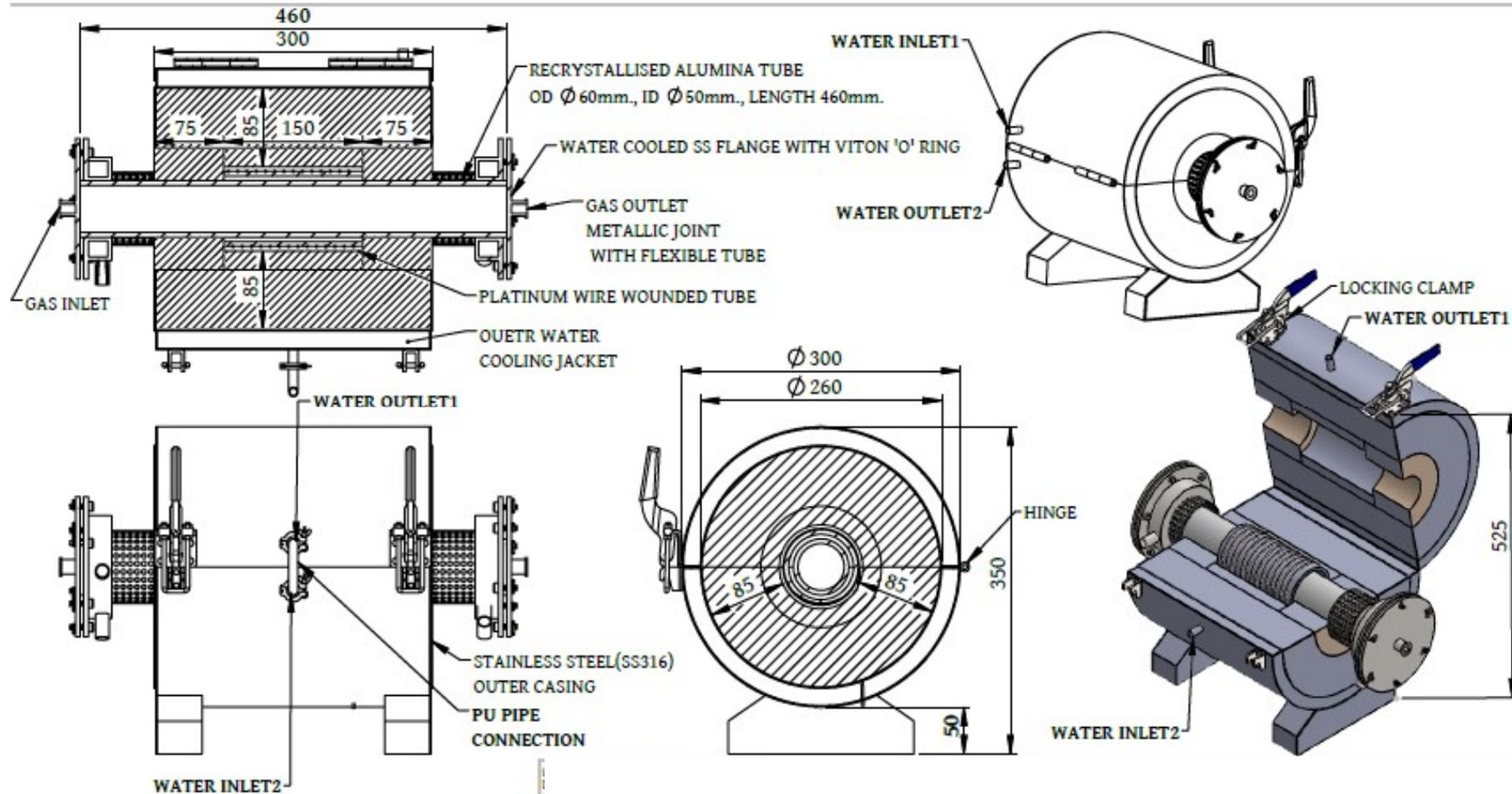
be provided such that two can be kept as spares. The plugs should exactly fit the red hot exposed zone of reaction tube.

17. An accessory work tube of proper dimension should be provided to protect the heating elements and support the work piece.
18. Thermal insulation should be of high quality and should also be provided in the joint of two half circles where they meet with each other by press fitting such that the heat loss through the hinge joints can be prevented.
19. The alumina reaction tube should be open at both end and fitted to the stainless steel flange (KF) with O ring seal with press fit type arrangement.
20. Water cooled flanges of press fit type should be provided at both ends along with the all metal fittings for water flow. The connection of cooling water to chiller will be through 8mm female threading already exist in the glove box. Chilled water will enter inside one flange then it will go to the second flange, the outlet of second flange will cool the body of furnace and the last outlet from the body will go to chiller through 8mm female threaded opening. Hence all the flexible metal hoses should be used for cooling the flanges and furnace body. One 6mm bolt should be welded at the top of furnace for measuring the skin temperature. The cooling of flange should be through circulation of water using stainless steel braided tube of diameter of 8mm and of length 1.5 to 2 meter.
21. The gas connections (inlet and outlet) should be provided through ¼” good quality stainless steel needle valve and KF-50 flanges at both the ends. One fine pressure gauge should also be connected to check the leaktightness of the reaction tube. The outlet of gas to be used for reaction should be connected to a flexible SS hose after the needle valve (Smooth finish without kink or rough surface for connecting to the exhaust of glove box. The length of the hose should be around ½ meter for withstanding the hot gas. Try to maximize use of wing nuts as it is easy for operation inside glove box.
22. The length of the reaction tube along with flanges should not exceed 460mm.
23. Twin wire thermocouple of R- type should be provided for controlling the temperature and safety cut off.
24. The furnace should be as compact as possible. The dimensions of all the fittings should be as small as possible to make the complete furnace with all connections compact.
25. The constant temperature zone length should not be less than 80 mm ($\pm 2^{\circ}\text{C}$)
26. The KF flanges should be possible to tighten with wing nuts.
27. Material of construction of O ring in the KF fitting should be of Viton.
28. The SS flanges should have adjustable support from the bottom to avoid load on ceramic tube.
29. Stainless steel guard should be provided for exposed portion of alumina tube on both sides as per the drawing. Provide asbestos sheet / ceramic insulation above the tube protruding such that there will not be direct exposure of red hot zone of tube.
30. The fixed flanges should be covered with semicircular perforated mesh at the top to avoid tearing of gloves. There should not be any sharp edges on it.
31. Leak testing of all weld joints (Die Penetration Test) should be done before supply and the test certificates need to be provided.
32. The temperature controller (Eurotherm model: 2416 or equivalent with 16 segment ramp/soak with total 4 programmes.) and a step down transformer have already been purchased for a high temperature molybdenum silicide furnace. The same controller and transformer will be used for this furnace. Hence the firm should be able to modify the controller based on the current rating of the furnace.
33. The length of thermocouple cable and power cable should not be shorter than 20 metres.
34. The furnace should automatically trip in case of over temperature in the furnace and thermocouple getting opened.

35. The power for the chiller is being controlled through the power of temperature controller of furnace. If chiller fails, then there is provision for cooling the furnace by automatic supply of tap water controlled by solenoid valves. These connections should be restored after the electrical circuitry modifications.
36. Digital Voltmeter and ammeter already exist in the controller, so no need to be supplied.
37. A conceptual drawing of furnace including the dimension shall be submitted along with the offer. The ultimate responsibility for the satisfactory commissioning and demonstration of the furnace as per purchaser's specification lies with supplier.
38. Satisfactory performance of the furnace should be demonstrated at specified maximum temperature at user's site.
39. Two sets of instruction /operating and troubleshooting manuals in English , detailed circuit and wiring diagrams for control panel , thyristor power and control module , two sets of mechanical drawings etc. shall be supplied along with the furnace
40. Before dispatch, inspection of the furnace, control system including performance testing in hot condition shall be undertaken at the supplier's works. If any minor modifications suggested, it should be done before dispatch.
41. Service and maintenance should be provided with an expert technician as and when required.
42. There should be comprehensive warranty for a period of 1 yr.

Drawing:RACD/MS/02

Compact, Cylindrical, Tubular, Split, and horizontal Platinum wound high temperature furnace with provision to cool body with chilled water for glove box adaptation



Material of construction:SS316

Annexure-I

Scope of the work

1. Fabrication, supply, installation, commissioning and testing of a Compact, Cylindrical, Tubular, Split, and horizontal Platinum wound high temperature furnace with provision to cool the body with running water for glove box adaptation. The item should meet all the specifications. The scope also includes the modifications in the existing transformer and the temperature controller (which had been procured for furnace with molybdenum silicide heating element) for compatibility with Pt furnace. All connections for gas flow and water circulation with proper leak tight fittings also remain in the scope of supplier. Qty =1 no

It is not required to specify all the details of the works involved with the specified work. However, the specified items shall conform in all respect to complete satisfaction of the purchaser and to high standard of workmanship.