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GOVERNMENT OF INDIA
BHABHA ATOMIC RESEARCH CENTRE
RADIATION SAFETY SYSTEMS DIVISION

Ref: **RSSD/ RSS/ 10018 / 2018**

Date: October 31, 2018

Price quotation is invited for Design of fabrication of Vacuum System with mounting arrangement for Graphite Calorimeter as per drawings in enclosed sheets along with general terms and conditions.

The quotation must be sent in a sealed envelope, addressed to

HEAD

RADIATION SAFETY SYSTEMS DIVISION, BARC

MUMBAI- 400 085

on or before **November 25, 2018, 17:00 hrs.**

Sealed quotation must be sent by **speed post or registered post** only.

Quotations sent by courier services will be rejected.

Kindly make sure that the envelope containing the quotation is sealed and super scribed "**Quotation for Vacuum System, KIND ATTN. Mr. Sougata Rakshit**".

(Indenting Officer)
Sougata Rakshit
SO (D), RSSD

Encl:

1. Technical specifications and Drawings of "Vacuum system for graphite calorimeter".
2. Scope and Terms & Conditions for fabrication work.

A. Description of Fabrication Work:

Title: Design and Fabrication of Vacuum System with mounting arrangement for Graphite Calorimeter.

	Item Name	Quantity for Fabrication
1	Vacuum System with mounting arrangement for Graphite Calorimeter	ONE

B. General Terms & Conditions:

1)	Materials has to be delivered at North Gate Reception, BARC, Trombay, Mumbai-400 085
2)	After completion of job supplier should inform purchaser for pre dispatch inspection (if needed) before delivery of materials.
3)	Work should be completed within 90 days from receipt of work order.
4)	In the quotation the firm should clearly mention Rate, Basic cost, Taxes (applicable), logistics and other applicable charges given in full breakup details.
5)	<u>Applicable Reduced GST Rate of 5% may be applicable as BARC generally provide GST Exemption certificate. In price quotation please mention both actual GST amount and also reduced applicable GST amount.</u>
6)	GSTIN number shall be clearly mentioned in quotation.
7)	Tender price should be valid for a period of 90 days from date of tender opening.
8)	Full Payment will be made only after satisfactory completion of work and delivery of items to BARC.

Title: Design and Fabrication of Vacuum System with mounting arrangement for Graphite Calorimeter

Description of Work:

Suitable vacuum system for cylindrical graphite block inside a graphite calorimeter has to be fabricated. One side of the existing cylindrical graphite block is covered by thin Mylar sheet. A vacuum cup has to be fabricated to enclose remaining sides of the graphite block to maintain vacuum inside it. Turbo molecular pump (TMP) backed by rotary pump has to be supplied along with all necessary vacuum fittings. The vacuum system should be able to create a **vacuum level of 10^{-6} mbar or better inside the vacuum cup within a nominal period of not more than three hours** after powering on the vacuum system.

Scope of work:

Design, fabrication and testing of vacuum cup, fabrication of wooden stand, fabrication of metal frame and supply of vacuum system pumps, gauge and accessories for Graphite Calorimeter as per specification given bellow.

Specifications:

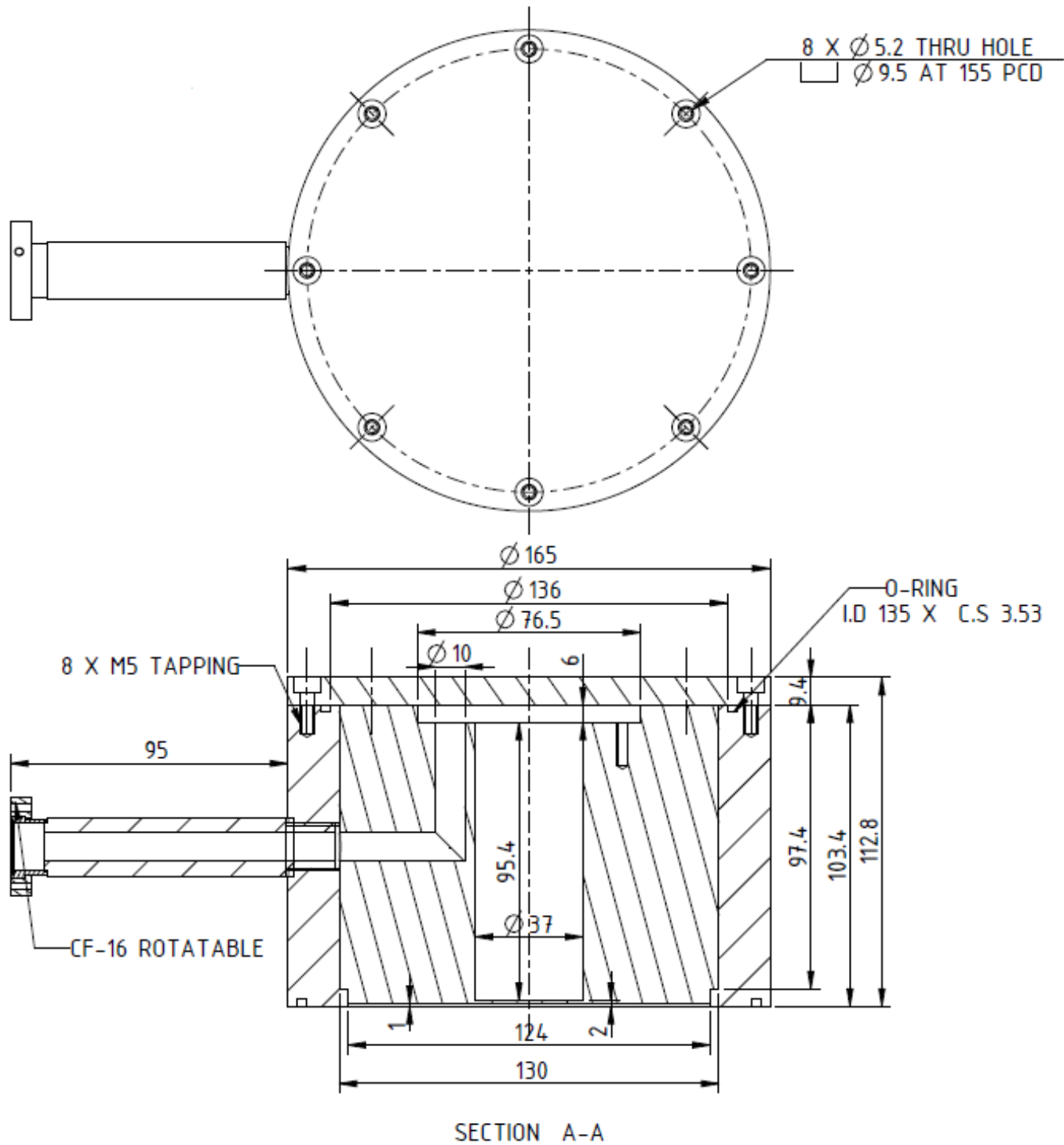
Vacuum cup	As per the enclosed engineering drawing Material: Delrin
Turbo Molecular Pump (TMP) (with controller and connecting cables):	Reputed brands like Pfeiffer Vacuum, Agilent Technologies or equivalent. Ultimate pressure: 10^{-10} mbar or less. Pumping Speed: 60 liter/second or more for air Pumping Gas Type: Dry Air Inlet-side Flange: DN 100 ISO-K (ISO 100) Outlet-side Flange: To match with inlet of Rotary pump Operating voltage: 220-240 VAC, 50 Hz Controller and connecting cables: Suitable drive control unit to be provided with the pump with safety & operational interlocks incorporated into it. Provision for interfacing with PC through RS-232 serial communication and/or USB must be available with the controller. Vital pump parameters such as speed, temperature etc. to be made available for display. Necessary accessories, cables, control unit drivers and software etc. to be provided with the unit.
Rotary vacuum pump (with connecting hardware) for backing of TMP.	Reputed make by Pfeiffer vacuum or equivalent. Pumping Speed: $5 \text{ m}^3/\text{hour}$ or more Pumping Gas Type: Dry Air Inlet-side Flange: To match with inlet of TMP Operating voltage: 220-240 VAC, 50 Hz No. Of stages: Two stage Accessories: Blank flange, hinge clamp, O-ring, and centering ring with filter for all the vacuum ports of the pump Power cable with length of about 3 m. All other accessories applicable.
vacuum gauge	Reputed make by Pfeiffer vacuum, Agilent technologies etc or equivalent. Gauge should be placed in rugged metallic case. Measurement Range: Atmospheric pressure to 10^{-8} mbar

	<p>pressure Accuracy: Better than 30% at minimum pressure Reproducibility: Better than 5% at minimum pressure Display: Digital Control & Interfacing unit: Provision for interfacing with PC through RS-232 serial communication and/or USB must be available with the controller. Power supply: 230 V, 50 Hz Necessary accessories, power and sensor cables and driver software (if applicable) to be provided with the unit.</p>
Vacuum Fittings	Compatible Vacuum locking valve
	<p>Vacuum feed through: Vacuum compatible connectors for 24 numbers of electrical connections inside vacuum cup Air side plug with 5m long cable compatible with above feedthrough from outside.</p>
	<p>Standard KF, CF type flanges compatible for the vacuum pumps and other fittings in the vacuum system. Material: Stainless steel</p>
	Two nos. of extra ports has to be provided.
Tie rods for assembly of the calorimeter.	<p>Dimension: M10 x 250 mm Quantity 12 nos. Material: SS</p>
Wooden bottom base plate for stable mounting of the graphite calorimeter on existing laboratory table. (Refer to attached drawing)	
Suitable metal/wooden frame with adjustable legs and castors to mount rotary pump and turbo pump, controller etc. (Refer to attached drawing).	
Connection from vacuum cup inside graphite calorimeter to turbo molecular pumping system has to be done using flexible bellow (material: stainless steel) to prevent vibration to vacuum cup inside calorimeter. Vibration damper is to be provided with pump unit.	
All vacuum fittings should be leak tested for a leakage rate not more than 1×10^{-9} mbar. Liter/second.	
Warranty: Standard warranty of all components, vacuum fittings, vacuum pumps for ONE year period from date of satisfactory supply of the system to BARC.	

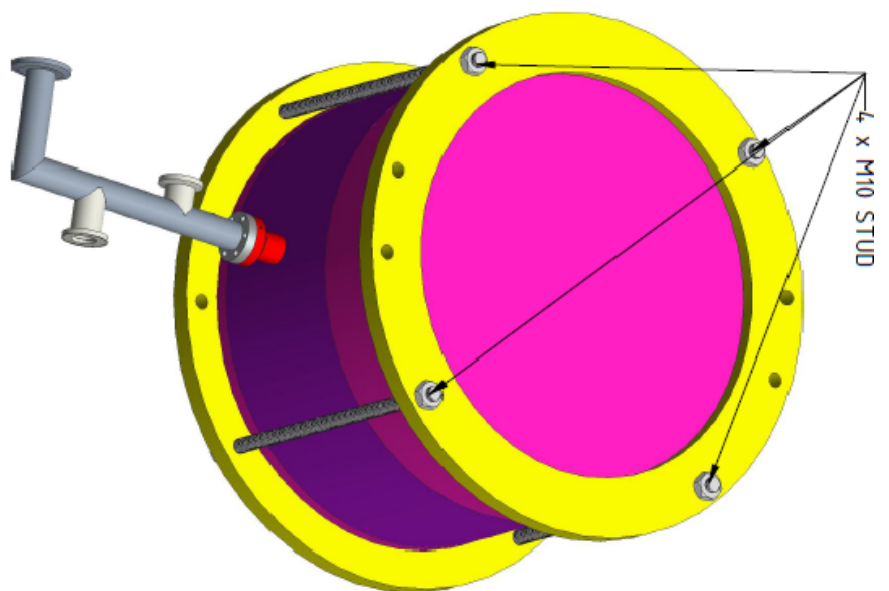
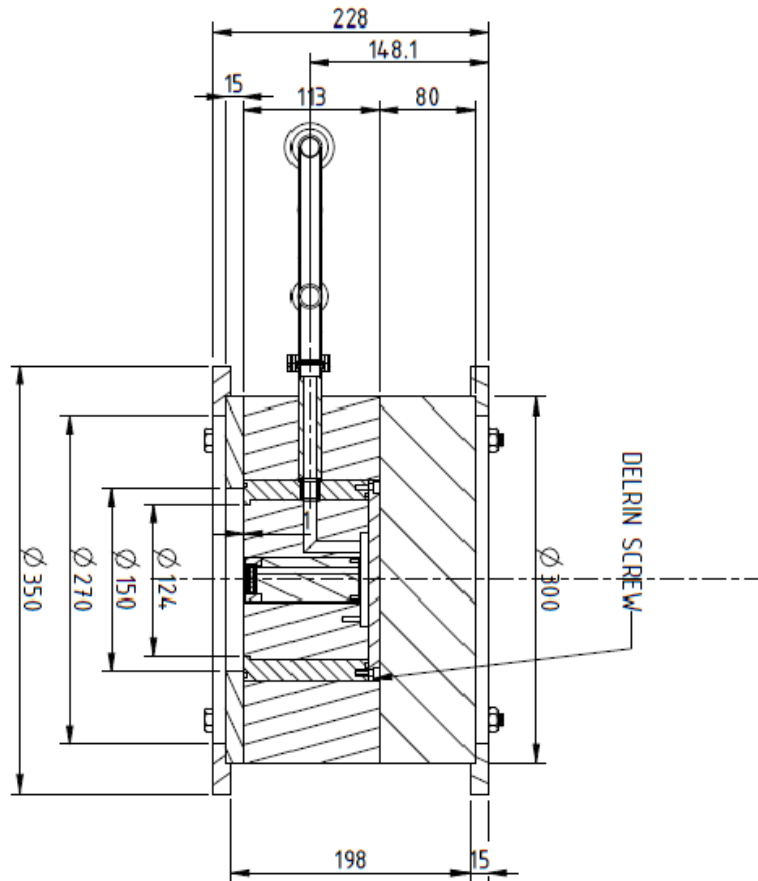
Drawing 01 (Vacuum Cup): (Quantity: ONE)

Material: Delrin.

All dimensions are in mm



Drawing: Full view of graphite calorimeter system (Quantity: ONE)
All dimensions are in mm



Drawing 02 (Full Vacuum system: Pumps & fittings): (Quantity: ONE)

All dimensions are in mm

