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GOVERNMENT OF INDIA  
BHABHA ATOMIC RESEARCH CENTRE  
DIVISION OF REMOTE HANDLING & ROBOTICS (DRHR)

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Ref: DRHR /APD/INQ/2017/197

Date: 27/9/2017

**Sub: Minor Fabrication - Invitation of Quotation.**

**Fabrication, Supply and Guarantee of absolute dosimeter system as per enclosed specifications and Annexure-I.**

1. Quotations are invited for the minor fabrication job: Absolute dosimeter system as per enclosed specifications and Annexure-I.
2. The quotation includes the fabrication of parts, certification of material, 3rd party certification of dimensional tolerance of parts, assembly, calibration and delivery of the system to Basement, D-Block, Molab, BARC, Trombay, Mumbai.
3. **No Free issue material will be supplied by BARC.**
4. Taxes other charges, if any, shall be quoted separately.
5. The quotation must reach Head, DRHR, BARC by **October 15th, 2017** and must be sent in a sealed envelope superscribed with the **reference number & the due date given above.**
6. The address on the envelope should read:

**Head, DRHR,  
BARC, Trombay, Mumbai - 400 085.  
(Attn.: Amaren P Das, SO (F), DRHR)**

7. Quotations should be sent through **Speed Post** only. Hand delivery of quotation or by private courier is not accepted.
8. The fabrication and assembly work shall be subjected to inspection by our engineer. The finished unit shall not be dispatched prior to approval by our engineer at bidder's premises. The unit shall be delivered by the bidder at **Basement, D-Block, Molab, BARC, Trombay, Mumbai-400085.**
9. Head, DRHR, BARC reserves the right to accept / reject any or all quotations without assigning any reason.
10. Incomplete offer / offer received after the due date shall not be considered.
11. The bidder shall provide break-up cost **for material and fabrication** in the quotation.
12. Quotations should be preferably neatly printed and corrections are not acceptable.
13. Quotation must indicate the **delivery period** and the **validity of offer.**
14. Quotation received in computer-generated form shall not be acceptable.
15. Quotation must be submitted in printed letterhead, mentioning clearly GST registration no., PAN No. Submission of challan and Invoice shall also comply the same, in case, work order is placed.
16. Drawings must be returned along with the offer.

Encl.: Annexure - I  
Annexure - II

**Annexure-I**

**(A) Scope of work:**

Fabrication, assembly, demonstration and supply of the **absolute dosimeter system** as described in system description attached.

Material required for manufacturing and procedure qualification shall be arranged by supplier.

Minor fabrication. Job description	Quantity	Reference document
Fabrication and assembly of absolute dosimeter system	As Per Drawings	Annexure II (system description )
Provide material certificate for Material Used	NA	
Provide 3 <sup>rd</sup> Party certificate of geometric tolerance of parts	NA	
Calibration of system as per details attached	NA	Annexure II (system description )

**(B) Delivery and Guarantee**

1. **Consignee:** Basement, D-Block, Modlab, BARC, Trombay, Mumbai. .
2. **Guarantee:** The items under the work order shall be guaranteed for a satisfactory performance against manufacturing defects and faulty workmanship, for a period of 12 months from the date of final acceptance
3. All work shall be done with good workmanship. Our supervisor will supervise the quality of work.

**I General Specifications**

**1. *Quality surveillance, inspection***

- 1.1. All work covered shall be subject to quality surveillance / inspection by the purchaser or his authorized representative.
- 1.2. No Insurance policy is required for the material as the job is to be done by supplier's material.

**2. *Delivery***

- 2.1. The bidder shall finish the work after approval by our engineer within 3 months from the date of firm Work order is issued to the bidder.
- 2.2. Any delay which is attributable to the supplier is liable for penalty @ 0.5% per week (max.5%) to be imposed on supplier.
- 2.3. In case any extension in delivery is to be granted to the supplier. The supplier should request for the extension before expiry of the work order. The same may be justified by the Division, whether extension granted is with or without levy of liquidated damages.

3. **Sub-Contract**

3.1. The fabricator shall not sub-contract any or all the work without written consent from the purchaser. The fabricator shall be responsible to the purchaser for all work carried out the sub-contractor, of the fabricator, if allowed by the purchaser.

4. **Payment**

4.1. Payment will be made only after satisfactory completion of work and against submission of original bill in triplicate and advance stamped receipt.

5. **Tax**

5.1. Income Tax of 2% on the bill amount and surcharge on IT as applicable and education Cess @ 3% (on IT& SC) shall be deducted in payment.

5.2. On request, exemption form for payment of Octroi tax and Excise duty shall be provided to the supplier.

6. **Confidentiality**

6.1. No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "**Proprietary**" in nature by 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.

6.2. This clause shall apply to sub-contractors, consultants, advisors or the employees engaged by a party with equal force.

7. **"Restricted information" categories under section 18 of the Atomic Energy Act,1962 and "Official Secrets" under section 5 of the Official Secrets Act, 1923:-**

7.1. Any contravention of the above mentioned provisions by any contractor, sub-contractor, consultant, advisor or the employees of the contractor will invite penal consequences under the aforesaid legislation.

8. **Publication against use of BARC's name without permission for publicity purpose:-**

8.1. The contractor or sub-contractor, consultant, advisor or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any public media like Press, Radio, T.V. or Internet without the prior written approval of BARC.

## Annexure II System Description

The absolute dosimeter system consists of a **X-Ray** generator (not in scope of supplier) and an ionization chamber mounted on a x-y motion calibration bench as shown in the figure 1. This system is used for primary standardization of instruments sent by different laboratories to BARC. The x-Ray source is of 320KV and 30mA continuous current rating. The beam size is 40mm X 60mm at a distance of 50cm.

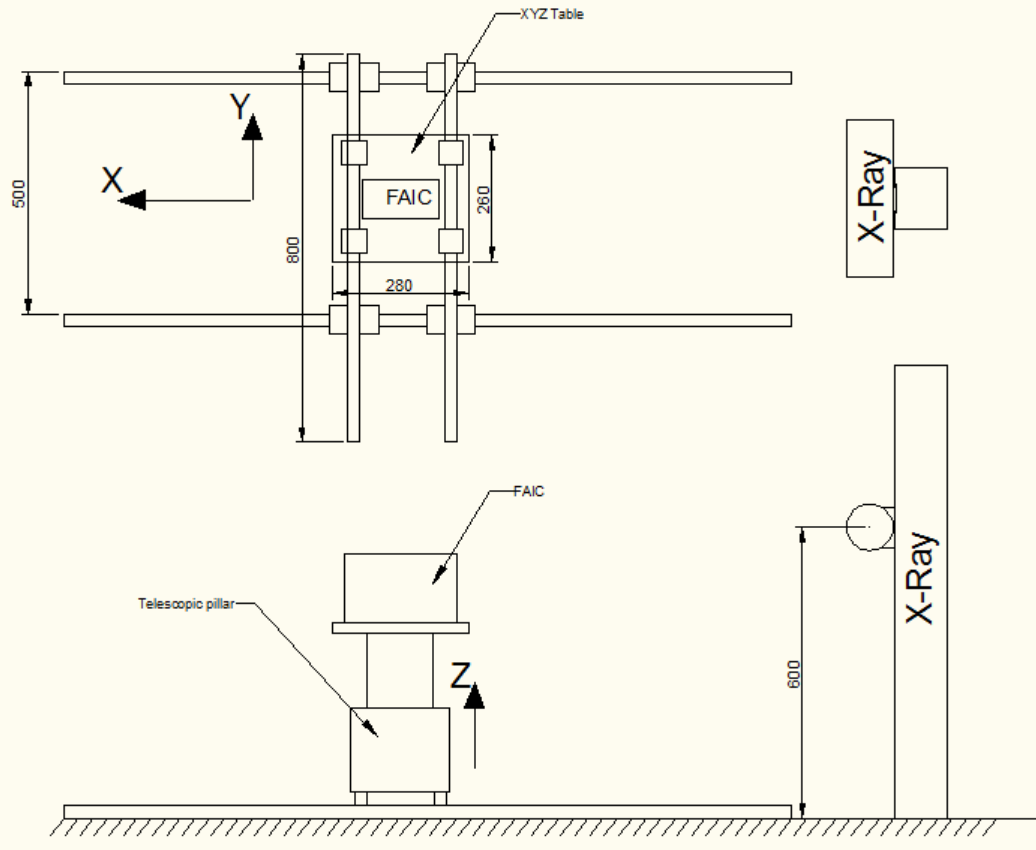


Figure 1

**ZYX Platform/Table:** This platform is used to locate the FAIC or the instrument along the line of the x-ray beam. The platform is to hold a payload of 50Kg. The layout is for the table and its motions are shown in the figure above. The X-stroke is 2m, the Y stroke is 1m and the Z stroke is 200mm about the mean position of 600mm from the ground. The motion of all the axis is computer controlled from remote station. The positioning error of all the axis is between  $\pm 0.5$ mm. The approximate speed of x and y stage is 1.5 m/sec. The z axis speed is 250 mm/sec.

### Drive System for XYZ Table

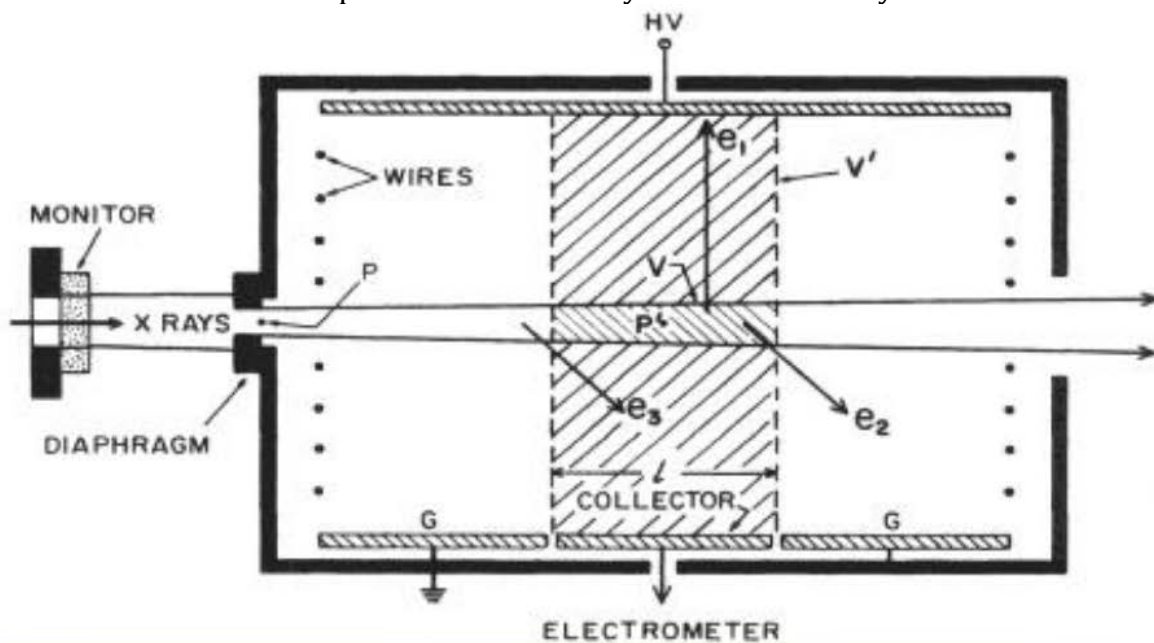
- Ac Servo motor 750W are used with 1:8 Gear Reduction for X and Y motion
- The z motion is achieved by Telescopic Pillar with load capacity of 200Kg, 20mm/s and retracted length of 440mm (Make Thompson Model No: LC2000N24-600441NE)

### Table Details

The table is made of 40X 40 powder coated sections to hold weight of 300Kg, The motion in X and Y direction is on Cross LM guide Model 4SCR25UU+2000/1000LP, Make THK.

All the motor for actuation of X& Y axis is housed inside the table. Motors move along with the table.

**Free air ionchamber (FAIC)** is the main measurement equipment. The details are given in figure 2. The outer casing is the Pb shielding which prevents external ionizing radiation to enter the ion chamber which consist of a two parallel plates, the top plate is connected to HV as shown in fig 2. The bottom plate is divided into 3 parts the two gard plates labeled "G" and the Collector Plate. The guard plate are connected together and grounded the collector plate is connected to the Electrometer. A tungsten diaphragm is used to limit the cross section of the x-ray entering the ion chamber. The accuracy of the measurement by the ion chamber depends on the diaphragm diameter, length of the collector plate 'l', the co planarity of the three bottom plates and the parallelism of the collector plate to the HV (top) plate. The volume  $v'$  and  $v$  must be accurately determined to in order to get correct estimate of the ionization produced in the air by the incident x-ray .

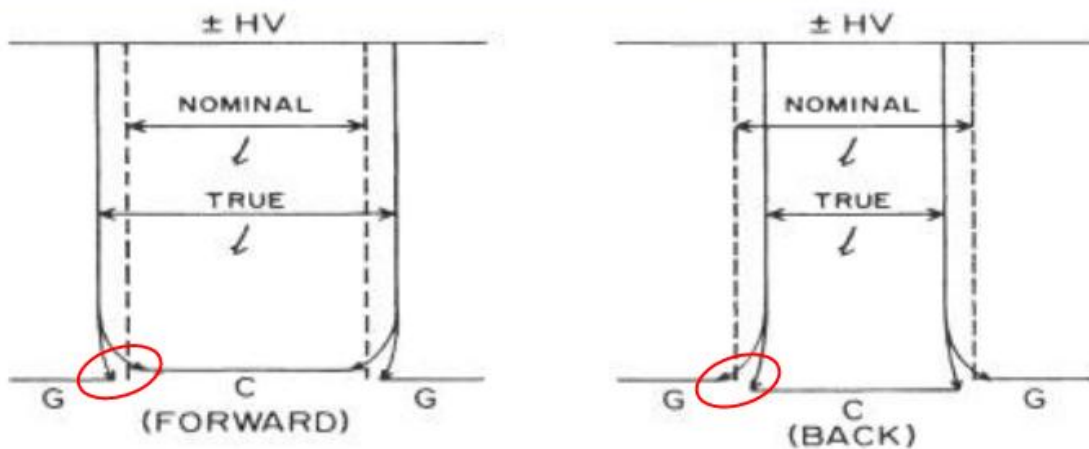


**Figure 2**

In order to achieve required correction factor of 1-2% are required by international standards following tolerance are require and the supplier must adhere to the same.

- Co planarity of the guard plates and the collector plate =5micron
- Parallelism of the HV plate (top plate ) to the collector plate = 0.01mm
- Length of the collector plate "l" +/- 0.002mm
- Gap between the collector plate and guard plate =0.5mm
- Tolerance of the id of the diaphragm 10+/-0.003mm

The detailed dimension of plates and the geometric tolerance is given in the attached drawings. These are important are to be verified by the third party. The supplier will arrange for the same and is within his scope of his work. The measurement has to be done in the presence of our engineer and by government authorized institute. The certificate for the same should be provided during installation and commissioning.



Effect of collector (C) misalignment with guards (G);  
condition *b* is not satisfied

Figure 3

### Calibration of the FAIC

The ion chamber is to be calibrated at the supplier end in presence of our engineers and officers. Following accessories are required for the calibration of the system and **is to be provided by the supplier**. The supplier should be conversant with calibration methodology for dosimeter systems.

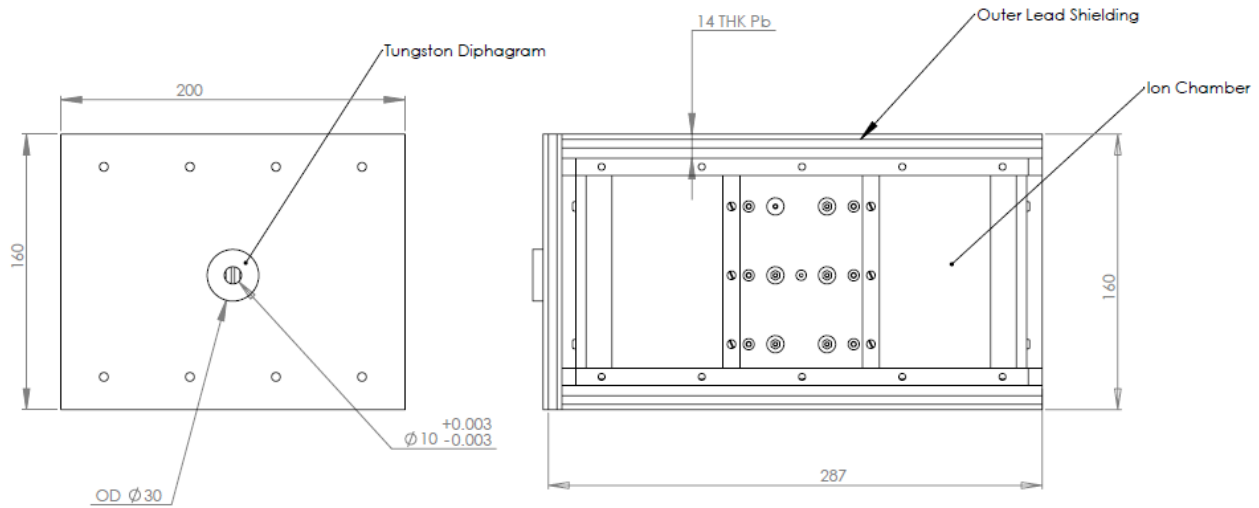
The FAIC is connected to a High Voltage System which has the following specifications

- High Voltage: 2000VDC
- Current rating = 0.05 A

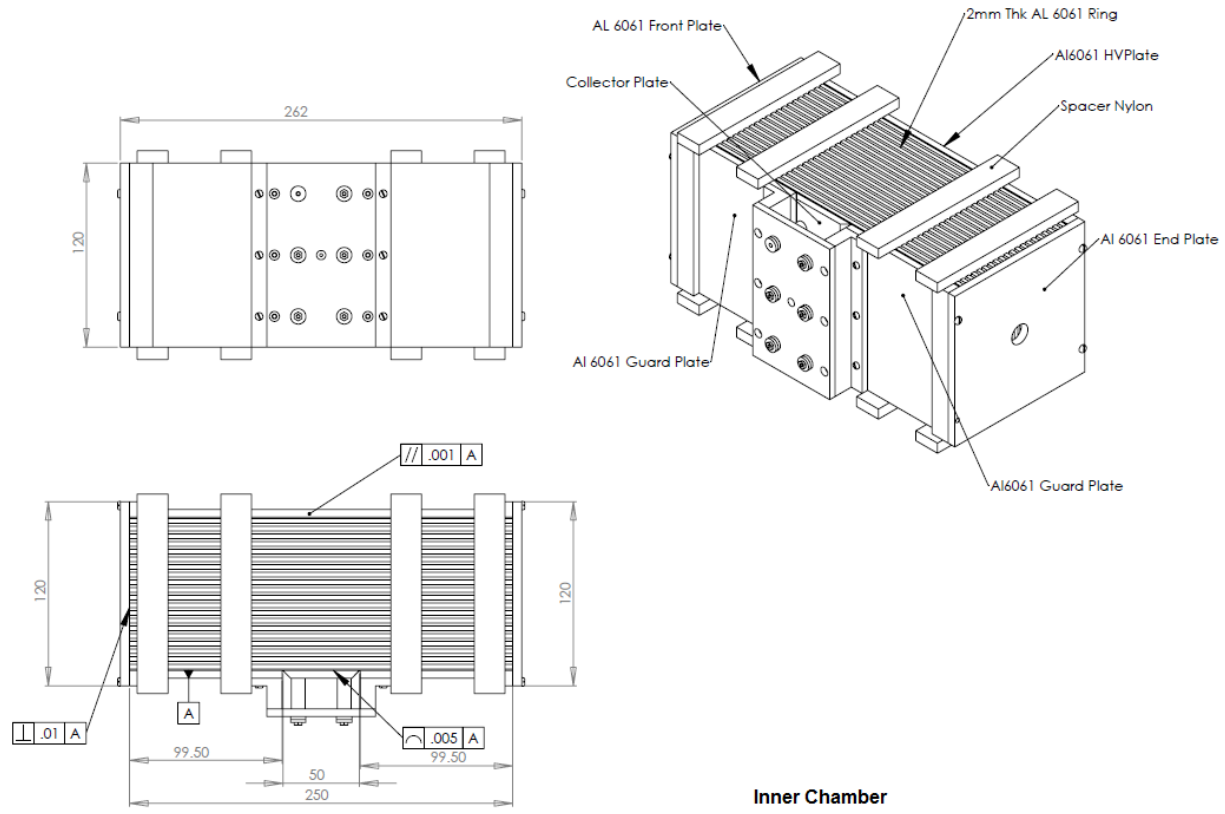
The electrometer connected with the collector plate must have the following specification

- Stability of the power supply 0.5%
- Precision of current measurmant =0.1%
- Min measurable current = $10^{-15}$ A
- Timer for charge measurement.

Source of ionization radiation using 30KV, 30mA xray source.



**Outer Lead Shield**



**Inner Chamber**

All Dimensions are in mm