



GOVERNMENT OF INDIA
BHABHA ATOMIC RESEARCH CENTRE
RESEARCH REACTOR MAINTENANCE DIVISION

TENDER NOTICE

Tender Notice No: RRMD/TN/TR- 1/ TN-541/2017

Date: 08/09/2017

To,
(Company name)

Sub: Tender enquiry for fabrication, assembly, supply, testing and commissioning of Tritium In Air Monitor

Sealed tenders are invited for and on behalf of the President of India by the Head, RRMD BARC, Trombay, and Mumbai-400085 from experienced vendors for fabrication, assembly, supply, testing and commissioning of Tritium In Air Monitor (TIAM).

1.0 Description of the work:

The work mainly involves supply and commissioning of 5 nos. of TIAMs. Each TIAM will be fabricated, assembled and tested with the following:

- 1.1 Fabrication and supply of Trolley for mounting TIAM components
- 1.2 Supply of Air Pumping System
- 1.3 Fabrication, testing and supply of Electronic Processing Unit
- 1.4 Overhauling of CICs and assembly with new sealing/ insulating components
- 1.5 Overall integration and testing of Tritium in Air Monitors

Details of TIAM are elaborated in Annexure-I.

2.0 Terms and conditions:

- 2.1 The offer should be valid for consideration for 30 days from due date of the offer.
- 2.2 The work shall be completed within **eight months** after issue of the work order.
- 2.3 On completion of the work, payment would be released on submission of bills in triplicate along with an advance stamped receipt.
- 2.4 The vendor should also clearly reply in his tender to “whether the contractor / vendor has any relative working in BARC or the contractor himself is an ex-employee of BARC or the contractor has any ex- employee of DAE on his payroll”.
- 2.5 Since the job has to be carried out at Dhruva, BARC, the employees deputed at site by the contractor should have a valid police verification certificate.
- 2.6 Contractor should mention their valid **PAN** No. and **GSTIN** in the quotation, failing which the offer shall be rejected.

3.0 Instructions to Tenders:

- 3.1 Tenders should submit documents in support of their technical capabilities.
- 3.2 Price quoted shall be filled up in the same format given in the Schedule-B with GST if any.

- 3.3 Free Issue Material (CICs & Ion Trap Units) will be issued at site (Dhruva) at the time of final integration / commissioning of TIAMs.
- 3.4 Tender shall be submitted in the sealed cover in the vendor's standard company format quoting our **Tender No.** on the envelope and addressed to 'Head, RRMD, BARC, Trombay, Mumbai-400085 and submitted in the RRMD office, Dhruva'. The offer should be submitted so as to reach RRMD office, Dhruva on or before 25/09/2017 up to 1500 hrs. Tender is to be sent only through registered post or speed post, hand delivery or courier of tenders will not be accepted.
- 3.5 Tenders shall be opened the next (working) day at CC, BARC, Trombay. Shri N. V. Patel may be contacted on phone no. 25596237/ 25594323 from 10 AM to 5 PM to arrange entry permit if anyone wants to visit the site before sending their quotation.
- 3.6 The acceptance of the tenders will rest with Head, RRMD who does not bind himself to accept the lowest offer, and reserves to him the authority to reject any or all the tenders received without assigning any reason.
- 3.7 Quotation received after the due date and time shall be summarily rejected.

Thanking you,

Yours faithfully,

Sd/-
(P. Sumanth)
Maintenance Superintendent - (Instruments)
RRMD, BARC
(For and on behalf of the President of India)

Enclosures: Schedule –A & B

Schedule –A

Tender Notice No: RRMD/TN/TR-1/ TN-541 /2017

Dated 08/09/2017

Name of Work: - Fabrication, assembly, supply, testing and commissioning of Tritium In Air Monitor

Sl. No.	Description	Qty	Unit	Rate
1.	Water	As required	Litre	Free
2.	Electricity	As required	KWH	Free
3.	Compensated Ion Chamber (CIC)	5	numbers	Free
4.	Ion Trap Unit	5	numbers	Free

Schedule – B

Tender Notice No: RRMD/TN/ TR-1/TN-541 /2017

Dated 08/09/2017

Name of Work: Fabrication, assembly, supply, testing and commissioning of Tritium In Air Monitor

Sl. No	Name of items	Qty (Q)	Supply Rate (S)	Installation Rate (I)	Total basic cost of supply (S x Q)	Total basic cost of installation (I x Q)
1	Fabrication, assembly, supply, testing and commissioning of Tritium In Air Monitor as per specifications in Annexure-I	5 no.				
2	Taxes on total basic cost of Supply (% GST)					
3	Taxes on total basic cost of installation (% GST)					
4	Total Cost (including all charges)					

Net supply = Total basic cost of supply + taxes on total basic cost of supply

Installation charges = Total basic cost of Installation + taxes on total basic cost of installation

Total cost (including all charges) = Net supply + installation charges

Signature of the contractor with seal

Note: The prices shall be quoted clearly without any overwriting. Overwriting/correction are not acceptable.

Annexure-I

Technical Specifications for Items

The Tritium In Air Monitor (TIAM) consists of 40 litres capacity Compensated Ion Chamber (CIC), an Air Pumping System and Electronic Processing Unit. These components of TIAM are mounted on a trolley as shown in simplified General Arrangement in figure-1.

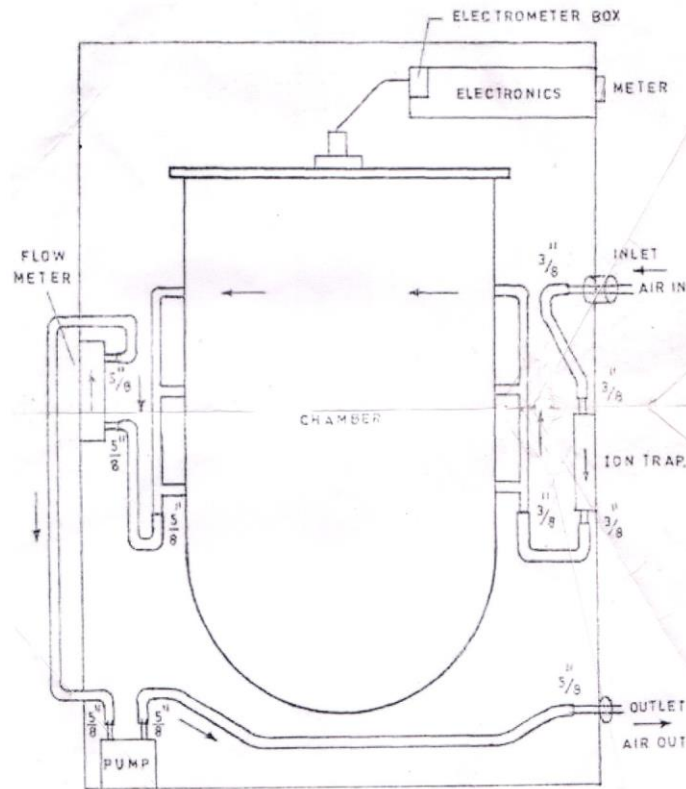


Fig.-1 Representative simplified GA for Tritium in Air Monitor (Not to the scale)

Compensated Ion Chamber (CIC) consists of three concentric cylinders with annular space in between. The three cylinders are connected to the Electronic Processing Unit through 3 nos. of feed-through in the top lid. The cylinders are insulated from each other using Teflon O-rings. Teflon spacers / rings are used to assemble the three cylinders together maintaining the insulation resistance. Sampled air flows between the outer and middle cylinder. Inter space between middle and inner cylinder has no air flow. Sketch of the CIC is given in figure-2.

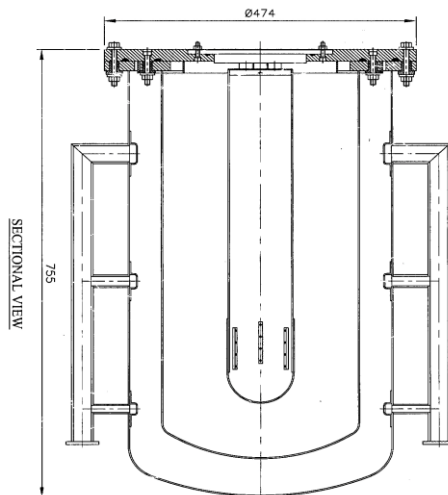


Fig.-2 Dimensions of Compensated Ion Chamber

Detailed technical specifications for components of each Tritium In Air Monitor are as follow.

1. Trolley on Caster wheels

Parameter	Specifications / accessories
Dimensions	Approximately 150 cm (Height) x 60 cm (Width) x 60 cm (Depth)
Constructions material	powder coated aluminum
Base	Caster wheels with lock
Accessories	Clamps, angles etc. for fitting air pumping system, electronic processing unit and CIC inside trolley.

2. Air Pumping System

Air pumping system is required to establish sufficient amount of air flow through a chamber of CIC by sucking air from area under tritium activity monitoring.

Parameter	Specifications / accessories
Vacuum Pump with motor	
Construction/type	Integrated pump and motor assembly
Max Flow range	110 LPM of air
Max Pressure	0.7 Kg/cm ²
Max Vacuum	116.0 mbar absolute
Motor	Single phase 0.25 HP working on 230V AC
Noise Reduction	Internal sound suppression for lower operating noise
Thermal overload protection in motor	The thermal over load protection should be there for preventing motor windings from damage, should the pump become stalled during operation.
Rotameter	
Flow range	0 to 50 LPM of air
Scale	Scale marking from 0 to 50 LPM on transparent tube
Accuracy	5% of full scale or better
Tubing	
type	Breaded PVC tubing
size	3/8" from air sampling point to CIC input and 5/8" from CIC output onwards. Length of 3/8" tubing is around 2 feet and Length of 5/8" tubing is around 6 feet.
Filter	Woolen filter at the air sampling point. Filter should be housed in suitable size housing located at air inlet
Regulating valve	Air flow regulating valve should be placed, preferably near to the air sampling point, for adjusting flow through CIC.

3. Electronics Processing Unit

This unit interfaces with the CIC and provides tritium activity concentration signal output for local and remote display. This unit consists of following modules:

- A. LV Power Supply Module
- B. HV Module
- C. Signal Processing Module

Parameter	Specifications / accessories
LV Power Supply Module	
Supply voltage	All the required LV supplies for signal processing shall be generated in this unit
Regulation	All the LV supply voltages should be regulated so that performance of the Signal processing unit should be stable and accurate.
HV Power Supply Module	
Supply Voltage	For Ion Chamber EHT: 82 volts DC (Maximum of 100V DC)
	For Ion Chamber EHT: - 82 volts DC(Maximum of -100V DC)
	For Ion Trap EHT: 300 volts D.C. (Maximum of 400V DC)
Supply current	Rated at 1 mA
Signal Processing Module:	
It is an Electrometer Head Amplifier Unit that should be contained in MS box and mounted inside the unit and connected to the collecting electrode by cable and associated connectors.	
Ranges	<p>Output: Linear DC Voltage for every range:</p> <p>Range - 1 (X1): 0 DAC to 2.5 DAC – 0 to 1V</p> <p>Range – 2 (X 10): 0 DAC to 25 DAC - 0 to 1V</p> <p>Range – 3 (X 100): 0 DAC to 250 DAC - 0 to 1V</p> <p>Range – 4 (X 1000): 0 DAC to 2500 DAC - 0 to 1V</p> <p>If Range-1 is selected then instrument should be able to measure up to 25 DAC i.e. Linear DC voltage output for every range should go up to 10V. This also applies to other ranges too.</p>
Input Current Range	0.1 pA to 1 nA
Current to DAC conversion	Approximately, 0.4 pA corresponds to 1 DAC. However, provision for calibration should exist to take care of variation in CIC current output for the given tritium activity concentration
Response time	Typically less than 30sec, when activity concentration changes from lower end of the range to full range and vice versa. Time Constant: 1 st range < 30 seconds, 2 nd range < 10 seconds, all other range < 2 seconds.
Front panel displays and output requirements	Tritium activity indication shall be provided on the front analog panel meter. It should provide indication of tritium in DAC (Derived Air Concentration).
Alarm set point	Alarm set point should be adjustable throughout the ranges. Provision should exist to display alarm setting on front panel analog meter by operating a sprint loaded toggle switch.

Alarm Outputs	The unit should provide audio and visual alarm indication on the unit. Provision for local and remote alarm acknowledgement and reset should be there. The unit should provide two pair of changeover contacts that can be interfaced to other systems. The alarm relay should de-energize on alarm (high activity) condition.
Testability	Test provision should exist for checking alarm functionality
Accuracy	+/-15% of the reading
Recorder output	Isolated 4 to 20mA DC corresponding to the range with 600 ohms load driving capacity
Connectors on the Electronic Processing Unit	<ol style="list-style-type: none"> 1. ± EHT: UHF Receptacle Type Amphenol 83- 798 SO-239A 2. Signal input from Detector : UHF Receptacle Type Amphenol 83- 798 SO-239A 3. Ion Trap: BNC 4. Mains: 3 Pin MS Circular Type Amphenol MS-3102-10SL-3P 5. 4-20mA output & 1 pair of Changeover contacts : 6 Pin MS Circular Type Amphenol MS3102A-14S-6S
Normal operating conditions	Temperature range : 8°C – 45°C Relative Humidity : 55% to 85%
Occasional operating conditions and storage conditions	Temperature range : 5°C to 70°C Relative Humidity : 50% to 95%
Input power supply:	230V AC ±10%, 50Hz. The mains power supply ‘ON’ indication shall be provided on the front panel. AC Line transient suppressor should be provided.
Testing	Calibration & functional checking and Burn-In test for 168 hours

4. Overhauling of CICs and assembly with new sealing/ insulating components

The CICs shall be opened, cleaned and assembled again with new sealing cum insulating rings and insulating discs.

Parameter	Specifications / accessories
Material of sealing cum insulating rings & insulating discs per TIAM	PTFE (Teflon)
Size and numbers of the sealing cum insulating rings per TIAM	Two numbers 12 mm O rings. One O-ring having inner diameter of 404 mm and other O-ring having inner diameter of 306 mm.
Size and numbers of the insulating discs per TIAM	Approximately 20 nos. of circular insulating discs cum spacer having around 25 mm dia and 6 mm thickness
Testing of assembled CICs	CICs assembled with new sealing rings and insulating discs should be tested for insulation resistance between electrodes of CIC. Insulation resistance should be around $10^{13} \Omega$ between electrodes or higher. Leak tightness for air should be ensured among inner chamber, outer chamber & atmosphere.

5. Overall integration and testing of Tritium in Air Monitors

All the subsystems of Tritium in Air Monitor viz. CIC, Air Pumping System, Electronics Processing Unit should be mounted on Trolley with proper supports and interfaces should be made.

AC mains Power supply distribution to the Electronics Processing Unit and vacuum pump motor should be done through suitably rated MCB.

After complete integration, following functional checking should be carried out in assembled state at site.

1. Checking of air pumping system
2. IR check on CIC
3. Calibration & functional checking of Electronic processing unit
4. Alarm generation functionality

6. Installation & commissioning of Tritium in Air Monitors at site (Dhruva, BARC)

Trolley mounted TIAM shall be installed and commissioned at site by interfacing the unit with the existing arrangement for alarm generation & recording.

7. Other terms & Conditions:

Inspection & Testing:

Inspection & testing of all items will be carried out by BARC at vendor's works for ascertaining conformity to requirements specified above.

Guarantee:

The material should be guaranteed against any defective design & poor workmanship for a period of 12 months from the date of receipt of material at purchaser's end.