TE No. TL42Q0170 3Q219

Expression of Interest (EOI) for Design, Development, Realization and Installation of Large Vacuum Chamber Facility for testing High Power Electric Thruster.

1. Introduction

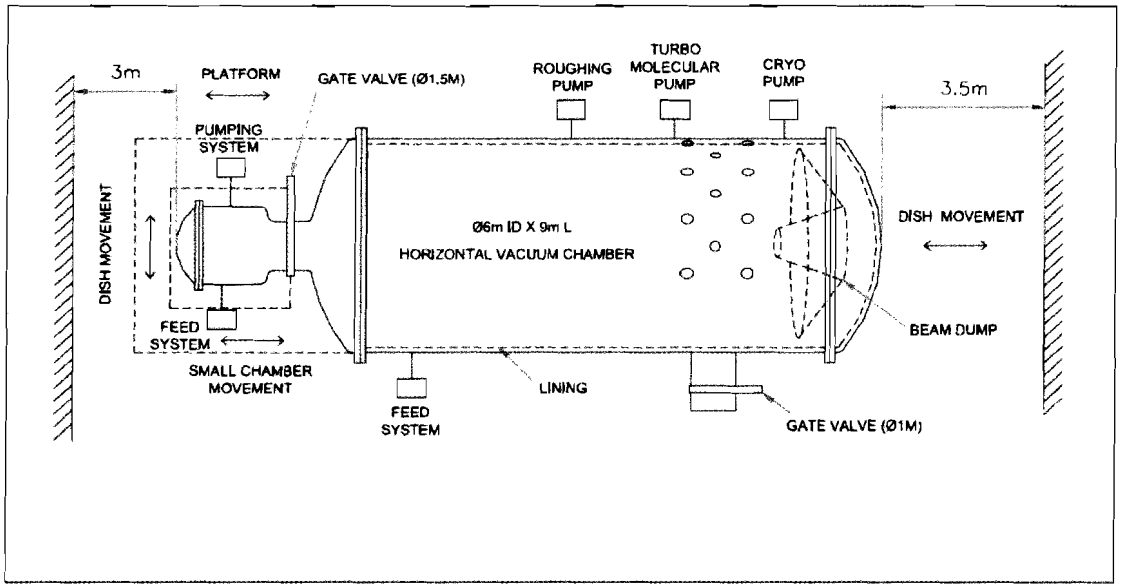
Liquid Propulsion System Centre (LPSC) is a premier institute in India developing and supplying state of the art liquid propulsion systems for India's space program. Recently, LPSC has embarked upon the development of high thrust electric propulsion systems with specific attention to Stationary Plasma Thrusters (SPTs) that uses Xenon as propellant. In addition to the existing test facilities, it is proposed to install a dedicated vacuum chamber which can cater to the testing of all types of SPTs up to a thrust level of 1N. This document provides the gross specifications/requirements of the vacuum chamber and the connected systems.

Attention of all reputed companies, organisations/ research laboratories either individually or as a consortium is drawn for submitting the EOI for the design, development, realization and supply of Large Vacuum Chamber and its associated equipment including the Xenon feed systems in a timely manner to meet the above purpose. In case of consortium there should be a prime contractor who will be responsible for the execution of the system.

2. Scope of work

1. Design of vacuum chamber along with its associated pumping systems and Xenon feed system to meet the requirements which will be reviewed and approved by LPSC
2. Procurement of components/equipment/material as per the design specifications.
3. Integration and testing of system at Contractors site and transportation and testing at LPSC as per plan that will be provided by LPSC.
4. Maintenance of system as per manual.

3. Configuration of the system envisaged



Typical schematic of the chamber and related equipments.

4. Technical details of proposal

Sl. No	Item description	Requirement
1.	Main Vacuum chamber	9m cylindrical length with 6 m diameter (internal)with tori spherical end dish, made of non magnetic Stainless steel material . Provision to mount semi-anechoic chamber and further augmentation. The design shall be as per the ASME pressure vessel codes Section VIII. The end dish shall be movable with suitable mechanism.
2.	Small Vacuum chamber	2.5 m cylindrical length with 2 m diameter (internal)with tori spherical end dish, made of non magnetic Stainless steel material, mated to main chamber through a 1.5 metre gate valve. The small chamber along with its pumping system shall be movable with suitable mechanism.
3.	Vacuum system and levels	The entire vacuum pumping system shall be oil free and a suitable scheme has to be proposed to achieve the required vacuum levels. Requirement of vacuum level is 1 x 10^{-6} mbar under no load condition. The pumping system shall be capable of providing a vacuum level better than 2 x 10^{-5} mbar when Xenon load of 20 mg/s with 20% redundancy on the pumping system. Provision for augmenting the pumping system to maintain the same vacuum level for a Xenon load of 60 mg/s with 20% redundancy shall be provided.
4.	Auxiliary systems	The contractor shall supply all the auxiliary systems required such as LN2/ GN2 storage and distribution system (Oil free) as well as Data acquisition system with safety provisions. Beam dump and the provision for mounting the plasma diagnostic system in the main chamber shall be provided as per LPSC specifications.
5.	Vacuum Chamber Control and Data Acquisition Systems (VCDAQ)	The chamber and pumping system has to be supplied with a VCDAQ to ensure the continuous operation of the system without manual intervention. The system should measure, monitor and acquire all the necessary system parameters and carry out the control operations related to the various pumping systems and safety interlocks.The control systems shall have high immunity for the EMI interferences

6.	Xenon Feed systems	The chamber shall have provision for the Xenon feed lines as required. The feed system shall have feed lines, mass flow controllers, filters and purifiers to cater to a variable flow rate of up to 100mg/s for Anode and up to 5mg/s for Cathode to cater to the testing requirement. The systems shall ensure contaminant free Xenon as per the thruster requirements.
7.	Third party inspection	Strict quality control and third party inspection shall be implemented during all stages of realization. Design reports, fabrication drawings, finite element analysis wherever applicable, material certificates, inspection reports by third party and quality control documents shall be submitted to LPSC for review and approval.
8.	Safety	All required safety systems & interlocks shall be installed to ensure the safety of the vacuum chamber, the thruster being tested and data acquisition system/diagnostic electronics . The safety of the operator has to be considered as the first priority while designing the entire system.
9.	Transportation and installation	The transportation, installation and commissioning of the entire system is the sole responsibility of the contractor including necessary approvals from associated departments for transportation is also Contractors responsibility. Before transporting to the LPSC Valiamala Campus, the party has to demonstrate the satisfactory working of the entire system at their premises in the presence of LPSC representative.

5. Commercial details of the proposal

Vendor shall have previous experience in design, development and installation of similar vacuum systems. Documentary evidence of the same shall be submitted along with the EOI. The company shall be financially strong to execute the work under this expression of interest and must have an experience of at least 10 years in this field.

The following commercial details of the company and proposal shall be submitted along with the EOI

1. Annual turnover of company for last 10 years.
2. Proof of experience in field for 10 years.
3. List of customers in aerospace or scientific area.

5. Company website.

6. Delivery period

Timely delivery is the essence of the contract.

Phase – I shall be design (by contractor) & review of the system by LPSC.

Phase – II shall be procurement of material/equipment, manufacturing & assembly.

Phase – III contains Pre dispatch inspection, transportation, handling, commissioning and erection of system.

Phase – IV consists of acceptance testing and training of personnel at LPSC.

The delivery time for whole system is 18 months.

7. Mode of tender

In the first stage companies have to respond to this expression of interest (EOI) explaining their capabilities and expertise to execute the proposed work. **No price is to be quoted.** Parties meeting the minimum requirements will be called for pre-bid meeting at LPSC, Valiamala.

Based on the discussions so held, detailed technical specification will be firmed up and detailed requirement specification in the form of 'Request For Proposal' (RFP) will be provided by LPSC.

In the second stage, techno – commercial and price bid will be invited from short listed vendors on two part bid basis.

Final selection will be based on techno – commercial evaluation of price bid.

8. **Payment terms:** payment terms will be finalized based on mutual discussion between the party and LPSC.