



भारत सरकार / Government of India
अंतरिक्ष विभाग / Department of Space
यू.आर. राव उपग्रह केंद्र / U.R.RAO SATELLITE CENTRE
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बेंगलूरु/ BENGALURU – 560 017

Ref No.: URSC/PUR/ISCP 2022056555/EoI-01/23-24

25.04.2023

**परमाणु ऑक्सीजन उच्छादन परीक्षण
सुविधा की स्थापना हेतु इच्छा की अभिव्यक्ति हेतु आमंत्रण (ई.ओ.आई.)
Invitation for Expression of Interest [EoI]
for Establishment of Atomic Oxygen exposure test facility.**

यू.आर. राव उपग्रह केंद्र (यू.आर.एस.सी.) (पूर्व में इसरो उपग्रह केंद्र) , भारतीय उपग्रहों की अभिकल्पना, विकास, संविचन और परीक्षण के लिए भारत सरकार के अंतरिक्ष विभाग के तहत भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) का अग्रणी केंद्र है। परमाणु ऑक्सीजन ऊपरी वायुमंडल (200 कि.मी से 600 कि.मी) में प्रधान घटक है। परमाणु ऑक्सीजन पैराबैंगनी विकिरण (यू.वी – 100 से 200 तरंगदैर्घ्य) द्वारा ऑक्सीजन के वियोजन के कारण विरचित हुआ है। परमाणु ऑक्सीजन तथा अंतरिक्षयान के बीच अंतरक्रिया अपरदन तथा ऑक्सीकरण द्वारा अंतरिक्षयान के सामग्रियों के द्रव्यमान, सतह आकृतिविज्ञान, वैद्युत, ऊष्मा तथा प्रकाशिकी गुण में महत्वपूर्ण परिवर्तन लाया जा सकता है।

U.R. Rao Satellite Centre [URSC] (Formerly known as ISRO Satellite Centre), of Indian Space Research Organization [ISRO] under Department of Space, Government of India is the lead Centre of ISRO for Design, Development, Fabrication and Testing of all Indian made Satellites. Atomic Oxygen is the predominant constituent in the upper atmosphere (200 Km to 600 Km). Atomic oxygen is formed due to the dissociation of O₂ by ultraviolet (UV-100 to 200 nm wavelength) radiation. The interaction between atomic oxygen and spacecraft surfaces can produce significant changes in the mass, surface morphology, electrical, thermal and optical properties of the spacecraft materials through erosion and oxidation.

परमाणु ऑक्सीजन में 200 कि.मी तथा 650 कि.मी के बीच की तुंगता पर उच्चसंख्या की सांद्रता तथा रैम का प्रभाव रहता है। परिक्रमण अंतरिक्ष गति (करीबन 7.0 कि.मी) वायुमंडलीय परमाणु ऑक्सीजन द्वारा करीबन 5 eV के महत्वपूर्ण ऊर्जा के साथ अंतरिक्षयान सतह को एक फ्लक्स का उत्पादन करता है। जिस सतह पर वह संघट्ट होता है उस पर असंख्य रासायनिकी तथा भौतिकी घटनाओं को चालू करने के लिए यह ऊर्जा, पर्याप्त है। सतह लक्षण में परिवर्तन परमाणु ऑक्सीजन फ्लूयन्स या कुल समेकित फ्लक्स आपतन से सीधा संबंधित है। यह फ्लूयन्स अनेक पैरामीटर जैसे, 11- वर्ष सौर चक्र गतिविधियाँ, कक्षीय वेग वेक्टर, तुंगता, सतह अभिमुखीकरण, स्थानीय समय तथा मिशन काल जैसे अंतरिक्षयान कक्षीय पैरामीटर पर निर्भर है। परमाणु ऑक्सीजन (ए.ओ.) फ्लूयन्स सौर क्रियाकलाप में बढ़ती के साथ बढ़ता है तथा उपग्रह तुंगता में बढ़ती के साथ घटता है। फ्लूयन्स के उत्पाद तथा सामग्री के अपरदन लब्धि (अभिक्रिया गुणांक) से सामग्री अपरदन गहराई मिलती है।

Atomic oxygen has a high number density and ram impact energy at the altitudes between 200 km and 650 km. The orbiting spacecraft motion (aprox. 7.0 Km/s) through the atmospheric atomic oxygen can generate a flux to the spacecraft surfaces with significant energy of about 5eV. This energy is sufficient enough to initiate numerous chemical and physical events on the surface it impacts. The changes in surface properties are directly related to the atomic oxygen fluence or total integrated flux incident on material surfaces. This fluence in turn is dependent on many parameters such as, 11-year solar cycle activity, the orbital velocity vector, spacecraft orbital parameters such as altitude, surface orientation, local time and mission life. Atomic oxygen fluence increases with the increase in solar activity,

and decreases with the increase in the satellite altitude. The product of fluence and the erosion yield (reactivity coefficient) of the material will give the material erosion depth.

परमाणु ऑक्सीजन (AO) उच्छादन परीक्षण सुविधा हेतु भू पर अंतरिक्ष जैसे वातावरण / परिस्थिति का अनुकरण करने विविध अंतरिक्षयान सामग्रियों के सतह अपरदन / ऑक्सीकरण यंत्र को समझने के लिए आवश्यक है। कुछ अंतरिक्षयान द्वारा उच्छादित सामग्री है जैसे धातु, मिश्रधातु, पॉलिमाइड, एपोकसी तथा ऊष्मीय पेंट।

Atomic oxygen (AO) exposure test facility is required to simulate the space like environment/ condition in the ground to understand the surface erosion/ oxidization mechanism of different spacecraft materials. Some of the spacecraft exposed materials are metals, alloys, polyimide, epoxies and thermal paints.

परमाणु ऑक्सीजन उच्छादन परीक्षण सुविधा की स्थापना हेतु भारतीय संगठन विक्रेताओं को पहचानने / चयन हेतु की जाने वाली बोली प्रक्रिया में भाग लेने हेतु हम शैक्षणिक संस्थाओं / विश्वविद्यालय / अनुसंधान संस्थाओं की प्रतीक्षा है।

We are looking for Academic Institutions / Universities / Research Institutes for participation in a bidding process for identification / selection of Indian organisation/vendors for establishment of Atomic Oxygen exposure test facility.

यह प्रस्ताव विशेष रूप से यू.आर.एस.सी के लिए परमाणु ऑक्सीजन उच्छादन परीक्षण सुविधा की स्थापना करने के लिए इच्छुक भारतीय उद्योग द्वारा इच्छा की अभिव्यक्ति करने के लिए है।

The proposal is to invite Expression of Interest from exclusively Indian Industries who have or are interested for “establishment of Atomic Oxygen exposure test facility” for URSC.

ई.ओ.आई. दस्तावेज को हमारे वेबसाइट www.isro.gov.in से डाउन लोड किया जा सकता है।

Eol documents can be downloaded from our website www.isro.gov.in

ई.ओ.आई को तकनीकी पैरामीटर के अनुपालन तथा तकनीकी सुविज्ञता, फर्मों की वित्तीय विश्वस्तता के आधार पर मूल्यांकन किया जाएगा।

The Eol will be evaluated on the basis of Compliance to the Technical Parameters & Technical Expertise, Financial soundness of the Firm[s].

आवश्यकता पड़ने पर ई.ओ.आई. की प्रक्रिया को रद्द करने / पुनः जारी करने या सूचना/ब्यौरों को आगे प्राप्त करने के अधिकार को यू.आर.एस.सी आरक्षित रखता है।

URSC reserves the right to cancel/re-issue the process of Eol if the necessity so arises or to seek further information/details.

यदि कंपनी/फर्म को किसी भ्रष्ट या कपटपूर्ण पेशे में भाग लेने के बारे में पाया गया तो उन्हें निविदा प्रस्तुत करने की प्रक्रिया से बहिष्कृत किया जाएगा और उनके ई.ओ.आई दस्तावेज पर विचार नहीं किया जाएगा।

Companies/Firms, if found to have indulged in any corrupt or fraudulent practices, will be debarred taking part in the Tendering process and their Eol Document will not be taken up for consideration.

“इच्छा की अभिव्यक्ति” के साथ आपूर्तिकार/फर्मों को निम्नलिखित सूचना को विस्तृत रूप में उपलब्ध करना होगा: Along with “Expression of Interest” Suppliers/ Firm[s] should furnish the following information also in detail:

1. कंपनी के पंजीकृत पते के साथ फोन, फैक्स, ई-मेल, वेब विवरण आदि
Registered address of the Companies with Phone, Fax, Email, Web etc.
2. कंपनी/संगठन की स्थिति (स्वामित्व/भागीदारी/निजी/लोक लि. आदि) स्वामित्व, भागीदार, बोर्ड के निदेशक आदि का नाम व पता
Company/Organization Status (Proprietary/Partnership/Private/Public Ltd. etc.) with Name and Address of Proprietor, Partners, Board of Directors, etc.
3. सहयोगी: (क) भारतीय (ख) विदेशी
Associates: (a) Indian (b) Foreign.

4. पिछले तीन सालों में प्रमुख उपभोक्ताओं की सूची के साथ पूरा पता और उनके संपर्क व्यक्ति
List of Major Customers during the last 3 Years with full address and their Contact Persons.
5. अवसंरचना सुविधा का स्वामित्व / उपलब्धता के ब्यौरे
Details of Infrastructure Facilities owned / available.
6. कंपनी के प्रमुख शेयरधारी के नाम तथा पता और उनके शेयर पूँजी का प्रतिशत
Names and addresses of the major Shareholders of the Company and the percentage of their share capital.
7. पूँजी तथा पिछले तीन वित्तीय वर्षों की कुल बिक्री के साथ नवीनतम वार्षिक रिपोर्ट की प्रति
Capital and Turnover for the preceding 3 Financial Years with copy of latest Annual Report.
8. उपलब्ध वित्तीय क्षमता/ ऋण सुविधाएँ
Financial Capacity/Credit facilities available.
9. बैंकों के नाम और पता
Name and Address of Bankers.
10. व्यापार संघ जिससे उद्योग संबंधित हैं
Trade Association to which Industry/ies belong to.
11. स्थापना बिक्री/सेवाकर पंजीकरण संख्या
Establishment/Sales/Service Tax Registration Number.
12. व्यवसाय का प्रकार
Nature of Business
13. अपने बैंकों द्वारा जारी की गई फर्म की शोधन / वित्तीय क्षमता
Solvency/Financial capacity of the Firm issued by their Bankers.
14. कोई अन्य सूचना जो उद्योग संगत समझें
Any other information the Industry/ies consider relevant.
15. अपने सामर्थ्य और कमियों को क्षेत्रों के स्पष्टतः उल्लेख करते हुए कंपनियों के प्रोफाइल
The Profile of the Company/ies clearly bringing out the areas of Strength and Weaknesses.
16. ई.ओ.आई में भाग लेने हेतु स्व-मूल्यांकन, तकनीकी और संगठनात्मक क्षमता
Self-Assessment Technical and Organizational Competence to take part in the Eol.

ई.ओ.आई.प्रतिक्रिया का समापन /Completion of the Eol Response:

- a. कंपनी / फर्मों को सलाह दी जाती है कि वे ई.ओ.आई .दस्तावेजों में निहित सभी अनुदेश; नियम व शर्तें; प्रारूप; आवश्यकताएं तथा अन्य सूचनाओं को ध्यानपूर्वक पढ़ें। ऐसा माना जाता है कि ई.ओ.आई की प्रस्तुति को उसके आशय को पूरी तरह समझने के साथ ई.ओ.आई दस्तावेजों का ध्यानपूर्वक अध्ययन तथा परीक्षा के उपरांत ही किया गया है।
The Company/Firms are advised to study all the instructions; Terms and Conditions; Forms; Requirements and other information in the Eol documents carefully. The submission of Eol shall be deemed to have been done after a careful study and examination of the Eol documents with full understanding of its implications.
- b. इस ई.ओ.आई के लिए उत्तर ,संपूर्ण तथा सभी पहलुओं में पूर्ण होना चाहिए। ई.ओ.आई . दस्तावेज द्वारा आवश्यक सूचनाओं को न प्रस्तुत करने या सभी तरह से ई.ओ.आई .दस्तावेजों को पूरी तरह अनुक्रियात्मक न होने पर प्रस्तुत करना कंपनी/फर्मों के जोखिम पर होगा तथा इससे दस्तावेज की अस्वीकृति भी हो सकती है।
The response to this Eol should be full and complete in all respect. Failure to furnish all the information required by the Eol document or submission of proposal not substantially responsive to the Eol documents to every respect will be at the risk of the Company/Firms and may result in rejection of the document.
- c. प्रस्तुत ई.ओ.आई के सभी पृष्ठों पर संख्या लिखना है तथा प्राधिकृत हस्ताक्षरी द्वारा हस्ताक्षरित होना आवश्यक है।
All the pages of the Eol submitted must be numbered and signed by the authorized signatory.

- d. ई.ओ.आई के संबंध में प्रचार करना सख्त मना है तथा एजेंसी द्वारा प्रस्तुत ऐसे प्रचारित ई.ओ.आई अस्वीकृति के अधीन हैं।
Canvassing in connection with the Eol be strictly prohibited and such canvassed Eol submitted by the Agency are liable to be rejected.

उपरोक्त सभी सूचना सहित "इच्छा की अभिव्यक्ति" अधोहस्ताक्षरी को उपरोक्त संदर्भ संख्या को उद्धृत करते हुए निर्धारित दिनांक व समय तक पहुँचना चाहिए।
"Expression of Interest" with all the above information shall reach the address given below, quoting the above Reference Number on or before the due date & time.

व. प्रधान, क्रय व भंडार/ Sr. Head, Purchase & Stores
यू.आर. राव उपग्रह केंद्र/U R Rao Satellite Centre,
ओल्ड एयरपोर्ट रोड / Old Airport Road,
विमानपुरा (पो), बेंगलूरु /Vimanapura Post, Bangalore – 560017, भारत/India

Email: psob@ursc.gov.in (कृपया नोट करें, किसी भी स्पष्टीकरण के लिए उल्लिखित ई-मेल पर कृपया भेजें। फिर भी ई.ओ.आई. के लिए प्रतिक्रिया को केवल उपरोक्त डाक पते पर ही भेजें।)
Email: psob@ursc.gov.in (Please note that, any clarifications shall be sent to Email mentioned herein. However, response to Eol has to be sent to above mentioned postal address only)

स्पष्टीकरण प्रस्तुति की अंतिम तिथि
Last date of submission of clarification : **08.05.2023 10:00 Hrs IST**

पूर्व-ई.ओ.आई. बैठक (भास्करा सम्मेलन कक्ष,
मुख्य भवन, यू.आर.एस.सी)
Pre-Eol meeting (at Bhaskara Conference
Hall, Main Building, URSC) : **12.05.2023 13:30 Hrs IST**

ई.ओ.आई प्रस्तुति की अंतिम तिथि
Last date for submission of Eol : **26.05.2023 10:00 Hrs IST**

ई.ओ.आई. खोलने की तिथि
Opening date of Eol : **26.05.2023 10:30 Hrs IST**

उपरोक्त सभी सूचना सहित इच्छा की अभिव्यक्ति, अधोहस्ताक्षरी को उपरोक्त संदर्भ संख्या को उद्धृत करते हुए 26/05/2023 तक पहुँचना चाहिए। इस प्रस्ताव को पूर्व-ई.ओ.आई अर्हता के रूप में पहल किया गया है। बिना कारण बताए इच्छा की अभिव्यक्ति को स्वीकार या अस्वीकार करने का अधिकार यू.आर.एस.सी. आरक्षित रखता है।

"Expression of Interest" with all the above information shall reach the undersigned, Quoting above Reference Number on or before **26/05/2023**. This proposal is initiated as a Pre-Eol Qualification. URSC reserves the right to accept or reject all or any such "Expression of Interest" without assigning any reasons what so ever.

Sd/-
व . प्रधान, क्रय व भंडार/Sr. HEAD, PURCHASE & STORES



Atomic Oxygen Exposure Test Facility Establishment – EOI

Invitation for

Expression of Interest (EOI)

for

Establishment of Atomic Oxygen

Exposure Test Facility

U R Rao Satellite Centre (URSC)
Indian Space Research Organisation (ISRO)
Bengaluru

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Atomic Oxygen Exposure Test Facility Establishment – EOI

**PART-I
GENERAL INFORMATION**

PART-I: GENERAL INFORMATION

A.1.0 Introduction / Preamble

Atomic Oxygen is the predominant constituent in the upper atmosphere (200 Km to 600 Km). Atomic oxygen is formed due to the dissociation of O₂ by ultraviolet (UV-100 to 200 nm wavelength) radiation.

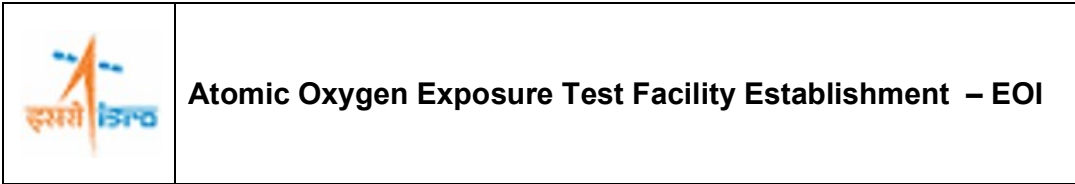
The interaction between atomic oxygen and spacecraft surfaces can produce significant changes in the mass, surface morphology, electrical, thermal and optical properties of the spacecraft materials through erosion and oxidation.

Atomic oxygen has a high number density and ram impact energy at the altitudes between 200 km and 650 km. The orbiting spacecraft motion (aprox. 7.0 Km/s) through the atmospheric atomic oxygen can generate a flux to the spacecraft surfaces with significant energy of about 5eV. This energy is sufficient enough to initiate numerous chemical and physical events on the surface it impacts. The changes in surface properties are directly related to the atomic oxygen fluence or total integrated flux incident on material surfaces. This fluence in turn is dependent on many parameters such as, 11 year solar cycle activity, the orbital velocity vector, spacecraft orbital parameters such as altitude, surface orientation, local time and mission life. Atomic oxygen fluence increases with the increase in solar activity, and decreases with the increase in the satellite altitude. The product of fluence and the erosion yield (reactivity coefficient) of the material will give the material erosion depth.

Atomic oxygen (AO) exposure test facility is required to simulate the space like environment/ condition in the ground to understand the surface erosion/ oxidization mechanism of different spacecraft materials. Some of the spacecraft exposed materials are metals, alloys, polyimide, epoxies and thermal paints.

A.2.0 GOALS OF THIS EXPRESSION OF INTEREST (EOI)

- The objective is to solicit EOI proposals from the interested bidders, preferably by Academic Institutions / Universities / Research Institutes for participation in a bidding process for identification / selection of Indian organisation/vendors for establishment of ATOX exposure Test Facility
- Identification / Selection and qualification of technically competent **Indian vendor's / Organisation** having required infrastructure and relevant expertise in such sophisticated



design and fabrication and realization process and willing to join hands with ISRO as part of indigenization programme in a collaborative manner.

- The organisation will be responsible for design and fabrication, Procurement of required components / equipments, operation and maintenance of this facility to meet the requirements of URSC.
- This document describes scope of this EOI i.e. the requirements for design, fabrication, **operation & maintenance of the ATOX exposure Test facility**

A.3.0 EOI ISSUING AUTHORITY

- This Expression of Interest (EOI) is issued by URSC/ISRO.
- It is intended to identify / short-list and qualify potential Indian organisation.
- Decision with regard to the short-listing of bidders through this EOI shall be final.

A.4.0 PROJECT DETAILS

Title		Establishment of Atomic Oxygen Exposure Test Facility
1	Project Initiator	Power Systems Group, ISRO
2	Contact Person	Head, Purchase and Stores, URSC, ISRO
3	Technical Focal Point	Dr. Uma B. R. Mail ID: uma@ursc.gov.in , Ph.No. : 08025083531

A.5.0 TENDER PROCESS AND TENTATIVE TIME FRAME

S. No.	Key Activity	Time Frame
1	Release of Invitation for EOI	T₀
2	Last date for submission of written questions/clarifications by the bidders	T₀ +10 days
3	Pre-Bid Meeting (Offline @ URSC campus) [#]	Within T₀ + Two weeks
4	Last date for Submission of EOI Response	T₀ + Four weeks
5	Opening of EOI Responses	T₀ + Four weeks
6	Declaration of Identified / Short listed organisation /EOI Closing	After the technical evaluation of bids by URSC
Responding organization		
<ul style="list-style-type: none"> • To consider 24 months from the signature of the agreement(s)/ MOU / RFP/ PO as the goal for the establishment of the infrastructure and facility (it includes all the procurement of required equipments), • Shall also consider a further 6 months period as the target for process optimization and qualification of the facility by testing different samples provided by URSC. • The details of the no of samples, type of material, and size of the sample shall be provided by URSC. 		

Table 1: Tender Process and Tentative Time frame



Atomic Oxygen Exposure Test Facility Establishment – EOI

Vendors willing to seek any clarifications can either send written communication within two weeks of EOI release or can also participate in the pre bid meeting, by sending willingness to attend through email in this regard. The date of pre – bid meeting will be fixed based on number of response received.

- The Tender Process seeks to engage Indian Vendors to competitively involve in this integrated proposal that will meet the URSC’s project objectives.
- *A Pre-Bid Conference will be arranged at U.R. Rao Satellite Centre, HAL Airport Road, Vimanapura PO, Bengaluru-560017. Interested Companies / organisations can take part in the Pre-EOI Conference in order to have better understanding of our Invitation to EOI document, clarify doubts if any, and other Allied Technical and Commercial Terms and Conditions of design, development, Establishment, running and maintenance of Atomic oxygen exposure test facility*
- Please note that request for “**Advancement/Postponement**” of Pre-EOI conference for Expression of Interest, will not be entertained under any circumstances.
- Interested Vendor[s] may please provide the details of their Representative[s] taking part in the Pre-EOI meeting for Expression of Interest well in advance in order to arrange for Security clearance.
- Data required for Security Clearance (If respondent is willing to participate in URSC):
 1. Name of the Visitor
 2. Nationality
 3. Date of Birth
 4. Place of Birth
 5. Gender
 6. Occupation
 7. Name and Address of Company/Firm
 8. Phone No.

In the event of Universities/ Organizations who are unable to attend the Pre-EOI conference for Expression of Interest physically, a Pre-EOI conference for Expression of Interest through Video Conference/ on line platform shall be arranged by U.R. Rao Satellite Centre, Bengaluru upon the request from the Universities/ Organizations.

A.6.0 SUBMISSION OF PROPOSALS

- EOI Proposals, in its complete form in all respects as specified in the EOI, must be submitted to PSO, URSC, ISRO, HAL Airport Road, Bengaluru.



Part II
SCOPE OF SERVICES

Part II: SCOPE OF SERVICES

B.1.0 BACKGROUND

URSC invites the EOI from potential and technically competent Indian Academic institutions / Universities / Research Institutes to design, fabricate and establish an ATOX Exposure Test Facility followed by operation/ running and maintenance of the facility.

This project involves design, fabrication, installation and testing / characterizing the materials / samples for its space worthiness.

Indian Academic institutions / Universities / Research Institutes willing to work collaboratively with URSC and meeting the following pre-requisites are encouraged to participate in this process.

B.2.0 General Guidelines for Submission of EOI:

The EOI proposal should contain but not restricted to the following:

- Organization profile like ownership, management hierarchy List of key personnel and their expertise and road map.
- Unique capabilities and facilities available within the organization that would be added advantageous to this project.
- Project Implementation plan, including assembly/installation, system integration & testing.
- Planned schedule with milestone for building of different infrastructures.
- Organization to provide a description of the methods and techniques for initiating, planning, monitoring and controlling the technical work and schedules.
- Response should be either sent by post or courier or in person. However ISRO will not be responsible for any delay in delivery of the response.
- ISRO has the right to accept or reject any response or cancel the entire process without assigning any reason
- ISRO will set up steering and monitoring committee to monitor the progress of the work and usage of the facility.
- For this EOI only technical details shall be sent and Cost related information shall not be disclosed

B.3.0 OBJECTIVE OF INVITATION FOR EOI

- To invite, select and shortlist Indian organisation meeting the outlined requirements against the evaluation criteria detailed in this document .
- Provide information to potential respondent about the requirement.
- Outline the Tender Process and further formalities.
- Set out the Evaluation Criteria against which the URSC will evaluate each EOI respondents to select and shortlist.
- To prepare the Request for Proposal (**RFP**).

B.4.0 SCOPE OF WORK

B.4.1 Facility Design & Establishment

- Designing the facility / configuration based on URSC /ISRO requirements
- Fabrication and installation of the test facility at their premises.
- Procurement of all the equipments and required component.
- Running and maintaining of the facilities.

B.4.2 Operation & Maintenance

- For conducting the ATOX exposure tests on samples / materials supplied by URSC/ISRO

B.4.3 Details :

Main scope of this EOI is establishment of atomic oxygen (ATOX) exposure test facility along with its peripherals in **India**. The important aspect of this proposal is, the establishment of Atox exposure test facility shall be in their premises in India, running of the facility and regular maintenance etc.

It is not the intent of this document to completely specify all details of design and construction. Nevertheless the system shall conform in all respects to high standards of engineering, design & workmanship and shall be capable of performing the operations in a safe and efficient manner as per the industry standard/ codes.

1. Designing the facility / configuration based on URSC /ISRO requirements.
2. Fabrication and installation of the test facility at their premises.
3. Procurement of all the required equipments/ instruments as per the URSC requirements. The details of the specifications of the equipments shall be discussed with the URSC team.

4. Demonstration of the uniformity and repeatability of the atomic oxygen (O) constituent in the chamber.
5. Calibration of the chamber by using standard procedure with witness sample.
6. Infrastructure –Power, ventilation system for the facility.
7. Engaging competent Manpower for operation, maintenance and training of the manpower.
8. Characterization of the exposed materials by using standard characterization methods like SEM, XPS, XRD (not limiting to these methods) or by any other suitable methods and analysis of the test results.
9. Shall procure required equipments like microbalance for weight measurements for mass loss calculation.
10. Facility shall have the required methodology for measurement of energy & flux of the generated oxygen, identification of different elements / atoms during the test. Also it should clearly differentiate between the material reaction due to atomic oxygen or due to sputtering.
11. Ensuring of proper security of the facility and operator by incorporating proper safety measures.
12. Obtaining of required statutory clearance from the state and central government offices to run the facility. There shall be no violation of local and national government rules during the facility establishment and running.
13. Submission of Quarterly progress report during facility establishment and facility utilization to ISRO.

B 5.0 GENERAL SPECIFICATIONS OF THE FACILITY:

- *The exposure chamber should be able to accommodate samples of nominal size 10cm X 10cm and if possible accommodate bigger size sample with uniform atomic oxygen (Atox) flux over the entire target sample. Multiple samples can be tested at a time.*
- *The required accumulated fluence will be $1 \times 10^{22} \text{ cm}^{-2}$ and it shall be achieved in reasonable time i.e. within one to two weeks. To achieve this, required atomic oxygen flux shall be worked out.*
- *The Atox generation shall be by RF or laser induced breakdown (any similar method) of the molecular oxygen.*
- *The facility shall produce Atox of velocity equivalent to $7-8 \text{ Km s}^{-1}$ and energy in the range of 5eV to 10eV (hyper thermal oxygen).*

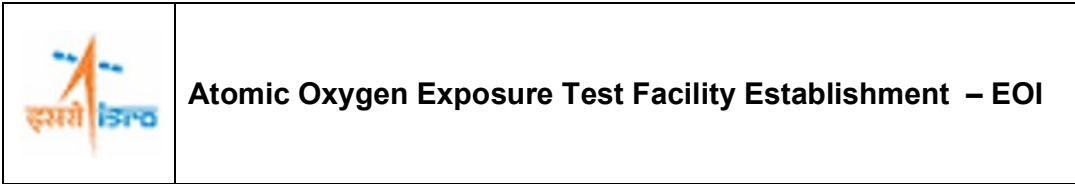
- *Sample size is min 10cmX10cm. Uniformity of the generated atomic oxygen on the target sample shall be within $\pm 5\%$.*
- *The vacuum level required in the chamber shall be rough vacuum $\sim 10^{-5}$ to 10^{-6} mbar to ensure there is no contamination from the chamber itself.*
- *Inside the vacuum chamber there should not be any component/part/material which is a source of out-gassing above the acceptable limit as per high vacuum industry standard (Desirable limit: Total Mass Loss (TML) < 1% and Cumulative Volatile Condensable Mass (CVCM) Loss < 0.1% when performed under standard test conditions).*
- *Maintain the temperature of the sample holder between -100 Deg C to +100 Deg C.*
- *Provision for UV source of $\sim 250\text{nm}$ to 600nm shall be provided.*
- *The Atox test system should be able to carry out the test with both UV and Atox to study the synergetic effect of UV and atomic oxygen.*
- *The internal surfaces of the test chamber shall be protected from reaction due to atomic oxygen.*
- *The chamber shall be provided with number of view ports having suitable diameter for taking various vacuum feed through for operation of different diagnostic equipments.*
- *Internal mounting brackets shall be provided to mount the samples for test.*
- *The chamber should be configured taking into account easy accessibility of all the internal systems for operation such as cleaning, repair and maintenance & loading of coating material & optical components.*

It is not the intent of this document to completely specify all the details of specifications, design and construction. The detailed specifications of each equipment/ component of the facility will be worked later.

B 6.0 ELIGIBILITY REQUIREMENTS

The technical response will be evaluated and graded based on the criteria listed down below. The details of the following requirements shall be provided by university/ organization.

Qualification Criteria



- The university / organization shall have expertise in the field of Atomic oxygen and its generation. Details of key personnel and their expertise
- The university / organization shall have sufficient trained and experienced man power to build and run the system. They should bring out the execution of the work in detail.
- The university / organization shall have sufficient / identified land which is required to establish the facility.

B 7.0 EOI EVALUATION METHOD / CRITERIA

- Interested Indian university / organization shall make a technical presentation on preliminary plan / proposal to an expert committee of URSC, ISRO on a mutually agreed date / time after the due date for the submitting of EOI response.
 - Organization shall have expertise in the field of ECR plasma, generation of oxygen by any suitable methods like RF/ Laser, material characterization. Key personnel shall have publications in this field.
 - The prospective universities / organization shall be rated/ evaluated on the eligibility criteria specified based on the documents provided with the technical response.
- ✓ *Based on the Universities/ Organizations profile, industrial experience and techno commercial capability, organisations will be shortlisted. If required a team from URSC will visit the Vendor's existing Facility/university/organisation to assess the technical suitability.*

B 8.0 EOI TERMS AND CONDITIONS

- a. This EOI is not an offer and is issued with no commitment. URSC reserves the right to withdraw the EOI and change or vary any part thereof at any stage. URSC also reserves the right to disqualify any bidder, should it be so necessary at any stage.
- b. URSC reserves the right to withdraw this EOI, if URSC determines that such action is in the best interest of the Organization.
- c. Timing and sequence of events resulting from this EOI shall ultimately be determined by URSC.
- d. Each respondent shall submit only one EOI proposal.