भारत सरकार
अंतरिक्ष विभाग (अं.वि.)
लियोस-इसरो
पीन्या औद्योगिक संपदा
लियोस

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE (DOS)
LEOS-ISRO
PEENYA INDUSTRIAL ESTATE
LEOS

फोन नं Ph No. 080-28398836 / Fax. 080-28391964 / ईमेल e-mail: purchase@leos.gov.in

# निविदा आमंत्रण
# INVITATION TO TENDER

मैसर्स
**M/s** 00000

हमारी संदर्भ सं
**Our Ref. No.** LEOS 2026-001018-01

निविदा अंतिम तिथि
**Tender Due at** 16:00 hrs IST on 14/08/2026

महोदय
**Dear Sirs,**

कृपया निम्नलिखित मदों की आपूर्ति के लिए अनुलग्नक (फार्म सं.   संलग्न ) में उल्लिखित निबंधन एवं शर्तों के अनुसार संलग्न निविदा प्रपत्र में वर्णनात्मक सूचीपत्र/पैम्फलेट/साहित्य सहित हमारी संदर्भ सं. एवं अंतिम तिथि (मोटे अक्षरों में) ऊपर लिखते हुए अपनी मुहरबंद निविदा प्रस्तुत करें।

Please submit your sealed quotation , in the Tender Form enclosed here along with the descriptive catalogues /pamphlets /literature ,superscribed with Our Ref.No. and Due Date for the supply of the following items as per the terms & conditions mentioned in Annexure(Form No. AS PER ENCLOSURE )

| क्र.सं. **Sl. No.** | विनिर्देशों सहित मद का विवरण **Description of items with Specifications** | इकाई **Unit** | मात्रा **Quantity** |
|---|---|---|---|
| 1 | Supply, Installation, Demonstration, and Training of Large Area Thin Film Coating System (LATCS) (Detailed Specification as per enclosure) | 1 | 1 |

सुपुर्दगी स्थल
**Delivery At** Store, LEOS

प्रेषण की विधि
**Mode of Despatch** BY ROAD

शुल्क छूट
**Duty Exemptions** AS PER ENCLOSURE

विशेष अनुदेश
**Special Instructions** NIL

विशेष निबंधन
**Specific Terms** AS PER ENCLOSURE

निविदाकारों को अनुदेश
**Instructions to Tenderers**

R

GANTHIMERI AKKISETTY
PURS. & STORES OFFICER
भारत के राष्ट्रपति के लिए एवं ओर से
For and on behalf of the President of India
क्रेता /The Purchaser

भारत सरकार
अंतरिक्ष विभाग
विद्युत - प्रकाशिकी तंत्र प्रयोगशाला (लियोस)
पहला क्रास, पहला स्टेज, पीण्या औद्योगिक एस्टेट
बेंगलूर - 560 058. भारत
दूरभाष : +91-80-28396470, 28371286-87
फैक्स : +91-80-28392304

Government of India
Department of Space
**Laboratory for Electro-Optics Systems (LEOS)**
1st Stage, 1st Cross, Peenya Industrial Estate,
Bangalore - 560 058. India
Telephone : +91-80-28396470, 28371286-87
Fax: +91-80-28392304

Ref No: LEOS 2026001018/EoI/2026-27 25.05.2026

## Invitation for Expression of Interest (EOI) for Large Area Thin Film Coating System (LATCS)

Laboratory For Electro-Optics Systems [LEOS], of Indian Space Research Organization [ISRO] under Department of Space, Government of India is responsible for Design, Development, Production And Delivery Of Electro-Optic Sensors And Optics To Spacecrafts. LEOS is currently inviting indigenous Industry Partners for Supply, Installation, Demonstration, and Training of Large Area Thin Film Coating System (LATCS).

This proposal is to invite Expression of Interest Global industries having technical infrastructure and capability for Supply, Installation, Demonstration, and Training of Large Area Thin Film Coating System (LATCS). Those vendors who are interested in qualifying Supply, Installation, Demonstration, and Training of Large Area Thin Film Coating System (LATCS) may respond to this enquiry, detailed EOI document attached.

In this regard, LEOS invites the Expression of Interest [EoI] from Global Industries/Vendors who have or are in the process of establishing full-fledged Supply, Installation, Demonstration, and Training of Large Area Thin Film Coating System (LATCS) to LEOS.

The EOI will be evaluated on the basis of bidder's experience, understanding of scope of work, facility infrastructure, proposed methodology and work plan, skilled manpower and the financial strength of the industry.

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

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

Along with "Expression of Interest" Suppliers/ Firm[s] should furnish the following information also in detail:

1. Registered address of the Companies with Phone, Fax, Email, Web etc.
2. Company/Organization Status (Proprietary/Partnership/Private/Public Ltd. etc.) with Name and Address of Proprietor, Partners, Board of Directors, etc.

3. Associates: (a) Indian (b) Foreign.
4. List of Major Customers during the last 3 Years with full address and their Contact Persons.
5. Details of Infrastructure Facilities owned/ available.
6. Names and addresses of the major Shareholders of the Company and the percentage of their share capital.
7. Capital and Turnover for the preceding 3 Financial Years with copy of latest Annual Report.
8. Financial Capacity/Credit facilities available.
9. Name and Address of Bankers.
10. Trade Association to which Industry/ies belong to.
11. Establishment/Sales/Service Tax Registration Number.
12. Nature of Business
13. Solvency/Financial capacity of the Firm issued by their Bankers.
14. Any other information the Industry/ies consider relevant.
15. The Profile of the Company/ies clearly bringing out the areas of Strength and Weaknesses.
16. Self-Assessment Technical and Organizational Competence to take part in the EOI.
17. Response forms as mentioned in the EoI

Completion of the EOI Response:

a. Company/Firms are advised to study all the instructions; Terms and Conditions; Forms; Requirements and other information in the EOI documents carefully. The submission of EOI shall be deemed to have been done after a careful study and examination of the EOI documents with full understanding of its implications.

b. The response to this EOI should be full and complete in all respect. Failure to furnish all the information required by the EOI document or submission of proposal not substantially responsive to the EOI documents to every aspect will be at the risk of the Company/Firms and may result in rejection of the document.

c. All the pages of the EOI submitted must be numbered and signed by the authorized signatory.

d. Canvassing in connection with the EOI be strictly prohibited and such canvassed EOI submitted by the Agency are liable to be rejected.

A Pre-EoI meeting will be arranged by Laboratory For Electro-Optics Systems [LEOS], Bengaluru in order to have a better understanding of the activities involved, clarify doubts, if any. Subsequently, the vendor(s) shall submit the response to Expression of Interest.

Interested Vendor[s] may please provide the details of the representative[s] taking part in the Pre-EoI meeting well in advance prior to dates specified in Table-1 to the Focal Point in order to arrange for Security clearance. Vendor[s] representative shall carry an "Authorization Letter" for attending the Pre-EoI meeting. Member Representative shall be limited to maximum of two (2) per bidder/company/organisation

Pre-EOI Queries from vendor [s] shall reach LEOS 5 days prior to date of Pre-EOI meeting to Mail ID: purchase@leos.gov.in. Please note that request for "Pre-ponement/postponement of Pre-EoI meeting" will not be entertained under any circumstances.

"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.

क्रय एवम भंडार अधिकारी / Purchase & Stores officer
विद्युत प्रकाशिकी तंत्र प्रयोगशाला (लियोस)
Laboratory For Electro-Optics System(LEOS)
भारतीय अन्तरिक्ष अनुसंधान संगठन
Indian Space Research Organisation
अन्तरिक्ष विभाग, भारत सरकार Dept. of Space, Govt of India
बेंगलूरु - 58 Bengaluru-58
कर्नाटक, भारत/Karnataka, India

Please address your clarifications quoting the EOI number to E-mail: purchase@leos.gov.in. Request for participation in Pre-EoI meeting shall reach on or before 30.06.2026 10:00 @ Hrs IST to the Email mentioned herein. However, response to EOI (hardcopy) shall be sent to above mentioned postal address only). E-mail & Fax quotations are not acceptable. Quotation received after due date & time are not acceptable.

तालिका 1
Table 1:

| ई ओ आई विवरण की प्रस्तुति<br>Submission of EOI Details | |
|---|---|
| स्पष्टीकरण प्रस्तुत करने की अंतिम तिथि<br>Last date of submission of clarification | 25.06.2026 16:00 Hrs IST |
| Pre-EOI meeting (at Conference Hall, Reception (CISF), LEOS) | 30.06.2026 11:00 Hrs IST |
| ईओआई प्रस्तुत करने की अंतिम तिथि<br>Last date for submission of EOI | 14.08.2026 16:00 Hrs IST |
| ई ओ आई की खोलने की तिथि<br>Opening date of EOI | 17.08.2026 11:00 Hrs IST |

"Expression of Interest" with all the above information shall reach the undersigned, Quoting above Reference Number on or before 14.08.2026 @16:00 Hrs IST. This proposal is initiated as a Pre-EOI Qualification. LEOS reserves the right to accept or reject all or any such "Expression of Interest" without assigning any reasons what so ever.

क्रय एवम भंडार अधिकारी / PSO

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# Expression of Interest (EOI) for Large Area Thin Film Coating System (LATCS)

| S.No | Specifications | |
|---|---|---|
| **1.0** | **System Requirement** | |
| 1.1 | Large Area Thin Film Coating System (LATCS) for the purpose of development and production of high reflectance (HR) optical coatings on mirror substrates up to 2000 mm diameter. | |
| **2.0** | **Applications Requirement** | |
| 2.1 | The system shall be capable of loading a glass substrate horizontally of varying diameter up to 2000 mm. | |
| 2.2 | The coating plant should be capable of depositing multi-layer coating in single run without any break in vacuum/ deposition cycle through manual as well as automatic mode. | |
| 2.3 | **Coating thickness Uniformity (over the entire area of 2000 mm diameter): ≤ 5 %**<br>The uniformity shall be achieved with or without the incorporation of masks.<br>Vendor shall provide the document details about coating uniformity during technical bid, also vendor shall provide a coating fixture to accommodate the samples to check the coating uniformity up to 2000 mm diameter. | |
| **3.0** | **Vacuum Chamber** | |
| 3.1 | Chamber Size | External size (typical): 3000 mm diameter x 2000 mm height,<br>Internal diameter (typical): 2400 mm |
| 3.2 | Ultimate Pressure | Better than 5E-7 mbar (without loads) |
| 3.3 | Operation Pressure | 1E-2 to 1E-4 mbar (during sputtering),<br>5E-6 mbar (during e-beam evaporation) |
| 3.4 | Pump Down Time | Pump down time to reach 5E-2 mbar from ambient pressure: ≤ 15 minutes.<br>Pump down time to reach 2E-6 mbar after opening high vacuum valve: ≤ 60 minutes. |
| 3.5 | Chamber pressure | Overnight hold on pressure (without operating any vacuum pump): < 2E-2 mbar<br>High vacuum (When all the sub-systems are loaded): < 1E-6 mbar |
| 3.6 | Material | Non-magnetic Stainless Steel AISI 304/316, Buffed/ polished/ sand bead blasted and suitable for clean room environment. |
| 3.7 | Cooling | Water cooling line on the outside wall of the chamber with sensor. |
| 3.8 | View Port | Minimum Three (03) numbers - 150 mm diameter. Vendor can provide more than 3 nos. of view ports, if required.<br>These view ports need to be in proper location to monitor the coating process as well as chamber conditions. Each view port shall have ND filter glasses on the outside door of the coating chamber. |

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| 3.9 | Chamber Stand and Frame | The support stand and chamber frames shall be clean room compatible and to be fabricated using non-magnetic stainless steel.<br>The stand frame is to be mounted to strong rubber/hard plastic roller and stopper for easy maneuver and handling of chamber.<br>All the electric wires, gas lines and water lines need to be inside of constructed steel ducts and to provide easy access to each part of chamber. |
| 3.10 | Leak Rate | Better than 2E-8 mbar l/sec Helium |
| **4.0** | **Inside of Coating Chamber** |  |
| **4.1** | Fixture | The substrate holder platform and associated fixtures shall have provision to accommodate mirror of 2000 mm diameter and multiple components of smaller size substrates ranging from 50 to 2000 mm.<br>The coating plant and substrate holding platform should be designed to facilitate easy loading of the component. Suitable fixture/ tools should be provided in the chamber to meet this requirement. |
| **4.2** | Rotation | Typical required rotational speed is 5 to 20 rpm with continuous variable speed for a load capacity of > 2000 kg (main bearing load capacity).<br>Gear driven with speed control motor (for soft starts and stops) to reduce the vibration and noise. |
| 4.3 | Substrate Loading Gantry Mechanism | A crane shall be provided with a minimum of 5 tons loading capacity.<br>Loading mechanism shall ensure safety of the mirror substrates while lifting, loading and unloading along with the holder. |
| 4.4 | Shutter | The shutter should be provided for magnetron sputter sources and e-beam sources.<br>Necessary mechanism shall be provided to avoid cross contamination of the coating materials and targets. |
| 4.5 | Shielding/ liners | Removable stainless steel side shields shall be provided for inside, base and top wall of chamber. |
| 4.6 | Temperature Sensor | Temperature sensor shall be provided to monitor chamber temperature. |
| 4.7 | Quartz crystal monitoring system | Dual head sensors shall be located in different places inside the chamber to ensure the coating uniformity across 2000 mm diameter from the center.<br>A minimum of four sensor heads shall be provided. |
| **5.0** | **Ports** |  |
| 5.1 | The chamber shall be provided with necessary feed through/ports along with five (05) no. of spare ports for future augmentation. The dimension of the spare ports will be decided during the technical review after the placement of purchase order. |  |

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| **6.0** | **Linear Ion Source** | |
| 6.1 | Inverted magnetron type Linear ion source shall be provided for pre-cleaning of the substrates<br>**Make: Gencoa** | |
| 6.2 | Operating voltage & Current | 500 – 2500 V & 1A |
| 6.3 | Beam Length | 1150 mm (typical) |
| 6.4 | Gas flow | Integrated gas flow controller to maintain the beam conditions. |
| **7.0** | **Magnetron Sputtering** | |
| 7.1 | Source | Internal mounted linear magnetron sputtering source - Three numbers (03)<br>**Make: Gencoa** |
| 7.2 | Magnetron type | Rectangular Magnetron with (typical) dimension of 75 (W) x 1200 (L) x 10 (T) mm |
| 7.3 | Magnetron housing | With three-fold gas inlet for uniform gas distribution (for Argon, Nitrogen and Oxygen) with mass flow controller.<br>Magnetron housing design shall ensure the uniformity of the coating. Vendor shall provide the details of housing. |
| 7.4 | Magnet Array type | High yield magnetic array for higher target utilization with dynamic variable speed lateral movement to scan the plasma and sputter the entire target surface.<br>The target utilization shall be up to 70 % or better. |
| 7.5 | Power source | Pulsed DC power supply unit, 10 kW pulsed<br>**Make: Advanced Energy** |
| 7.6 | High Voltage Switches | Three (03) Numbers - one for each magnetron |
| 7.7 | Target | Targets to deposit films as per the coating stacks mentioned in Section 20.1 shall be provided with indirect water cooling. |
| 7.8 | Process control | Full integration with system control software |
| **8.0** | **Electron Beam Source** | |
| 8.1 | Source | 270° beam deflection electron beam gun, water-cooled<br>**Quantity: 02 No** |
| 8.2 | Pocket | A Rotatable multi-crucible hearth with six numbers of 40 cc crucibles for each source<br>**Quantity: 02 No**<br>**Make: EB Sources /Ferrotec** |
| 8.3 | Power Supply and Controller | High voltage adjustable from 3 kV to 10 kV<br>Emission current 1 Amp.<br>Suitable high voltage regulation shall be provided to avoid beam drift and spot distortion from the set position. Automatic mode shall have interlinking to PID control of rate controller for gradual variation.<br>**Make: Niles Electronics/ Ferrotec** |
| 8.4 | XY Sweep Controller | Programmable Sweep Controller: Programmable up to a minimum of 50 steps for each pattern, each step defining the XY coordinates of the electron beam gun target and dwelling time. Capable of switching between pre-programmed patterns on-the-fly while the electron beam is running. |

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|  |  | **Quantity: 02 No**<br>**Make: Niles Electronics/ Ferrotec/ Telemark** |
| 8.5 | Hearth material | The hearth material shall be of high conductivity copper (free from Oxygen and Zinc). |
| 8.6 | Crucible liners | The crucible liners compatible to pockets (Section 8.2) shall be provided. One set of both graphite and OFHC liners shall be provided. |
| 8.7 | Feedthroughs | High Voltage Feedthrough, Low Voltage Feedthrough, Indexer Motor Feedthrough, Water Feedthrough and other necessary feedthrough as per configuration of the system. |
| 8.8 | Shielding | Proper shielding of high power connection and contamination shielding of whole electron beam source shall be adequately placed in chamber. |
| 8.9 | Process Gas Distribution | Oxygen gas line shall be connected to MFC to introduce the amount of gas in SCCM near the crucibles. |
| 8.10 | Interlock | Vacuum, Door, Water interlocks. Flow switch shall be provided for the water line of electron beam source/ plasma ion source for safety. |
| 8.11 | Process Control | Automatic control of thickness and rate by Thickness Controller. |
| **9.0** | **Plasma Gas Analyzer** |  |
| 9.1 | In order to analyze the composition of gases during deposition, remote plasma gas analyzer to be provided with feedback looping mechanism to control the pressure of the chamber. |  |
| 9.2 | Operating range | 10E-6 to 2E-1 mbar without any differential pumping.<br>**Make: Gencoa, Model: OPTIX** |
| 9.3 | Response time | Milliseconds or better |
| 9.4 | Spectral analysis range | 200 – 800 nm and Spectral library with automatic peak identification. |
| **10.0** | **Pressure monitoring system**<br>The quantity of vacuum gauges mentioned in Section 10.2 and 10.3 is the minimum requirement. Vendors shall provide more gauges if required for the process development. |  |
| 10.1 | Vacuum Gauge Controller | Combined controller shall be provided for high and low vacuum control and measurements.<br>**Make: Leybold /Pfeiffer/Granville Philip/ Inficon** |
| 10.2 | High Vacuum Gauge | 2 number Compact Full Range Gauge at appropriate location<br>1 number Capacitance Manometer Gauge for Process control<br>**Make: Leybold / Pfeiffer/ Instrutech/ Inficon** |
| 10.3 | Low Vacuum gauge | 2 number Pirani Gauge.<br>**Make: Leybold / Pfeiffer/ Instrutech/Inficon** |
| **11.0** | Pumping System |  |
| 11.1 | High vacuum pumping system | Cryo pumps and Turbo molecular pumps shall be provided. The combination of cryo and turbo pumps shall be used to meet the specified vacuum levels as per Section 3.2 to 3.5.<br>Make: CTI-Cryo Torr/ Leybold Coolvac/ HSR Balzers (Cryo pumps)<br>Make: Leybold/ Pfeiffer/ Agilent (Turbo) |

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| 11.2 | Low Vacuum Pumping System | Rotary and Roots Pumping station of suitable capacity to meet the specified vacuum levels as per Section 3.2 to 3.5 shall be provided.<br>**Make: Leybold/ Pfeiffer/ Agilent/ CTI/ HSR Balzers** |
| 11.3 | **Note:** Vendor shall provide the calculation to arrive at the required pumping capacity for the chamber volume along with the technical offer.<br>*** This is essential for technical bid evaluation.** | |
| **12.0** | **Thin Film Deposition Monitor / Controller** | |
| 12.1 | Crystal Monitor/ Controller | **Inficon IC/6 with Mode-Lock technology**<br>Pocket selection, rate control, gas control, and source shutter control are fully automatic.<br>**Thickness Resolution:** 0.1 nm / Thickness Accuracy: 0.5% |
| 12.2 | Optical monitoring system (OMS) | Broad band optical thickness monitor shall be provided for direct monitoring on glass. The operation of the OMS shall be integrated into HMI (Human – Machine Interface) of the coating system.<br>The broad band optical monitoring system shall allow the user to choose any wavelength to monitor the coating process within the wavelength band.<br>**Spectral range (typical):** 250 to 2100 nm,<br>**Mode of measurement:** Reflection/ Transmission<br>**Make: Intellimetrics / LZH/ Buhler/ HS-Group** |
| **13.0** | **Process Control** | |
| 13.1 | Coating Process Control System | The entire coating process shall be automatic with a provision for manual control. Mass flow controller, and other pre-coating process shall be programmed according to input data to interface to Programmable Logic Controller. |
| 13.2 | Programmable Logic Control (PLC) | Programmable Logic Control shall be provided with all the interlocks and process automation control interface with remote I/O modules. Complete I/O to accommodate all the necessary control of system I/O Interface with Thickness Controller, MFC, Auto Pressure Controller, Temperature Controller, Vacuum Valve Sequencing, Substrate Rotation, Safety Interlocks, HMI Software and Computer.<br>**PLC make: Allen Bradley/ Siemens/ Beckhoff** |
| 13.3 | Gas Distribution System | MFCs shall be provided for precise control of gas distribution during the coating process.<br>**MFC Make: Apex/ MKS/ Buhler**<br>Auto Pressure Controller: Controlling accurate precise pressure control during the process through back filling gas flow. Reactive gas control for metal oxide/ nitride processes to be ensured for stable process and reproducible deposition rate. Auto tune feature for optimizing control algorithm shall be provided. Remote |

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|  |  | plasma gas analyzer shall be in feedback loop to maintain accurate partial pressures to obtain stoichiometric films. |
| 13.4 | Computerized Operation | Microsoft Windows based user friendly software shall be provided to run manual or fully automatic operation. Automatic pump down, system shut down, Valve Control, process control and error log shall be configured. All the safety interlocks shall be preprogrammed for operation safety. Remote Access: Provision for remote access from computer to computer monitoring and navigating, and remote access for service monitoring shall be provided. |
| 13.5 | Industrial Computer & Printer | Latest industrial computer version and processor meeting minimum requirements of 8 GB RAM and 1 TB SSD shall be provided. The OS software with necessary License shall be provided in a storage media like USB drive.<br>**Redundant hard disk:** One redundant hard disk with complete image of the OS, operating software loaded shall be provided. External Storage media: One 2 TB hard disk shall be provided.<br>**Printer:** Multifunctional (Scan, Copy and Print) LASER color printer shall be provided along with one set of spare cartridges. |
| 13.6 | Touch Screen | 23" Touch Screen Monitor (typical) |
| **14.0** | **Electronics Control/ Console** |  |
| 14.1 | Electronic Console | Industrial 19" Rack Mount Cabinet.<br>The cabinet shall be mounted on the steel frame which stands onto strong rubber/plastic roller and stopper for easy maneuver and handling. Complete separation of power module and control module shall be provided to eliminate any cross talks and noises.<br>All components shall be CE compliant and off-the-shelf products. |
| 14.2 | System Control | PLC shall be used for all the interlock and process automation control interface. |
| 14.3 | Safety Interlocks | All necessary interlocks shall be included for safety of operator and safety of instruments. Water, Air, pressure, chamber door and frame door shall be interlocked accordingly. |
| **15.0** | **Water Distribution System** |  |
| 15.1 | To maximize the performance of vacuum process and coating process, proper cool and warm water distribution system shall be installed to the system. |  |
| 15.2 | Chamber Main Frame/ Vacuum System/ Valve | Water line through door and chamber body, high vacuum pump, main valve plenum. Warm water flow (in vent condition) shall be provided to reduce water vapor absorption and provide constant temperature control within +/- 2 degree. |
| 15.3 | Sputter/Evaporation Sources | Water line through magnetron source, linear ion beam source, e-beam source and crystal head. |
| 15.4 | Flow Meters / Switches | Water Flow Meter and Flow Switches shall be provided in the water line to check the flow rate and set the alarm limit. |

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| 15.5 | Water Units | Cold and Warm water unit shall be provided. Warm water unit should be programmed to switch ON when chamber is being loaded with substrates/ chamber door is open. |
| **16.0** | **Compressed Air Distribution System** | |
| 16.1 | Compressed air distribution system shall be installed for controlling all the pneumatic valves. Requirement of compressed air pressure shall be provided during technical bid.<br>**Note:** Compressed air will be provided by LEOS. | |
| 16.2 | Filters and Regulator | Air flow shall pass through filter and regulator to each cylinder's solenoid valve to activate the vacuum valves. |
| 16.3 | Safety Interlock | In case of pressure drop below the required set value, the alarm shall be activated. |
| **17.0** | **Valve Control** | |
| 17.1 | Valve Actuation | Electro-pneumatic control valve |
| 17.2 | Valve Operation | Manual and Automatic |
| 17.3 | High Vacuum Valve (Main Valve) | VAT Make Gate Valve |
| 17.4 | Fore Line Valve | One (01) number |
| 17.5 | Roughing and Venting | Two (02) numbers valves shall be provided for roughing (1 valve shall be configured for soft roughing)<br>Two (02) numbers valves shall be provided for venting with one valve configured for soft venting. |
| **18.0** | **Frames** | |
| 18.1 | Chamber Body | Chamber body has to be welded to support frame |
| 18.2 | Electric Console | 19" rack type |
| 18.3 | Water Manifold | Stainless steel and brass water distribution unit / main in/out pipe size should be specified by customer to retrofit to customer's water supply line.<br>Separate sensors to be used for different parts of the circulation system integrated with system software. |
| 18.4 | Air Solenoid Manifold | Solenoid valve assembly for electro-pneumatic actuator. |
| **19.0** | **Essential Spare Parts** | |
| 19.1 | E-Gun spares | Two sets of filament assembly, o-ring sets, various bolts, electrical parts (transistors, capacitors etc.), filament assembly spares (ceramics, bolts etc.), XY sweep coil assembly 1 set, crucible liners (copper and graphite), indexer spares (bearings, helical flex coupler etc.). |
| 19.2 | Magnetron Sputter Source Spares | Necessary Re-build kit (2 Set), Targets-1 No each for each type of materials (Target material purity certificate shall be provided). |
| 19.3 | Basic spare parts for chamber (apart from the parts included in the system) | Chamber temperature sensor- 02 No, Water temperature sensor - 02 No, Shields (liners) - 02 Set, View port shield glass - 05 No, View port glass (inside chamber) - 50 No, Air hose (compatible to system) - 100 meter, Water hose (compatible to system) - 100 meter, Water flow sensors - 02 No, sealing rings (O-rings) of various size for complete chamber -1 Set, bearings for substrate |

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| | | rotation and other rotatory parts- 1 set, vacuum grease - 01 No, MFC- 03 No for each type of gases. |
| 19.4 | Pumping system spare parts | Two (02) sets of necessary spare parts for servicing of the cold heads of cryo pumps, charcoal array, radiation shield, absorbers (in cryo compressor), temperature sensor, Helium lines. |
| 19.5 | Electrical & Control System Spare Parts | Electronic relay kit, Circuit breaker, Other electronic items -1 Set each.<br>Electrical and Electronic spares: Set of spare fuses for electrical distribution panel, instruments and a set of spares for PLC. |
| 19.6 | Spare Vacuum gauges | One number spare gauge for each type gauge mentioned in Section 10.2 and 10.3 |
| 19.7 | Spare valves | One set of spare valves shall be provided for fore line, roughing and venting as per Section 17.0 |
| 19.8 | Essential Tools | Tools Box, Adjustable wrench, Nose player, wrench set, Allen wrench set, screw drivers, hammer, other necessary tools- 1No each. |
| **20.0** | **Acceptance Criteria** | |
| 20.1 | Vacuum demonstration as per Section 3.2 to 3.5<br>Thickness uniformity as per Section 2.3.<br>The vendor should carry out demonstration of HR coating process with Type 1 & Type 2 coating stack and meet the following specifications.<br>**Typical Coating stack:**<br>**Type - 1:** NiCr/ Ag / NiCr / $Si_3N_4$ (Silver as reflector layer) demonstration by magnetron sputtering<br>**Type - 2:** Cr/Al / $SiO_2$/$TiO_2$ or $Nb_2O_5$ or $MgF_2$ layer (Aluminum as reflector layer) demonstration by combining magnetron sputtering and e-beam evaporation<br>**Spectral Requirement for Type 1 coating:**<br>400 - 1100 nm, Average Reflectance:> 93 %<br>**Spectral Requirement for Type 2 coating:**<br>200 - 400 nm, Average Reflectance:> 87 %<br>400- 1100 nm, Average Reflectance:> 90 % | |
| 20.2 | Vendor shall demonstrate spectral performance, uniformity and durability test requirements in three (03) consecutive repeatable processes for both Type 1 & 2.<br>The coatings shall pass all the tests as per Section 20.3. These tests will be carried out at LEOS using LEOS facilities (the samples coated at vendor's premises shall be provided to LEOS to carry out the tests before acceptance).<br>The uniformity of the coating shall be demonstrated using 50 mm diameter substrates located at different areas to cover 2000 mm diameter. | |

**20.3 Test and evaluation details:**

Vendor shall ensure that the coated components will sustain the following tests. Vendor shall carry out 3 consecutive trial coatings and provide 4 samples for each trials to carry out following tests (Total No of samples 12).

| Test | Requirement |
|---|---|
| Humidity | Temp: + 50°C ± 1°C, RH: 95% Duration: 24 Hrs. |
| Thermal Storage | Temp: - 20°C ± 1°C and + 70°C ± 1°C Duration: 24 Hrs. |
| Thermal cycling | Temp: - 20 to +70 °C ± 1°C, Dwell time: 2 Hrs. & No of Cycles: 10 |
| Thermal shock | Temp: - 20 to +70 °C ± 1°C, Dwell time: 5 min & No of Cycles: 100 |
| Thermo vacuum | Temp: - 20 to +70 °C ± 1°C, Vacuum better than $10^{-5}$ Torr, Dwell time: 2 Hrs.± 5 min & No of Cycles: 10 |
| Adhesion | As per MIL-PRF-13830B |
| Abrasion | As per MIL-PRF-13830B |
| Radiation resistance | Gamma Radiation: 10 Krad (si) |

**21.0 Factory Acceptance Test (FAT):**

21.1 LEOS will provide required number of substrates for coating runs as a part of FAT. These substrates after coating shall be shipped to LEOS, with a suitable packaging to ensure the integrity of the samples during transit, for test and evaluation at LEOS. However, vendor shall arrange coating materials/ targets required for the FAT coatings.

LEOS will provide report on evaluation of the samples as per Section 20.3 and acceptance criteria. Vendor shall prepare a detailed report incorporating all the specifications as depicted in Section 3.2 to 3.5 (Vacuum performance), acceptance criteria results (based on input from LEOS) and send the final report to LEOS.

Dispatch of the coating system shall commence only after clearance given by LEOS. LEOS reserves the rights to depute its personnel for factory acceptance test.

**22.0 Installation, Demonstration and training**

22.1 The system shall be installed by the vendor at LEOS premises. All the necessary accessories required for the installation shall be provided by the vendor. LEOS will make arrangements for all necessary civil and electrical input requirements.

**After installation at LEOS the vendor shall demonstrate the coating as per the acceptance criteria (Section 20.0).**

Required substrates and coating materials will be provided by LEOS during acceptance tests.

22.2 **Training:** Supplier shall provide training on operation and maintenance of the equipment to LEOS staff for a period of five (05) working days.

**23.0** Electrical Power Distribution Requirements

23.1 400 ± 10 % Volts AC(3 phase) and 230 ± 10% (single phase): 50 ± 3% Hz

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| 23.2 | Maximum/Peak power requirement during deposition with all sub-modules in ON condition and minimum power during overnight pumping shall be clearly specified. |
| 23.3 | Suitable capacity power backup (Uninterrupted Power Supply) system shall be supplied for the complete system operation. The Uninterrupted Power Supply system shall provide necessary backup up to a minimum of 30 minutes even during the deposition process. |
| **24.0** | **Delivery Period** |
| 24.1 | **18 months** from the date of acceptance of purchase order. |
| 24.2 | The vendor is required to provide the delivery schedule including critical milestones, starting from the release of purchase order by LEOS. The schedule should include the date of factory acceptance tests, date of shipment, Installation/Commissioning at LEOS, demonstration of system performance etc. These details shall be clearly brought out in the technical bid. |
| 24.3 | Installation and commissioning shall be performed within one month from the date of receipt of the system at LEOS. |
| **25.0** | **Warranty** |
| 25.1 | The system shall be warranted for a period of **two years from the date of installation**. Two-year warranty is a mandatory requirement. Optional quote for two year extended warranty (after completion of warranty) and Three Years of Non Comprehensive Annual maintenance contract shall be provided, which includes one visit per annum and unlimited breakdown visit charges. |
| **26.0** | **Documentation** |
| 26.1 | Language of documentation: English. Document shall contain all the details related to the coating plant and associated subsystems and utilities requirements and their layout including the information related to mechanical, electronic and electrical layout drawings of the main system as well as all the subsystems required for maintenance and service. |
| 26.2 | QA/QC documents, Calibration certificates for the measuring instruments and acceptance test reports for the coating chamber shall be provided. |
| 26.3 | Instructions for operation, troubleshooting details and remedial solutions for different subsystems of the coating plant. |
| 26.4 | System maintenance details and periodicity of maintenance. Fault finding and rectification of the coating plant and associated system. |
| 26.5 | OEM certificates for all the subsystem with part number, date of manufacturing. |
| 26.6 | Warranty Certificate for the coating system and accessories for two years from the date of installation and successful demonstration. |
| **27.0** | **Deliverables** |
| 27.1 | The coating system as per specifications (Sl. No 3 to 18) - 1 Set<br>Essential spares as per Sl. No 19 - 1 Set<br>Documents as per Sl. No. 26 - 2 Sets |
| **28.0** | **General Requirements** |
| 28.1 | **Visit to Vendor Facility:**<br>LEOS reserve the right to visit vendor fabrication facility during the evaluation of expression of interest. During the visit, vendor can make a presentation of system building capabilities and show the fabrication facilities. Acceptance to this clause is a mandatory requirement for the technical bid evaluation. |

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| 28.2 | **Vendor Heritage:**<br>1. The manufacturers who have the heritage in the design, manufacturing and supply of coating plants for ***space based telescope large mirror(> 1 .5 meter) applications*** only eligible to bid.<br>2. Documentary evidences (*example purchase order/installation report/literature published in Journals/ Technical Notes published which contains citation of the coating plant used to fabricate mirrors etc.*) shall be provided for supply of similar coating plants to any space based agencies/ institutions/ organizations should be submitted along with the technical offer. It is mandatory to provide the documentation to consider for technical bid evaluation.<br>3. The bidder shall provide the ***list of customers*** to whom they have supplied similar systems along with their contact details. The supplied system should have been demonstrated for space based optical coating applications.<br>4. If the offer is submitted by Indian representatives, technical specifications should be provided by the original manufacturer. *Indian representatives should also provide the authorization certificate from the original manufacturer in the technical offer.* |
| 28.3 | Schematic drawing of the complete system to be provided by the vendors along with technical specifications. |
| 28.4 | Vendors shall ensure the required critical spares availability for ten (10) years. |
| 28.5 | **Pre Bid meeting**<br>Pre bid meeting will be arranged at LEOS. Vendors shall participate in the meeting either virtually or in-presence. |
| 28.6 | Vendor shall provide approximate foot print area and power requirement for the complete coating system. |
| 28.7 | **EOI evaluation criteria:**<br>1. Compliance statement should be provided for all the specifications. Without which the offer will not be considered for technical evaluation. Compliance statement shall not contain only "YES"/ "Complied", but details/values for each specification shall be provided. The offers with compliance statement "YES"/ "Complied" will not be considered for further evaluation. Vendor shall provide the compliance to all the specifications from S. No 1.1 to 28.6 with necessary explanation/ documentary evidence as the case may be.<br>2. Participation in the pre bid meeting is mandatory. Vendors who are not participating will not be considered for further evaluation.<br>3. The manufacturers who have the heritage in the design, manufacturing and supply of coating plants for ***space based telescope large mirror(> 1 .5 meter) applications*** will only be considered for further evaluation. Vendors shall provide necessary details as per 28.2. |
| 28.8 | **Tender Process after EOI:**<br>The tender will be issued (in the limited tender mode) to vendors who are qualified as per 28.7. |