

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
VIKRAM SARABHAI SPACE CENTRE (VSSC)
THIRUVANANTHAPURAM**

**Tender for Design and Development of a 16-inch Telescope Receiver
System for Atmospheric Lidar Application**

Bids to be submitted online

Tender No.: VSSC/PURCHASE UNIT II (AVN)/VS202400292701 dated 18-07-2024

A. Tender Details

Tender No : **VSSC/PURCHASE UNIT II (AVN)/VS202400292701**

Tender Date : **18-07-2024**

Tender Classification: **GOODS**

Purchase Entity : **PURCHASE UNIT II (AVN)**

Centre : **VIKRAM SARABHAI SPACE CENTRE (VSSC)**

Design and Development of a 16-inch Telescope Receiver System for Atmospheric Lidar Application

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A.1 Tender Schedule

Bid Submission Start Date : **18-07-2024 10:00**

Bid Clarification Due Date : **09-08-2024 17:00**

Bid Submission Due Date : **20-08-2024 14:00**

Bid Opening Date : **20-08-2024 15:00**

Price Bid Opening Date : **26-08-2024 15:00**

B. Tender Attachments

Technical Write-up/Drawings

Document : Work Description, Specifications and Conditions

Instructions To Vendors

2. Conditions for BIDDER FROM A COUNTRY WHICH SHARES LAND BORDER WITH INDIA - Restrictions under Rule 144 (XI) in GFR, 2017.

1. Any bidder from a country which shares a land border with India will be eligible to bid in this tender, only if the bidder is registered with the Competent Authority. Competent Authority for the purpose of registration shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

2. Any false declaration and non-compliance of the above would be a ground for immediate rejection of offer or termination of the contract and further legal action in accordance with the laws.

3. Validity of Registration: Registration should be valid at the time of submission of bids and should be valid at the time of placement of order.

3. PPP Make in India(Divisible Items-Class I & II Local Suppliers)

1. A committee (with an external expert from a practicing cost accountant or practicing chartered accountant, if required) constituted for independent verification shall verify the self-declarations & auditor's / accountant's certificates on random basis, as per the requirements.

2. a) The subject item falls under divisible category. b) The offers are sought from Class I & II Local Suppliers.

3. Definitions: A supplier or service provider, whose goods, services or works offered for procurement, has local content: i. Equal to or more than 50%: Class-I local supplier. ii. More than 20% but less than 50%: Class-II local supplier. iii. Less than or equal to 20%: Non-local supplier.

4. False declarations will be in breach of code of the integrity for which a bidder or its successor's will not be eligible/debarred for purchase preference from further tenders / pending tenders for two years along with other actions as may be applicable.

5. In case of a complaint received from any local supplier indicating a need for review / verification of Local content of successful vendor / awarded vendor, for accepting a complaint from such complainant (w.r.t the false declaration given by the successful vendor on the local content), a complaint fee of Rs.2Lakhs or 1% of the locally manufactured items being procured (subject to a maximum Rs. 5Lakhs), whichever was higher, to be paid by demand draft by the complainant. In case, the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be substantially correct, deposited fee of the complainant would be refunded without any interest.

6. In cases the quoted price is in excess of Rs.1000 Lakhs (including duties, taxes and freight & Insurance) the 'Class-I & II local supplier shall provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in case of suppliers other than companies) giving the percentage of local content.

7. In line with Public Procurement (Preference to Make in India), Order 2017 & its amendments issued by Govt. of India from time to time with a view to support the Indian industries, ISRO has implemented "Purchase Preference Policy". The "Purchase Preference" is applicable for the "Class-I Local Supplier" for the goods/ services/ works covered in this tender, subject to the following terms & conditions:-

8. 'L1' means the lowest technically accepted tender / bid / quotation (i.e. lowest landed cost including duties, taxes and freight & Insurance).

9. 'Local content' means the amount of value added in India (i.e. indigenous items/services added in the offered products/ services/ works) be the total value of the item offered (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties/IGST) as a proportion of the total value (excluding net domestic indirect taxes), in percent.

10. 'Margin of purchase preference' means the maximum extent to which the price quoted by the "Class-I local supplier" above the L1 (landed cost).

11. Purchase Preference Policy:- Goods/Works which are divisible in nature (required quantity is greater than 1 or not a package basis):

i.If L1 is 'Class-1 local supplier', the order/contract for full quantity shall be awarded to L1 bidder.

ii.If L1 bid is not from a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1.

Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference (i.e. 20%) and contract for that quantity shall be awarded to such Class-I local supplier subject to matching the L1 price (inclusive of duties, taxes and freight & insurance).

iii.In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase 'preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded

accordingly. In cases where none of the 'Class-I local supplier' within the margin of purchase agree to match L1 price, in such cases 100% quantity shall be ordered on original L1 bidder.

iv. In case no offers are received from 'Class-I local supplier' or none of the 'Class-I local supplier' falls within the margin of purchase preference of 20%, the order shall be processed on L1 vendor.

v. In case L1 bidder (not a 'Class-I local supplier') is not accepting splitting of order on 50:50 basis, in that case the order/contract shall be awarded to such 'Class-I local supplier' for full quantity subject to matching the L1 price.

vi. Regarding MSEs (Indian vendors):

a) The following additional aspect as indicated below would be applicable for procurement which are falls under divisible category (i.e., not applicable for indivisible category), in case of participation of MSEs in the tendering who are also complying to the Minimum Local Content (MLC) stipulated in the tender.

b) If any Indian vendor satisfies the requirement of MSEs stipulation and also falls within the purchase preference margin as called for in MSME policy (in case of matching L1 price) will be considered for ordering 25% of tendered quantity, the balance quantity / works will be considered for distribution amongst all bidders (including MSEs) as per the purchase preference policy.

c) In case no MSEs qualifies for purchase preference or do not match with L1 price then the total tendered quantity will be distributed amongst all bidders as per the purchase preference policy.

12. The 'Class-I & II local supplier' should provide a "Self Certification" along with technical offer indicating that the item offered meets the minimum local content [as per Sl. No.(3)] as called for in the tender and provide the percentage of local content along with details of the location(s) at which the local value addition is made. In case of two bid tenders, it is mandatory to indicate compliance to MLC(minimum Local Content) in technical bid zone.

13. The ink-signed certificate shall be provided on vendors letter head along with the offer (in case of online tender, copy of ink-signed certificate shall be uploaded along with your offer under concerned tab. Original in Hard copy shall be produced on request). In case of non-submission of certificate, the purchase preference shall not apply.

14. The margin of Purchase Preference shall be up to 20%.

15. The Public Procurement (Preference to Make in India), Order 2017 issued by Govt. of India indicates that if there are any general or specific restrictive clauses to restrict participation of Indian companies in those countries procurement tenders, reciprocity clause need to be invoked as per the order. Hence, if ISRO or Govt. of India come across that Indian suppliers of an item are not allowed to participate and / or compete in procurement by your government, the bid submitted by you will be not be considered and excluded from eligibility for procurement. Please note this point.

16. Works means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works'. Works includes Engineering, Procurement and Construction (EPC) contracts and services include

System Integrator (SI) contracts.

C. Bid Templates

C.1 Technical Bid - Design and Development of a 16-inch Telescope Receiver System for Atmospheric Lidar Application

1. EQPT - Optics: Design and Development of 16-inch Telescope Receiver for Atmospheric Lidar Application

Item specifications for EQPT - Optics

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Scope of the Work	<p>(i) The scope of the work entails the end-to-end development of a 16-inch Telescope Receiver for Mie (Aerosol) Lidar Application, which includes the design and fabrication of the telescope along with 2-channel back-end optics assembly near the telescope focal plane, and the integration, installation, testing and commissioning of the complete system at the installation site (SPL facility at IPRC, Mahendragiri); (ii) The party has to demonstrate the performance of the system during the development phase (at the factory site) and during the installation and commissioning phase (at IPRC, Mahendragiri); (iii) During the installation, the party should perform and demonstrate precise optical alignment of the telescope FOV with the vertically transmitted laser beam (laser arranged by VSSC at the installation site), confirming the reception of backscattered laser signals from higher altitudes; (iv) The system will be accepted and commissioned only after the successful operation as the telescope receiver for an atmospheric Mie lidar system at the installation site.</p>	Yes / No / Explain		
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2	System Description	<p>(i) The envisaged Telescope Receiver consists of a 16-inch telescope and back-end optics assembly (near the telescope focal plane) with two independent optics channels. The telescope should have a clear aperture diameter of about 400 mm, f-number in the range 8-11, and FOV of about 1 mrad (full angle), with a suitable and compact telescope configuration for atmospheric Mie (aerosol) lidar application.; (ii) The mirror surface finish (P-V) should be $\lambda/4 @ 532 \text{ nm}$ with an RMS error of $\lambda/25 @ 532 \text{ nm}$, and the overall optical efficiency is to be $>80\%$ (weighted avg., including obscuration of primary mirror) over the spectral range $0.4 - 1.1 \mu\text{m}$. (iii) The Telescope Receiver also consists of back-end optics with two independent channels (co- and cross-polarized channels for depolarization studies), including C/F optics, filters and PMT detectors. (iv) The telescope should be designed and realized as a zenith-looking system, pointing vertically upwards into the atmosphere; (v) An elevation-azimuth steering mechanism should be incorporated in the mounting structure of the telescope, for</p>	Yes / No / Explain		
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		precise alignment of the telescope FOV axis with the vertically transmitted laser beam up to an altitude ≥ 20 km; (vi) The primary function of the Telescope Receiver is radiation (photon) flux collection, i.e., the collection of backscattered laser photons from the atmosphere. It has to be noted that the telescope application is for radiation flux collection and not for imaging purpose.			
3	Telescope Receiver Configuration	The Telescope Receiver consists of a zenith-looking ~16-inch (about 400 mm) dia. telescope system with a narrow FOV of about 1 mrad (full angle), having two independent channels in the back-end optics assembly near the telescope focal plane. The purpose of the receiver is for flux collection, i.e., to collect the backscattered laser photons scattered by atmospheric aerosols and molecules, in the region from near surface to ≥ 20 km altitude. The specifications of the Telescope and Back-end optics channels are detailed below in SI Nos. 4 to 34.	Yes / No / Explain		
4	Optical configuration	Suitable and compact telescope configuration for atmospheric lidar application	Yes / No / Explain		
5	Telescope mirrors	Primary Mirror clear aperture of ~16 inch (~400 mm) diameter and Secondary Mirror of suitable diameter.	Yes / No / Explain		

6	Obscuration of Primary Mirror	<10%	Yes / No / Explain		
7	Telescope System f-number	Any value in the range f/8 to f/11	Yes / No / Explain		
8	Field-of-view	~1 mrad (full angle)	Yes / No / Explain		
9	Mirror material	Fused silica (quartz) OR Material with lower Coefficient of Thermal Expansion (CTE)	Yes / No / Explain		
10	Spectral range	0.4-1.1 μm or wider	Yes / No / Explain		
11	Mirror Surface Figure /Surface Finish requirement	P-V: 133 nm ($\lambda/4$ @ 532 nm & $\lambda/4.7$ @ 633 nm) or better; RMS: 22 nm ($\lambda/25$ @532nm & $\lambda/28$ @ 633 nm) or better	Yes / No / Explain		
12	Overall Optical Efficiency of the Telescope (including obscuration of the primary mirror by secondary mirror and mounting arms/structures)	>80% (weighted avg.) over 0.4-1.1 μm	Yes / No / Explain		
13	Wavefront error (system level)	≤ 140 nm	Yes / No / Explain		
14	Telescope performance stability	Telescope structure including mirrors shall be suitably designed to ensure optical performance over temperature variation of ± 5 deg C from room temperature (20°C to 30°C).	Yes / No / Explain		
15	Protective Cover	Adequate protective cover for shielding the telescope from weather events (rain, dust, wind etc.) during non-operational period	Yes / No / Explain		

16	Optical coating	Enhanced Aluminium coating Conforming to MIL-M-13508C with suitable protective coating; Minimum reflectance: > 90% over 0.4 - 1.1 μm ; Average reflectance: > 92% (weighted avg.) over 0.4- 1.1 μm	Yes / No / Explain		
17	Alignment reference	Suitable alignment provisions to be kept for realignment during unmount and remount of mirrors for telescope recoating.	Yes / No / Explain		
18	Calibration	Internal alignment reference for focusing/ calibration should be provided.	Yes / No / Explain		
19	Mechanical finish	Parts blackened to avoid stray light	Yes / No / Explain		
20	Mounting Structure	Telescope Receiver should be mounted in zenith-looking mode; Adequate elevation-azimuth steering mechanism should be incorporated in the mounting structure of the telescope, for coarse and fine adjustment of the FOV axis (within $\pm 5^\circ$); Adjustment range: +/- 5 deg; Coarse resolution: 0.1 deg or better; Fine resolution: 0.005 deg or better	Yes / No / Explain		
21	Range of operating conditions (air-conditioned)	Room temperature: 20°C to 30°C; Room Relative humidity: 50-65%	Yes / No / Explain		
22	Storage conditions (non-operating conditions in the room)	Room temperature: 20°C to 40°C; Room Relative humidity: 70-80%; Designed and constructed to withstand hazards associated with transit and storage at the installation site.	Yes / No / Explain		

23	Specifications of Back-end Optics Assembly with 2 independent channels	<p>The back-end optics of the Telescope Receiver consists of variable iris at the telescope focal plane, fine focal plane adjustment mechanism, collimating and focusing (C/F) optics, polarizing beam splitter cube for splitting the beam into two independent channels, appropriate mounting mechanism for interference filters (IF), filter wheel mechanisms for mounting and selecting desired ND filters in the two channels, and provision for mounting PMT detectors. The entire optics are aligned to the Telescope Receiver beam axis. The polarizing beam splitter cube splits the collected backscattered signal/flux into two independent channels, namely P and S, to get Co-polarization and Cross-polarization components, with each channel again having independent optics, ND filters and detectors. Party has to provide appropriate mechanisms for fine focal plane adjustments and filter selection (for ND and interference filters). Figure 1 in the attached document shows the nominal optical design layout of the back-end optics and detector assembly for the Telescope Receiver (Note:</p>	Yes / No / Explain		
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		detectors and IF/ND filters will be provided by VSSC). Technical Specifications of important components of back-end optics assembly are detailed below in Sl. Nos. 24 to 34.			
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24	Description of Back-end Optics Assembly [See Figure 1 of attached document for a nominal optical design layout of the telescope back-end optics and detector assembly for the Telescope Receiver]	<p>(i) The Back-end Optics Assembly is to be a modular unit attached to the telescope cylinder, near the telescope focal plane, at the appropriate location considering the telescope configuration. Nominal optics design for the back-end optics assembly is provided in Figure 1. The party can provide the final back-end optics design as per the requirement, and is responsible for selecting the appropriate optical components for the same; (ii) The back-end optics consists of variable iris at the focal plane, collimating and focusing (C/F) optics, polarized beam splitter cube, appropriate mechanisms for mounting and selecting desired narrow-band interference filters (IF) and ND filters, and provision for mounting two independent Photomultiplier Tube (PMT) detectors for two channels; (iii) Variable iris at the focal plane is for limiting the FOV of the telescope receiver system (envisaged full-angle FOV is about 1 mrad). In order to enable fine corrections/adjustments in the FOV, a variable iris is required. The iris should have markings and indicators. (iv) The beam collected by</p>	Yes / No / Explain		
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		<p>the telescope is taken out through a suitable opening, further reaching the collimating C/F optics and polarizing beam splitter. The entire optics is to be aligned to the Telescope Receiver beam axis; (v) The polarizing beam splitter cube splits the incoming backscattered signal into two independent channels, namely co-polarized (P) and cross-polarized (S) channels, each with an independent PMT, for depolarization studies; (vi) Adequate additional mechanical support is to be provided for the back-end C/F optics and detector assembly for P and S channels, ensuring the structural stability.</p>			
25	<p>List of back-end optics components to be provided by VSSC [Price of these components should not be included in the bid]</p>	<p>Interference Filters, ND filters, PMT detectors (Detailed specifications of these items will be provided to the party during design finalization after the placement of PO)</p>	Yes / No / Explain		

26	List of back-end optics components to be provided by the party [Price of these components should be included in the bid]	Variable Iris, All C/F optics components (plano-convex lenses/collimators), Polarizing Beam Splitter cube, Mounting mechanism for Interference Filters, Filter wheel mechanism for mounting and selecting ND filters for P channel, Filter wheel mechanism for mounting and selecting ND filters for S channel, Focal plane adjustment mechanism, Any other essential optical components, All other mounts and fixtures for mounting the components	Yes / No / Explain		
27	Material of back-end optics opto-mechanical block	Black Anodized Aluminum material is to be used for the back-end C/F opto-mechanical block of P and S channels	Yes / No / Explain		
28	C/F optics components such as plano-convex lens/collimators	Appropriate C/F optics components such as plano-convex lenses/collimators should be provided by the party (Please refer the nominal design of back-end optics given in Figure 1). Nominal specifications of the C/F components are: Plano-convex lens with Focal length 80 ± 1 mm and Size: 25 ± 1 mm (1 No.); Plano-convex lens with Focal length 40 ± 1 mm and Size: 25 ± 1 mm (2 Nos.). The C/F components should be designed for 532 nm Design Wavelength (DWL), ensuring minimal optical aberrations.	Yes / No / Explain		

29	Polarizing Beam Splitter Cube	Appropriate polarizing beam splitter cube has to be provided by the party. This is required to split the received backscattered signals at 532 nm into two beams: co-polarized (P) and cross-polarized (S) components. Required specifications are: Transmittance of P polarized light > 97%; Reflectance of S polarized light > 98%; Incident angle: 0 deg. Size of the beam splitter cube should be greater than the size of the lenses of the C/F optics.	Yes / No / Explain		
30	Mounting Mechanism for Interference Filters (IF)	Party has to provide appropriate mechanism to mount and select the desired interference filters (filter size: 25 ± 1 mm, nominal). The interference filters will be provided by VSSC.	Yes / No / Explain		
31	Mounting Mechanism ND Filters for P and S channels (2 Nos.)	Party has to provide appropriate filter wheel mechanisms having multiple slots (4-6 slots) for mounting and selecting the desired ND filters (filter size: 25 ± 1 mm, nominal), for P and S channels. Party can provide the number of filter slots that can be accommodated in the filter wheel mechanisms for a compact design. ND filters will be provided by VSSC.	Yes / No / Explain		

32	Detector mounting provisions for P & S channels (2 Nos.)	Party should provide appropriate modular provisions for mounting PMT detectors in the P and S channels of the back-end optics assembly. PMTs will be provided by VSSC. Specifications of the PMTs will be provided at the time of design finalization after the placement of PO.	Yes / No / Explain		
33	Focal Plane Adjustment Mechanism	The party has to suggest appropriate mechanism for making fine focal plane adjustments, to enable possible defocusing corrections (of about ± 20 mm or better).	Yes / No / Explain		
34	Spot Size	The achievable spot size of the image formed at the focal plane should be less than the PMT detector active area having diameter 7-8 mm. The achievable spot size should be clearly stated in the Techno-commercial Bid (Part-I).	Yes / No / Explain		
35	Other Specifications/Requirements	Other specifications and requirements to be mandatorily taken care by the party are listed below in Sl. Nos. 36 to 40	Yes / No / Explain		

36	Design and Realization of the system	The party should undertake the complete optical & opto-mechanical design and realization of the Telescope Receiver, and deliver the integrated telescope system with two independent back-end optics channels.; The conformity of all technical specifications given in Table-1 and Table-2 should be explicitly stated in the Techno-Commercial Bid (Part-I).	Yes / No / Explain		
37	Material of the Telescope Cylinder	The telescope cylinder should be made of material having opaque mechanical finish to block out all external stray light.	Yes / No / Explain		
38	Mirror mounts and obscuration	Appropriate opto-mechanical mirror mounts have to be incorporated, ensuring least obscuration of Primary Mirror (<10%).	Yes / No / Explain		
39	Mirror mounting and unmounting	The design must include a safe method of mounting and removing the mirrors for recoating. Details of recoating method are to be provided.	Yes / No / Explain		
40	Essential tools and fixtures	The party shall provide a dedicated package of infrastructure along with the equipment: (i) Standard tools, tool holders and fixtures that form part of the telescope system, and other related systems; (ii) Fixture for removal and assembly of mirror for coating shall be provided.	Yes / No / Explain		

Document : Work Description, Specifications and Conditions

Common Specifications (Applicable for all items)

Sl No	Specification	Value	Compliance	Offered Specification	Remark
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1	Scope of the Work	<p>(i) The scope of the work entails the end-to-end development of a 16-inch Telescope Receiver for Mie (Aerosol) Lidar Application, which includes the design and fabrication of the telescope along with 2-channel back-end optics assembly near the telescope focal plane, and the integration, installation, testing and commissioning of the complete system at the installation site (SPL facility at IPRC, Mahendragiri); (ii) The party has to demonstrate the performance of the system during the development phase (at the factory site) and during the installation and commissioning phase (at IPRC, Mahendragiri); (iii) During the installation, the party should perform and demonstrate precise optical alignment of the telescope FOV with the vertically transmitted laser beam (laser arranged by VSSC at the installation site), confirming the reception of backscattered laser signals from higher altitudes; (iv) The system will be accepted and commissioned only after the successful operation as the telescope receiver for an atmospheric Mie lidar system at the installation site.</p>	Yes / No / Explain		
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2	System Description	<p>(i) The envisaged Telescope Receiver consists of a 16-inch telescope and back-end optics assembly (near the telescope focal plane) with two independent optics channels. The telescope should have a clear aperture diameter of about 400 mm, f-number in the range 8-11, and FOV of about 1 mrad (full angle), with a suitable and compact telescope configuration for atmospheric Mie (aerosol) lidar application.; (ii) The mirror surface finish (P-V) should be $\lambda/4 @ 532 \text{ nm}$ with an RMS error of $\lambda/25 @ 532 \text{ nm}$, and the overall optical efficiency is to be >80% (weighted avg., including obscuration of primary mirror) over the spectral range 0.4 - 1.1 μm. (iii) The Telescope Receiver also consists of back-end optics with two independent channels (co- and cross-polarized channels for depolarization studies), including C/F optics, filters and PMT detectors. (iv) The telescope should be designed and realized as a zenith-looking system, pointing vertically upwards into the atmosphere; (v) An elevation-azimuth steering mechanism should be incorporated in the mounting structure of the telescope, for precise alignment of the telescope FOV axis with the vertically transmitted laser beam up to an altitude $\geq 20 \text{ km}$; (vi) The primary</p>	Yes / No / Explain		
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		function of the Telescope Receiver is radiation (photon) flux collection, i.e., the collection of backscattered laser photons from the atmosphere. It has to be noted that the telescope application is for radiation flux collection and not for imaging purpose.			
3	Telescope Receiver Configuration	The Telescope Receiver consists of a zenith-looking ~16-inch (about 400 mm) dia. telescope system with a narrow FOV of about 1 mrad (full angle), having two independent channels in the back-end optics assembly near the telescope focal plane. The purpose of the receiver is for flux collection, i.e., to collect the backscattered laser photons scattered by atmospheric aerosols and molecules, in the region from near surface to ≥ 20 km altitude. The party may refer the detailed specifications of the Telescope and Back-end optics channels provided in the attached document.	Yes / No / Explain		

Supporting Documents required from Vendor

- 1. Technical Manuals: Detailed technical manuals for the handling, operation and maintenance of the system, including layout diagrams, components for systematic fault diagnostics, procedure for removal/recoating/re-fixing of mirrors, etc.**
- 2. Final detailed engineering design document of the Telescope Receiver (to be submitted within one month of acceptance of the PO)**
- 3. List of deliverables that will be given by the party as per the design and requirements**
- 4. Schedule breakup and timeline of the system developmen**

- 5. Details of Acceptance Tests to be conducted at factory site and installation site**
- 6. Specifications and quantity of all essential spares and consumables for system operation, including tools and fixtures**
- 7. Technical document of items including the operational principle, specifications, make/model no. etc.**
- 8. Make and model details of the subsystems/subcomponents/items (if applicable)**
- 9. Results and figures of ray-tracing simulation studies, including achievable spot size at focal plane**
- 10. Optics design layout and detailed engineering drawings of the Telescope Receiver**

5 additional documents can be uploaded by the vendor

C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	The Bid should be valid for a minimum of 180 days from the date of opening of the Part-I. The party should clearly confirm the validity of their quote in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
2	The OEM licence and authorization should be valid for an extended period, at least up to the end of warranty period. Communication should be only with OEM or Indian agent.	Yes / No / Explain	
3	In case of imported parts/items, valid Authorization Letter from the OEM/Principal should be provided along with valid licence while submitting the quote and this shall be attached with the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
4	Payment terms for supply and payment terms for installation, testing, and commissioning of the system should be indicated separately.	Yes / No / Explain	
5	All items/subsystems should be delivered at IPRC, Mahendragiri, Tamil Nadu. Delivery terms should be clearly stated in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
6	Combined Bank Guarantee for Security Deposit and Performance (equivalent to 3% of the total contract value) shall be submitted on receipt of PO/contract and valid till completion of standard warranty. BG shall be submitted along with order acceptance.	Yes / No / Explain	
7	Security Deposit (SD) & Performance Bank Guarantee (PBG) can be in the form of Bank Guarantee, DD, FDR etc.	Yes / No / Explain	
8	LD Clause @ 0.5% per week subject to a maximum 10% of order value is applicable beyond the promised schedule for supply, installation, testing, training and commissioning of the system.	Yes / No / Explain	

9	Only Class-I and Class-II Local Suppliers as per Make in India policy are eligible to participate. The percentage of local content and location of value addition should be explicitly stated in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
10	Supplier has to quote for the complete system and partial offers will not be considered.	Yes / No / Explain	
11	The progress of development, including fabrication, assembly/integration, and testing at the factory site, should be informed to VSSC at appropriate intervals.	Yes / No / Explain	
12	Installation, testing, and commissioning of the system at IPRC, Mahendragiri, including training should be completed within 2 weeks from the date of delivery of the items	Yes / No / Explain	
13	Delivery of the system at IPRC, Mahendragiri (installation site) should be within 6 months from T0.	Yes / No / Explain	
14	System development should begin only after obtaining the design approval from VSSC. Date of design approval is considered as T0.	Yes / No / Explain	
15	Submission of Final Design and Engineering Drawings to VSSC for review should be within 30 days of the PO placement.	Yes / No / Explain	
16	Schedule breakup and timeline of the system development during different phases should be clearly stated in Techno-Commercial Bid (Part-I).	Yes / No / Explain	
17	Party should explicitly state the terms and conditions of the warranty.	Yes / No / Explain	
18	This includes workmanship, breakdown maintenance visits and replacement of defected subsystems/sub-components/spares in case of system failure at no extra cost (maximum shut down period: less than 30 days).	Yes / No / Explain	
19	List of spares (including their quantity) covered under the warranty period should be explicitly stated in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
20	A minimum 1-year Warranty should be provided for the system/sub-components (from the date of acceptance of the system after commissioning).	Yes / No / Explain	

21	The manufacturer may mention the standards followed (e.g. MIL std., Industry std. etc.). The mirror material certificate of compliance (COC) is to be provided.	Yes / No / Explain	
22	International standard shall be followed while selecting materials, components, equipment used in realizing the system.	Yes / No / Explain	
23	All the sub-systems and components used in the Telescope Receiver should be of high quality and reliability to support long-term and continuous operation of the system.	Yes / No / Explain	
24	Training should cover all the technical details of the system, including the handling and replacement of sub-components, consumables and spares, whenever required.	Yes / No / Explain	
25	Adequate technical training on handling, operating and maintaining the optics of the receiver system (including the optical alignment) should be imparted to the identified VSSC personnel at IPRC site during the installation period.	Yes / No / Explain	
26	All necessary tools/equipment/accessories required for installation, optical alignment, testing, commissioning and operation of the receiver system should be brought by the party.	Yes / No / Explain	
27	The system will be accepted only after integrating with the complete lidar system operating in Mie (aerosol) mode, and obtaining successful test results that meet all the scientific/technical requirements.	Yes / No / Explain	
28	Successful tests and demonstration of the system at the installation site is required for the commissioning of the system.	Yes / No / Explain	
29	The party should perform and demonstrate precise optical alignment of the telescope FOV with the vertically transmitted laser beam (provided by VSSC at installation site), confirming reception of backscattered signal up to an altitude ≥ 20 km.	Yes / No / Explain	
30	During the installation of the system, the party has to perform the optical alignment tests and demonstrate the achieved spot size at the focal plane.	Yes / No / Explain	

31	Possible acceptance tests include component level tests, spot size tests, and star imaging tests using CCD / array detectors.	Yes / No / Explain	
32	Test runs of the system should be carried out at the installation site in the presence of experts appointed by VSSC as per the mutually agreeable acceptance test procedure.	Yes / No / Explain	
33	Integration, Installation, Testing and Commissioning of the Telescope Receiver system at the IPRC site should be completed within 2 weeks, from the date of delivery of the complete system at the installation site.	Yes / No / Explain	
34	Supply of the complete system at the installation site at IPRC should not exceed 6 months from the date of design approval by VSSC.	Yes / No / Explain	
35	The system including all the sub-components and accessories are to be delivered at IPRC, Mahendragiri, Tirunelveli district, Tamil Nadu (hereafter referred IPRC site or installation site).	Yes / No / Explain	
36	VSSC reserves the right to witness the tests and review the progress of work at various milestones of the project at any reasonable point of time during the developmental phase at the factory site of the party.	Yes / No / Explain	
37	Pre-delivery test/measurement results of the system are mandatorily required for performance evaluations. Shipment of the system will be approved only after the test results are evaluated and certified as satisfactory by VSSC.	Yes / No / Explain	
38	The party has to explicitly provide the actual spot size achieved at the focal plane during factory testing, prior to delivery of the item.	Yes / No / Explain	
39	The party has to provide the details of the test results pertaining to the optics alignment, optical efficiency, etc.	Yes / No / Explain	
40	The possible acceptance tests at the factory site include component level tests, spot size tests, and star imaging tests using CCD / array detectors.	Yes / No / Explain	
41	Test results of the system should be recorded and provided to VSSC during the developmental phase at the factory site.	Yes / No / Explain	

42	Procurement/development of major subsystems/items, integration of subcomponents of the receiver system, factory verification and testing, disassembly and shipment should be informed to VSSC appropriately.	Yes / No / Explain	
43	The party should provide monthly (or whenever requested) updates during the development phase of the system.	Yes / No / Explain	
44	Parties submitting quotations may be called for meetings at VSSC for technical clarifications, if required. If called, parties can attend the meetings directly at VSSC or through video mode, to provide technical clarifications.	Yes / No / Explain	
45	The design document will be reviewed by VSSC, and any modifications suggested are to be incorporated in the final design upon mutual agreement. Any deviations in the design from party side due to any reason, has to be approved by VSSC.	Yes / No / Explain	
46	The document should also contain details of (i) reflectance/transmittance of optical components; (ii) overall optical efficiency of the system; (iii) achievable spot size at focal plane based on the optimized design parameters.	Yes / No / Explain	
47	Report on the detailed simulations for accepted telescope design/configuration/specifications, and the optimized receiver configuration arrived at should be included as part of the detailed design document.	Yes / No / Explain	
48	Detailed design drawings, ray-tracing and simulated results/figures should be included in the detailed design document.	Yes / No / Explain	
49	The final detailed engineering design document of the Telescope Receiver should be submitted by the party within one month of acceptance of the purchase order.	Yes / No / Explain	
50	Material to be used in the telescope cylinder and PM/FM mounts should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
51	List of deliverables that will be given by the party as per the design and requirements should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	

52	Duly filled compliance sheet, as per the format attached in Table-4 should be submitted as part of Techno-Commercial Bid (Part-I).	Yes / No / Explain	
53	Tests to be conducted during the development phase at the factory site and the parameters that are to be evaluated should be outlined. Tests that are to be performed at the installation site should also be outlined in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
54	Schedule breakup should include the time required for the design and review, fabrication, assembly/integration and testing at the factory site, delivery, installation, testing, and commissioning of the system.	Yes / No / Explain	
55	Schedule breakup and timeline of the system development during different phases should be clearly stated in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
56	Make and model details of the sub-components/items (if applicable) should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
57	List of equipment/tools required for routine operation and maintenance, post installation should be clearly described in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
58	Technical specifications related to trouble shooting/self-diagnostic tools should be clearly stated (like, alignment issues, dust contamination, etc.) in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
59	Vendor shall exclusively list out spares/consumables, tools and fixtures, which will be provided along with the system, in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
60	Any additional features that can enhance the system capability or performance should be clearly described in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
61	Specifications and quantity of all essential spares and consumables for system operation should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
62	Details of telescope mounting systems, optical benches and mechanical fixtures should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	

63	Method to be adopted for optical alignment between receiver optical FOV axis and transmitted laser beam at the installation site should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
64	Details of telescope protective cover for non-operational period should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
65	Opto-mechanical mounting structures of the telescope including back-end optics assembly should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
66	Detailed optical design layout and specifications of the back-end optics assembly should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
67	Telescope cylinder structure specifications should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
68	Telescope specifications including dimensions, configuration, optical material used, surface finish, reflective coating, reflectivity etc. for the mirrors should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
69	Results and figures of ray-tracing simulation studies, including achievable spot size at focal plane should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
70	Optics design layout and detailed engineering drawings of the Telescope Receiver should be included in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
71	The party should have heritage in the design and development of optical telescopes. The party has to provide details of proven track-record (such as previous POs to reputed institutions) along with the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
72	Other optical components such as polarizing beam splitters, C/F optics, and mounting fixtures for all optical components and detectors should be provided by the party.	Yes / No / Explain	
73	Among the optical components of the back-end optics assembly, VSSC will provide the interference filters, ND filters and PMT detectors, the cost of which should not be included in the bid.	Yes / No / Explain	

74	Details of health monitoring and procedures for speedy trouble shooting (e.g., related to optical alignment issues, dust contamination, etc.) should be explicitly stated.	Yes / No / Explain	
75	The party should provide detailed technical manuals for the handling, operation and maintenance of the system, including layout diagrams, components for systematic fault diagnostics, procedure for removal/recoating/re-fixing of mirrors, etc.	Yes / No / Explain	
76	Fixture for removal and assembly of mirror for coating shall be provided.	Yes / No / Explain	
77	The party shall provide a dedicated package of infrastructure along with the equipment, including standard tools, tool holders and fixtures that form part of the telescope system, and other related systems.	Yes / No / Explain	
78	The design must include a safe method of mounting and removing the mirrors for recoating. Details of recoating method are to be provided.	Yes / No / Explain	
79	The party has to provide adequate Telescope Protective Cover to protect the system from weather events during non-operational period.	Yes / No / Explain	
80	The mechanisms suggested for fine focal plane adjustments and the filter wheel mechanism for selection of desired IF/ND filters should also be detailed in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
81	System should include alignment references on the rear surface of the mirrors. Details of telescope alignment method are to be provided in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
82	Suitable provision is to be provided for handling and adjusting the mirrors for alignment corrections.	Yes / No / Explain	
83	Appropriate opto-mechanical mirror mounts have to be incorporated, ensuring least obscuration of Primary Mirror (<10%).	Yes / No / Explain	
84	The telescope cylinder should be made of material having opaque mechanical finish to block out all external stray light.	Yes / No / Explain	

85	The conformity of all technical specifications given in Table-1 and Table-2 should be explicitly stated in the Techno-Commercial Bid (Part-I).	Yes / No / Explain	
86	The party should undertake the complete optical & opto-mechanical design and realization of the Telescope Receiver, and deliver the integrated telescope system with two independent back-end optics channels.	Yes / No / Explain	
87	This tender is restricted only to Class-I and Class-II Local Suppliers as defined under DPIIT Order dtd 04/06/2020- Preference to Make in India Order-2017 Revision. Non-Local Suppliers need not quote. Foreign OEMs/Agents quoting on behalf of Foreign OEMs are not permitted to quote. High Sea Sales Quotes not permitted.	Yes / No / Explain	
88	This is a TWO-PART tender i.e. Techno-Commercial Bid (C1 & C2 of tender document) and Price Bid (C3 of tender document) shall be submitted separately. All technical and commercial terms and conditions shall be furnished in the Techno-Commercial Bid while price shall be indicated only in the Price Bid. Uploading price details anywhere else other than the price-bid shall lead to unconditional rejection of the tender. Please make note of the same. Tenderers are advised NOT TO UPLOAD any documents revealing the price in technical & Commercial bid other than area marked as price related documents	Yes / No / Explain	
89	Table-3 To be submitted along with the Price Bid (Part-II/ C3) in the prescribed format	Yes / No / Explain	
90	The vendor has to compulsorily submit the compliance statement online otherwise their offer will not be considered for further evaluation. Before entering the compliance statement, vendors are advised to refer the detailed specification provided.	Yes / No / Explain	
91	The Technical Specification/ Drawing/ Product Catalogues/ Works Carried by vendor/ Make offered etc. as a PDF file without any financial details has to be uploaded online mode by the vendor.	Yes / No / Explain	

92	Technical Bids will be opened at the scheduled due date & time. No further intimation will be sent in this regard. The schedule for price bid opening shown is only indicative. Price bids will only be opened in the case of parties who have been techno-commercially accepted, the details of which will be communicated at a later stage.	Yes / No / Explain	
93	Purchase preference to eligible vendors are applicable as per extant notifications issued by the Government of India. The Class-I/Class-II Local suppliers, at the time of submitting their offer, shall also indicate percentage of local content and provide self certification that the item (s) offered meets the local content requirement for Class-I/Class-II Local Suppliers as the case may be. They shall also give details of location (s) at which the local value addition is made.	Yes / No / Explain	
94	In cases if the item(s) offered exceed Rs. 10 Crores, the Class-I/Class-II Local Suppliers shall provide a Certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content. False Declarations will be in breach of the Code of Integrity under Rule 175 (1) (i) (h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.	Yes / No / Explain	
95	GST extra as applicable. Please quote applicable G.S.T rates with HSN code. Your GST Reg.No. and details shall be furnished in your quotation	Yes / No / Explain	
96	Delivery Terms All items/subsystems should be delivered at ISRO Propulsion Research Centre, Mahendragiri, Thirunelveli-Dist Tamilnadu.	Yes / No / Explain	

97	<p>Delivery Period Milestone Timeline:-</p> <p>1).Submission of Final Design and Engineering Drawings to VSSC for review within 30 days of PO placement.</p> <p>2). System development begins (T0)- (i.e., from the date of design approval) may be informed</p> <p>3). Delivery of System at installation site T1 - 6 Months from T0</p> <p>4). Installation, Testing & Commissioning, including Training T2 - 2 weeks from T1</p>	Yes / No / Explain	
98	<p>Payment Term- Our standard payment term-90 % of the total order value plus all taxes and duties will be paid within 30 days from the date of receipt and acceptance of item at our site & balance 10 % of the order value will be paid after final installation & commissioning and testing. Installation & commissioning report duly certified by End user, [CERTIFIED THAT THE (NO.QTY) HAVE BEEN SUCESSFULLY COMPLETED AND PAYMENT CAN BE RELEASED"- to be signed by End user and endorsed by the concerned Group Head] will be one of the documents for claiming payment.</p>	Yes / No / Explain	
99	<p>Liquidated Damages @ 0.5% per week subject to maximum of 10% of order value is applicable beyond the promised delivery schedule (Refer to Clause No.97 of RFP above).</p>	Yes / No / Explain	
100	<p>A minimum 1-year Warranty should be provided for the system/subcomponents (from the date of acceptance of the system after commissioning).</p> <p>a) List of spares (including their quantity) covered under the warranty period should be explicitly stated in the Techno-Commercial Bid (Part-I).</p> <p>b) This includes workmanship, breakdown maintenance visits and replacement of defected subsystems/sub-components/spares in case of system failure at no extra cost (maximum shut down period: less than 30 days).</p> <p>c) Party should explicitly state the terms and conditions of the warranty.</p>	Yes / No / Explain	

101	Performance Bank Guarantee for 3% of order value valid 2 months beyond the Warranty Period to be provided.	Yes / No / Explain	
102	Security Deposit: Successful Tenderer shall submit Security Deposit equivalent to 3% of the order value valid for a period of 60 days beyond the date for completion of the Purchase Order. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee or Fixed Deposit receipts from Nationalised/Scheduled Banks. No exemption is applicable for MSE vendors from submission of Security Deposit. In case PSU/Autonomous bodies/Central Government organizations, Indemnity Bond shall be accepted. Wherever SD and PBG are involved, the same can be submitted in consolidated SD cum PBG, valid till completion of warranty obligations under the contract. Necessary formats will be issued to the successful tenderer along with Purchase order.	Yes / No / Explain	
103	Country of Origin	Yes / No / Explain	
104	GeM Seller Unique ID	Yes / No / Explain	
105	Quote Validity: The Bid should be valid for a minimum of 180 days from the date of opening of the Part-I.	Yes / No / Explain	
106	PO ordering address in full with Contact Persons Name, E-mail id, Phone No. [also attach your Quotation in PDF format].	Yes / No / Explain	
107	Foreign vendors are not permitted to quote 1.Only Class -I and Class-II Local suppliers as per make in India policy are eligible to participate in the bid. 2. The percentage of local content should be specifically mentioned in the offer, without which will be summarily rejected 3. Preference will be given to class-I Local Supplier and in their absence, class-II Local supplier will be considered	Yes / No / Explain	

108	<p>Definitions: A supplier or service provider, whose goods, services or works offered for procurement, has local content: (a) Equal to or more than 50% - Class I Local Supplier (b) More than 20% but less than 50% - Class II Local Supplier (c) Less than or equal to 20% - Non-Local Supplier Mention your category.</p>	Yes / No / Explain	
109	<p>Local content means the amount of value added in India, (i.e. indigenous items / services added in the offered products / services / works) be the total value of the item offered (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties / IGST) as a proportion of the total value (excluding net domestic indirect taxes), in percent. Indicate the extent of Minimum local content in offered products / services and location and breakup / details of such value additions.</p>	Yes / No / Explain	
110	<p>Self-declaration on local content percentage and location of value addition: The Class I and II Local Supplier shall provide a Self-Declaration along with your bid in PDF format indicating the item offered meets the minimum local content as called for in the tender as mentioned above and provide the Percentage (%) of the local content along with the details of the location(s) at which the local value addition is made. In case of Two-part tenders, it is mandatory to indicate compliance to Minimum Local Content (MLC) in the technical bid itself. Confirm attachment of Self declaration as stated above along with the offer.</p>	Yes / No / Explain	

111	As per the provisions of Office Memorandum No. F. No. 6/18/2019-PPD dtd. 23.07.2020 (i.e., Rule No. 144 (xi) of GFR) and its Amendments, issued by Department of Expenditure, Ministry of Finance. I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered.	Yes / No / Explain	
112	If any of the bidders submit any forged or false documents along with the Tender, such tenders will be summarily rejected and such bidders will be blacklisted for all future tenders.	Yes / No / Explain	
113	Any other terms.	Yes / No / Explain	
114	All clause where PART I is mentioned should be read as C1 & C2 and Part II is exclusively C3	-	

C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	EQPT - Optics: Design and Development of 16-inch Telescope Receiver for Atmospheric Lidar Application	1.00 Sets		-		

Common charges (Applicable for all items)

Freight charge	
P&F Charges	