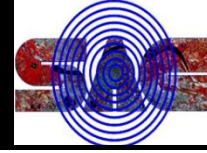




भारत सरकार GOVERNMENT OF INDIA
अंतरिक्ष विभाग DEPARTMENT OF SPACE
अंतरिक्ष उपयोग केंद्र - इसरो
SPACE APPLICATIONS CENTRE-ISRO
अहमदाबाद AHMEDABAD - 380 015



सं.: सैक/ई.ओ.आई./03/डी/2026-27

No.: SAC/EOI/03/D/2026-27

Date: 30/10/2026

भारत के राष्ट्रपति के लिए और उनकी ओर से, प्रधान, क्रय एवं भंडार, अंतरिक्ष उपयोग केंद्र, अहमदाबाद, निम्नलिखित के लिए ईओआई आमंत्रित करते हैं। For and on behalf of the President of India, Head, Purchase & Stores, Space Applications Centre, Ahmedabad invites EOI for the following.

ईओआई फाइल सं. EOI File No.	संक्षिप्त विवरण Brief Description	नियत तिथि और समय Due Date & Time
सैक/ई.ओ.आई./03/डी/2026-27 SAC/EOI/03/D/2026-27	Expression of Interest (EOI) for End-to-End Assembly, Integration & Testing (AIT) of Electro-Optical Payloads	30-11-2026; 1500 Hours

- विस्तृत तकनीकी दस्तावेज इसरो एवं सैक की वेबसाइट www.isro.gov.in और www.sac.gov.in पर उपलब्ध है जिसमें विनिर्देश, विक्रेता की पूर्व अपेक्षाओं का उल्लेख है और इसे वेबसाइट से डाउनलोड किया जा सकता है। [The detailed technical document including specifications, pre-requisites that a vendor should possess etc. are available on ISRO and SAC website www.isro.gov.in & www.sac.gov.in and the same can be downloaded from the websites.]
- कृपया ध्यान दें कि कोई भी स्पष्टीकरण psod@sac.isro.gov.in ईमेल पर भेजा जाए। लेकिन, ईओआई का प्रत्युत्तर केवल नीचे दिए गए पोस्टल एड्रेस पर ही भेजना होगा। Please note that, any clarification shall be sent to Email_id psod@sac.isro.gov.in. However, response to EOI has to be sent to below mentioned postal address only.
- कृपया अपने विस्तृत प्रत्युत्तर मोहरबंद लिफाफे में नियत तिथि 30-11-2026 (1500 Hrs. IST) तक या इससे पूर्व अधोहस्ताक्षरी को नीचे दिए गए पते पर भेजें। Please submit detailed response to the undersigned on or before due date 30-11-2026 (1500 Hrs. IST) in sealed cover on below address.

क्रय एवं भंडार अधिकारी Purchase & Stores Officer,
निविदा समूह Tender Cell,
अंतरिक्ष उपयोग केंद्र (इसरो) Space Applications Centre (ISRO),
जोधपुर टेकरा, अम्बावाडी विस्तार पी.ओ., Jodhpur Tekra, Ambawadi Vistar PO,
सेटेलाइट Satellite, अहमदाबाद Ahmedabad - 380015

- नियत तिथि बढ़ाने जाने के निवेदन पर कोई विचार नहीं किया जायेगा। No request for extension of the due date will be considered
- विलम्ब/देरी से प्राप्त प्रस्ताव स्वीकृत नहीं किए जाएंगे। Late/Delayed offers will not be accepted.
- कृपया अधोहस्ताक्षरित व्यक्ति को नियत तिथि पर या उससे पहले सीलबंद लिफाफे में केवल ई. ओ. आई. संख्या और नियत तिथि को विधिवत प्रतिस्थापित करते हुए विस्तृत प्रतिक्रिया प्रस्तुत करें। Please submit detailed response to the undersigned on or before due date in sealed cover only duly superscribing EOI Number and due date.
- किसी भी तकनीकी पूछताछ के लिए, 079-2691 3079/74, ईमेल: psod@sac.isro.gov.in पर संपर्क करें। For any technical query, contact on 079-2691 3079/74, Email: psod@sac.isro.gov.in.
- इन ईओआई के लिए शुद्धिपत्र, यदि कोई हुआ तो वेबसाइट पर प्रकाशित किया जाएगा। Corrigendum if any against this EOI will be published on website.
- यदि किसी भी शब्द के अंग्रेजी और हिंदी के बीच अर्थ में अंतर है, तो अंग्रेजी संस्करण प्रबल होगा। If there are difference in meaning between English and Hindi of any term, the English version shall prevail.
- हिंदी संस्करण का अनुसरण किया जाएगा और बाद में अपलोड किया जाएगा। Hindi version will follow and will be uploaded subsequently.

Sd/-

प्रधान, क्रय एवं भंडार Head, Purchase & Stores

हम लोग अपना कार्य नए ईक्रय पोर्टल पर शुरू करने वाले हैं। इसलिए साइट- <https://eproc.isro.gov.in/> पर जाकर कृपया अपने विक्रेता प्रोफाइल/क्रेडेंशियल्स को अद्यतित करें। As we are migrating to new E- procurement portal, kindly update your vendor Profile/Credentials by visiting <https://eproc.isro.gov.in/> सभी विक्रेताओं को साइट <https://gem.gov.in> पर जाकर गवर्मेंट ईपर स्वयं को पंजीकृत करने के लिए प्रोत्साहित किया जाता है। (जेएम) मार्केट प्लेस- All vendors are encouraged to register themselves on Government E-market Place (GeM) portal by visiting <https://gem.gov.in>

Expression of Interest (EOI)
for
End-to-End
Assembly, Integration & Testing (AIT)
of
Electro-Optical Payloads

SPACE APPLICATIONS CENTRE
AHMEDABAD

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Abbreviations

- EOI — Expression of Interest
- RFP — Request for Proposal
- SAC — Space Applications Centre
- IP — Intellectual Property
- EOM — Electro-Optic Module
- FM — Flight Model
- OGSE — Optical Ground Support Equipment
- MGSE — Mechanical Ground Support Equipment
- EGSE — Electrical Ground Support Equipment
- CGSE — Calibration Ground Support Equipment
- CCTV — Closed-Circuit Television
- BG — Bank Guarantee
- Front-End Camera Electronics (FECE)
- Detector Interface Board (DIB)
- Bias and clock Driver (BCD)
- Data Interface card (DIF)
- Digital Electronics
- Digital control and processing electronics (DCPE)
- Payload controller electronics (PLC)
- Payload Power Supply (PPS)

1. Introduction

The space programme in India has been developed over a period of more than five decades with a strong focus on application-driven programmes and bringing space to the service of the common man. In the process, ISRO has become one of the leading space agencies in the world. ISRO maintains one of the largest fleets of both communication and remote sensing payloads that cater to the ever-growing demand for fast and reliable communication and Earth observation, respectively.

Space Applications Centre (SAC) is one of the leading centres of Indian Space Research Organisation (ISRO), Department of Space, Government of India and is responsible for the design, development, assembly, integration, testing and calibration of both communication and remote sensing payloads.

Considering the ever-growing demand for multiple and simultaneous payload development within stringent project timelines and the objective of scaling up industry participation, outsourcing of Assembly, Integration and Testing of Electro-Optical (EO) remote sensing payloads is envisaged.

The present EOI covers five optical payload types with a common architecture containing optics on a structure, detector head assemblies and electronics packages supplied as Free Issue Material, but differing in optics, detectors and electronics.

The five payload types are:

- Wide Swath High Resolution imager (Type-1),
- Cartographic imager (Type-2),
- High Resolution imager (Type-3), and
- Advanced Resource Monitoring Satellite (Type-4) & (Type-5).

The technical proposal for this EOI will be evaluated on the basis of the vendor's experience and understanding of the scope of services, facility infrastructure, proposed methodology and work plan, skilled manpower, analytical / debugging capabilities and the financial strength of the company as provided in detail in subsequent sections.

2. Objectives

The main objective of this EOI is to enable industry partners to progressively acquire know-how on AIT processes by participating in the development of the first model of the proposed payloads at SAC, and finally execute AIT of the remaining models independently at their own premises. Typically, AIT activities include end-to-end development of optical telescope involving precision assembly and alignment of optical components, integration of focal plane assembly with telescope and focus optimization, electrical integration, mechanical assembly, test setup development for testing, characterization and calibration at sub-system level and integrated payload level, thermal implementation, harness verification, GCU setup validation, etc. in cleanroom and Thermovacuum conditions.

Optical payloads are highly sensitive to particulate and molecular contamination, mechanical shock and thermo-mechanical disturbance in the aligned optical train. Appropriate methodology including handling, loading/unloading, shipment, environment control (shock, temperature & humidity) shall be addressed to minimize the risk involved.

3. Procedure for Contract Finalization

The procedure for contract finalization is shown below:

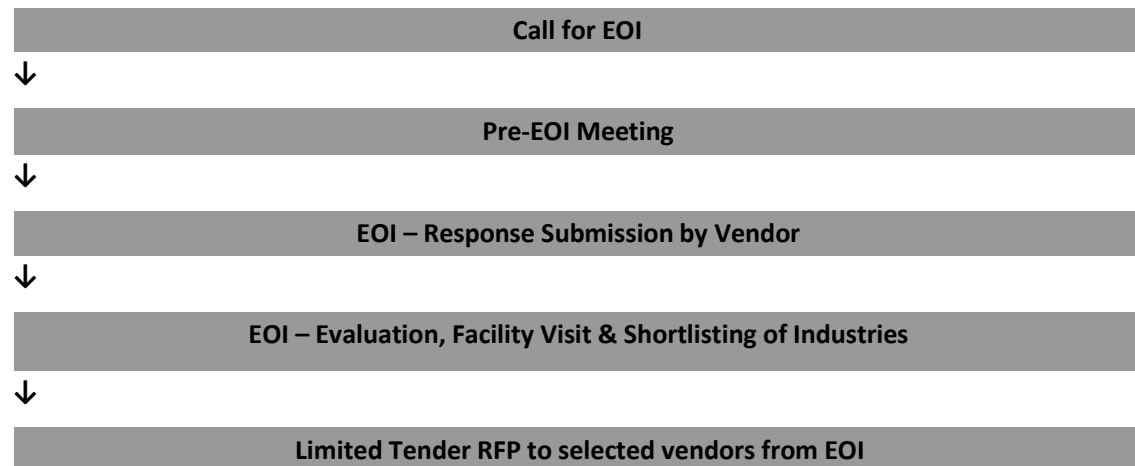


Figure 1. Procedure for Contract Finalization

SAC reserves the right to terminate this at the EOI stage itself.

4. Scope of Contract

4.1 Scope of Work

Under the solicited EOI, it is proposed to carry out the optical, mechanical, thermal and electrical Assembly, Integration, Alignment and Testing (AIT) activities of optical (electro-optical imaging) payloads of ISRO — multiple payloads of each of the five types described in the following sections:

Some of the major activities are identified as follows:

A. Telescope Development activities:

1. Stress-free bonding of optical components in their respective kinematic mounts within permissible position, tolerances, wherever applicable
2. Pre- and post-bonding interferometric measurements
3. Precision assembly and alignment of optical components in the telescope structure to realize integrated optical telescope
4. Performance optimization of telescope through interferometric testing
5. Environmental test for stress relieving
6. Development of various MGSE, OGSE for supporting above activities

B. EOM & FPA Development activities

7. Development of FPA / DHA wherever required
8. Precision assembly of FPA with telescope and focus optimization
9. Electrical integration of focal plane and associated electronics subsystems
10. Mechanical assembly of optical components, electronics packages
11. Thermal implementation on optical, mechanical and electrical subsystems
12. End-to-end performance optimization and characterization

13. Development of various MGSE, OGSE for supporting above activities

C. AIT activities (Electrical Integration, Test Setups, Ground Support Equipment, Checkout, Integrated performance evaluation, Calibration, T&E, Spacecraft Integration / URSC support)

14. Fabrication of ground test harnesses for cleanroom and thermovacuum testing

15. Development of various EGSE for supporting above activities

16. Pre-T&E testing and characterization of integrated payload

17. Thermovacuum test design for integrated payload considering acceptance temperature requirement of all elements

18. T&E of the integrated payload and performance compliance to all the specifications

19. Spectral and Radiometric Calibration of integrated payload

20. Troubleshooting and mitigation of developmental problems encountered during integration & test phase

21. Audit-related activities

22. Delivery of integrated payload to S/C team at URSC / ISITE Bangalore, post-transportation testing and participation in S/C level AIT and cleanroom and environmental testing

23. Report Generation & Documentation and copy to SAC

5. Flow of Activities

The technical activity for each payload is organised in the following phases:

- Phase-1: Kick-off Phase
- Phase-2: Co-development with SAC for the First Payload at SAC
- Phase-3: Execution of activities for the subsequent Optical Payloads at Vendor Premises

a) Phase-1: Kick-off Phase

- This programme consists of training that will be provided to the vendor at SAC to carry out the required activities mentioned in the contract. It is divided into two parts, namely Part A & Part B.
- Part A is the boardroom training for a duration of two weeks (10 working days) at SAC. It comprises training on a detailed overview of AIT activities of the EO payload, including optics handling and bonding, contamination control, Telescope assembly and alignment methodology, DHA / IDCA focal plane alignment, image quality (SWR / MTF), BBR, SNR / NEDT and radiometric / spectral calibration, electrical, mechanical, thermal elements handling etc. and will be held at SAC premises.
- Procurement, realization and development of all the elements required for payload AIT, as listed in Annexure-1, are classified as Part B activities.
- Vendor should be ready with all the elements listed in Annexure-1, as per SAC QA guidelines and processes, at the end of this phase.
- Vendor shall establish and qualify the contamination control regime (cleanliness monitoring, witness samples, protective optical covers) and the Optical Ground Support Equipment (OGSE),

MGSE (Mechanical Ground support equipment), EGSE, CGSE, ground focal plane alignment, integrated payload realization and image-quality verification and obtain SAC clearance for the same at the end of phase-1.

b) Phase-2: Co-development with SAC for the First Payload at SAC

This phase covers development of the first optical payload at SAC premises. The vendor deploys its qualified manpower with different domain expertise at SAC for the full duration of development and integration of the first payload; the vendor team will be responsible for this activity and will execute/participate under SAC supervision and learns each AIT activity through handholding by SAC. The training will continue till T&E phase followed by S/C level AIT and testing. However, during the training in phase-1, vendor shall start preparing for AIT of subsequent payloads at their own cleanroom as discussed in phase 3.

It contains five work packages:

- **Work Package 2A:** Telescope Development /Lens Integration: integration of the primary, secondary and tertiary mirrors (if supplied with their Mirror Fixation Devices or bonding of mirrors, if MFDs are separately supplied) onto the CFRP metering structure. Suitable steps shall be followed for lens integration.
- **Work Package 2B:** EOM & FPA development: FPA/DHA Development, telescope alignment and performance optimization with EOM; integration and alignment of aft optics; integration and alignment of all optical channels; detector focusing; baffle and cover integration, thermal implementation, etc.
- **Work Package 2C:** AIT activities including mechanical and electrical integration of electronics packages and sub-systems, harness and thermal implementation and verification of heater and thermistor functionality along with mapping followed by interface tests, end-to-end imaging performance testing and characterization till the commencement of Test and Evaluation (T&E) activities of the integrated payload. It includes integrated test setups which will also require mechanical fixtures and electrical test setups/simulators.
- **Work Package 2D: T & E of Optical Payloads:** This Work Package is defined as the T&E activities phase, in which the environmental tests (Thermovacuum & vibration) of the integrated payload will be led by the vendor at SAC premises. The Thermovacuum test shall include in-situ verification of optical performance at the specified hot and cold soak conditions — best-focus verification, SWR / MTF trend, BBR stability and radiometric stability in the PAN / MX channels, and NEDT, focus and cooler performance in the MWIR channel — using the collimator-based OGSE available at SAC. Vibration testing includes sine and random vibration tests as per the agreed-upon and approved test plan. After successful completion of integrated payload T&E and SAC clearance, payload has to be delivered to U R Rao Satellite Centre (URSC / ISITE), Bengaluru by the vendor in a transportation container with suitable air cargo in provisions for controlled temperature, humidity and vibration with appropriate monitoring (by vibration shock and HPT sensors etc.) of these parameters throughout shipment. It is the vendor's responsibility to carry out the Thermovacuum test design, including requirements for shroud temperature, the need for cryo plates, test heaters and temperature sensors etc. to meet the T&E, Thermovacuum test cycle, and obtain SAC clearance for the same.
- **Work Package 2E: Spacecraft Level Testing at URSC / ISITE:** This work package is defined as interfacing and testing of optical payloads at spacecraft level at URSC / ISITE, Bengaluru. The list

of tests is given in Annexure-2. Post-transportation, visual inspection and payload autonomous testing as per SAC requirements are the vendor's responsibility. SAC will provide the GCU setup required for this test. After the autonomous test, the vendor should provide support for all the spacecraft level integration and testing activities (which also includes spacecraft level environmental tests), pre-launch and post-launch till successful completion of In-orbit testing of payload. It is the vendor's responsibility to carry out the Thermovacuum test design, including requirements for shroud temperature, the need for cryo plates, test heaters and temperature sensors etc to meet the T&E Thermovacuum test cycle at spacecraft level Thermovacuum test.

c) Phase-3: AIT of subsequent payloads at Vendor site

Phase-3 is defined as the AIT of the subsequent payloads at vendor premises and contains similar sub-phases.

It contains five work packages:

- **Work Package 3A:** Telescope Development / Lens Integration: integration of the primary, secondary and tertiary mirrors (if supplied with their Mirror Fixation Devices or bonding of mirrors, if MFDs are separately supplied) onto the CFRP metering structure. Suitable steps shall be followed for lens integration.
- **Work Package 3B:** EOM development & FPA: FPA/DHA development, telescope alignment and performance optimization; integration and alignment of aft optics; integration and alignment of all optical channels; detector focusing; baffle and cover integration, etc.
- **Work Package 3C:** AIT activities including mechanical and electrical integration of electronics packages and sub-systems, harness and thermal implementation and verification of heater and thermistor functionality along with mapping followed by interface tests, end-to-end imaging performance testing and characterization till the commencement of Test and Evaluation (T&E) activities of the integrated payload. It includes integrated test setups which will also require mechanical fixtures and electrical test setups/simulators. It is the vendor's responsibility to carry out the Thermovacuum test design, including requirements for shroud temperature, the need for cryo plates, test heaters and temperature sensors etc. to meet the T&E Thermovacuum test cycle.
- **Work Package 3D: T & E of Optical Payloads:** This Work Package is defined as the T&E activities phase for subsequent payloads, in which the environmental tests (Thermovacuum & vibration) of the integrated payload will be carried out by the vendor at vendor premises. The Thermovacuum test shall include in-situ verification of optical performance at the specified hot and cold soak conditions — best-focus verification, SWR / MTF trend, BBR stability and radiometric stability in the PAN / MX channels, and NEDT, focus and cooler performance in the MWIR channel — using the collimator-based OGSE.
 - All the facilities (either owned by the vendor or provided by a third party) to be used by the vendor for T&E of the payloads should have clearance from SAC / ISRO.
 - After successful completion of integrated payload T&E and SAC clearance, payload has to be delivered to U R Rao Satellite Centre (URSC / ISITE), Bengaluru.
 - Design and realization of the transportation container as per SAC QA requirements ensuring cleanliness and humidity-control, vibration and shock isolation, logger to log temperature, humidity and shock and transportation to URSC / ISITE, Bengaluru is the vendor's responsibility.

- **Work Package 3E: Spacecraft Level Testing at URSC / ISITE:** This work package is defined as interfacing and testing of optical payloads at spacecraft level at URSC / ISITE, Bengaluru. The list of tests is given in Annexure-2. Post-transportation payload autonomous testing as per SAC requirements is the vendor's responsibility. Vendor has to establish the GCU setup required for this test. After the autonomous test, the vendor should provide support for all the spacecraft level integration and testing activities (which also includes spacecraft level environmental tests), pre-launch and post-launch till successful completion of In-orbit testing of payload. It is the vendor's responsibility to carry out the Thermovacuum test design, including requirements for shroud temperature, the need for cryo plates, test heaters and temperature sensors etc to meet the T&E Thermovacuum test cycle at spacecraft level TV test.

d) Overview of major activities that should be carried out by the vendor

- Vendor should obtain all required clearances from SAC prior to the commencement of Phase-2. Details of clearances required will be provided during RFP Phase.
- Receipt of FIM hardware from SAC (mirrors bonded with or without MFDs, CFRP structure, aft optics, DHA, IDCA and electronics packages & thermal elements whichever is applicable), packing as per QA guidelines and safe transportation to the integration site. Vendor will be responsible for the packaging, transportation and unpacking with own resources.
- Vendor has to maintain a log of all the activities as per the SAC guidelines. Any deviations in the performance and non-compliances should be reported to SAC as per the prescribed formats, together with the vendor's own root-cause analysis.
- Vendor should have independent QC & QA teams to support the quality requirements of all the activities, as per SAC prescribed guidelines. Internal auditing of all the activities should be carried out by the vendor, which will be followed by an audit by the SAC team.
- Vendor shall maintain a continuous record of cleanroom environment (particle count, temperature, and relative humidity), particle fall-out witness sample readings and molecular contamination witness samples for the complete duration during which flight optics are exposed. CFRP structure and other composite elements shall be handled under the moisture / outgassing controls specified by SAC.
- There may be an overlap of AIT activities between consecutive payloads and the vendor should be able to cater to the overlap requirement for timely delivery of the payloads. It is envisaged that there are separate teams for each work package, so that they can work concurrently when the different phases of different payloads are in progress.
- Phase-3 can have follow-on repetitions defined as Phase-3/s where $s = 2, 3, 4, \dots, NP$ and NP = number of payloads in the lot for each individual type.
- The vendor is responsible for the generation of documentation during Phases 2 and 3 as per the guidelines provided by SAC. Vendor has to prepare presentations for various Project reviews as will be defined in detail during the RFP Phase.

e) Phase Structure, Acceptance Criteria & Timeline

Figure 2. Phase Structure, Acceptance Criteria and Timeline

Phase	Work Package / WP		Payload	Location	Who leads	Acceptance Criteria	Start time	Indicative Time Line by Vendor	Indicative Time Line by SAC for review & Clearance (TS; days;)	Flow of time
Phase-1	WP-1	Kick off Phase	--				T1 = Kick off on Reception by SAC based on availability of Material	3 months	TS	T1S = T1 + 3 + TS
Phase-2	WP-2A	Telescope Development	1	SAC	Vendor	Telescope alignment Test Report & Review	T2 = Kick off on Reception by SAC based on availability of Material	3 months	TS	T2A = T2 + 3 + TS
	WP-2B	EOM / FPA Development				EOMA ERA Development Report & Review		3 months (in parallel)	TS	T2B = T2 + 3 + TS
	WP-2C	AIT activities				AIT Report & Review		3 months	TS	T2C = max(T2A,T2B) + 3 + TS
	WP-2D	T&E of Optical Payloads				T&E Completion report & Review		6 months	TS	T2D = T2C + 6 + TS
	WP-2E	Spacecraft Level Testing at URSC / ISITE				Test Report & Review		2 months	TS	T2E = T2D + 2 + TS
Phase-3	WP-3A	Telescope Development	2,3, 4,... N P	Vendor	Vendor	Telescope alignment Test Report & Review	T3 = Kick off on Reception by SAC based on	3 months	TS	T3A = T3 + 3 + TS
	WP-3B	EOM / FPA Development				EOMA ERA Development Report & Review		3 months (in parallel)	TS	T3B = T3 + 3 + TS

	WP-3C	AIT activities				AIT Report & Review	availability of Material	3 months	TS	$T3C = \max(T3A, T3B) + 3 + TS$
	WP-3D	T&E of Optical Payloads				T&E Completion report & Review		6 months	TS	$T3D = T3C + 6 + TS$
	WP-3E	Spacecraft Level Testing at URSC / ISITE				Test Report & Review		2 months	TS	$T3E = T3D + 2 + TS$

TS = time taken by SAC for review and clearance; unit: days; minimum allowed duration for each TS = 15 days.

Dependency: WP-2C and WP-3C shall start only after completion of BOTH corresponding A and B work packages; therefore, predecessor time is max (T2A, T2B) and max (T3A, T3B), respectively.

Total contract tenure, including vendor execution periods and SAC review/clearance periods, shall typically be around 5 years.

6. Payload Details

This EOI covers five optical payload types. All five share one architectural template as defined below:

- Reflective (or reflective-dominant) fore-optics with mirrors supplied as FIM on Mirror Fixation Devices, mounted on a CFRP metering structure / optical bench supplied and other required systems as FIM. All optical elements, CFRP structure and MFDs will be supplied to vendor as FIM for further activities of bonding, assembly and alignment.
- Refractive lens-based optics with lens assemblies supplied as FIM. All optical elements, CFRP structure and MFDs will be supplied to vendor as FIM for further activities of bonding, assembly and alignment.
- Type-specific aft optics (relay, dichroic, spectrometer, filter assembly) supplied as FIM, aligned by the vendor to the fore-optics.
- Detector head / focal plane assemblies (linear or area arrays, VNIR / SWIR / MWIR / TIR, cooled where required) supplied as FIM as aligned units with fiducials as applicable.
- A type-specific electronics package set (proximity, video, digital, power, mechanism control, calibration) supplied as FIM, integrated electrically by the vendor, thermal elements, baffles.
- Common vendor scope: optical, mechanical and electrical integration, alignment, focus setting, end-to-end performance evaluation (SWR / MTF, BBR, SNR / NEDT, radiometric, spectral and geometric calibration), Thermovacuum with optical port, delivery to URSC.

Each type is contracted as one lot comprising a different number of payloads, as detailed below:

- Wide Swath High Resolution imager (Type-1): 3 Units in 1 lot
- Cartographic imager (Type-2), 4 Units in 1 Lot
- High Resolution imager (Type-3): 3 Units in 1 Lot
- Advanced Resource Monitoring Satellite (Type-4) & (Type-5): 2 Units in each lot

a) Preliminary configuration details of Payload Type-1

The payload is a Three-Mirror Anastigmat (TMA) push-broom imager. The all-reflective TMA (primary, secondary and tertiary mirrors, each supplied with its Mirror Fixation Devices) is mounted on a CFRP metering structure. Aft optics behind the TMA split the beam: the visible / near-infrared path feeds the Detector Head Assembly (DHA) — a PAN + MX focal plane built from nine detectors in the FPA — and the mid-wave infrared path feeds an Integrated Detector-Cooler Assembly (IDCA). Electronics packages are mounted on the payload deck and side panels. The CAD model and other requisite details will be provided by SAC to the selected vendors.

A tentative list of all sub-systems including thermal elements that are to be integrated is shown in Table 1 below:

Approx. EOM size (mm): 2200 (R) x 1750(P) x 2600 (Y)

Approx. EOM Mass: 700 kg

Focal length ~ 3.5 m

Table 1. Preliminary Details of FIM Components to Be Supplied by SAC for Type-1

Package / Element- for one payload	Nos. (Tentative)	Size (mm) (Larger Dimension)/Power (W)/Mass (kg)
Primary, secondary, tertiary mirrors, Quaternary mirror each with Mirror Fixation Devices (MFD); mounted on ring/mirror benches	4	<ul style="list-style-type: none"> PM ~ 1130 mm/ (60 kg) SM ~ 214 mm / (7 kg) TM ~ 1000 mm/ (44 kg) QM ~ 850 mm/ (30 kg) PM, TM, QM – Includes only mirror & MFD
MWIR Split Mirror, small fold/butting mirrors	01/04	MSM ~ 9000 mm/ (14 kg) FM ~ 200 mm / (1 kg)
IR Lens Assembly	4 Sets	~ 300 mm/ (3.5 kg)
CFRP EOM structure, Trusses, PM & SM baffles FPA Structure	1 set	2200 × 1730 × 2100 mm/ (320 kg)
Detector Head Assembly — PAN + MX, (9 aligned detectors in the FPA)	1	~ 830 mm / (14 kg)
MWIR IDCA (Without Butting)	4	(5 kg)
No. of electronics packages (Power supply, FECE, Back-end electronics, PLC, Thermal electronics, ...)	14	~1500 W total power ~110 kg
Optical baffles, Thermal cover and stray-light stops	1 set	3m x 3m
Flight thermal elements — heaters, sensors, TIM, MLI; DHA and IDCA, heat pipes, thermal tapes, radiators with OSR	1 set	Thermal cover - 2800 / (60 kg)
Payload patch brackets (DC & signal)	1 set	
Digital harness & high-speed video (LVDS) cables	(1 set)	

b) Preliminary configuration details of Payload Type-2

This payload is a 1.2 m diameter obscured three-mirror Korsch-type optical telescope. The focal plane of the telescope has detectors for PAN and MX. MWIR and SWIR channels will use IDCA detectors. The high-speed camera electronics are configured along with mechanical support system to meet payload proximity and minimal spacecraft electrical interface requirements. A composite structure and light weighted optical elements are envisaged to meet the low mass criteria and very low coefficient of thermal expansion (CTE).

The telescope structure consists of metering cylinder, main optical bench (MOB) and secondary optical bench (SOB). The MOB supports the metering cylinder and 1.2 m diameter primary mirror on one side, and tertiary mirror, fold mirrors and the SOB on the other side. The focal plane array (FPA) and the

associated camera electronics are placed between the MOB and the SOB with a suitable supporting frame. The SOB is supported from the MOB using strut/truss structure. The 3 pairs of tabs along the circumference of the SOB form the interface to the spacecraft ring. The payload electronics packages in general comprise (1) Detector interface board (DIB) (2) Bias and clock driver (BCD) (3) Video processor (4) Camera processing electronics (CPE) and compressor (5) payload controller (PLC) and (6) payload power supplies (PPS). The CAD model and other requisite details will be provided by SAC to the selected vendors.

Focal length ~ 16 m

Table 2. Preliminary Details of FIM Components to Be Supplied by SAC for Type-2

Package / Element- for one payload	Nos. (Tentative)	Size (mm)/Power (W)/Mass (kg)
Primary, secondary, tertiary mirrors, fold mirrors, each with Mirror Fixation Devices (MFD);	6	PM – 90 kg, SMA – 10 kg, TMA – 12 kg, FMs – 12 kg
MWIR and SWIR fold mirrors	02	Will be provided during RFP
SWIR mirrors with MFDs	03	Will be provided during RFP
MWIR Lens Assembly	1	Will be provided during RFP
CFRP EOM structure, Trusses, PM & SM baffles	1 set	200 kg, 1500 mm
FPA Structure – MX / PAN	1	45 kg
MWIR optical assembly/mounts with FPA	1	50 kg
SWIR IDCA & FPA	1	50 kg
No. of electronics packages (Power supply, FECE, Back-end electronics, PLC, Thermal electronics, ...)	~10	10 types, 100 kg
Optical baffles, Thermal cover and stray-light stops	1 set	PM Baffle – 5.1 kg, SM baffle – 1.5 kg
Flight thermal elements — heaters, sensors, TIM, MLI; fine control of optical bench, DHA and IDCA heat pipes, thermal tapes, radiators with OSR	1 set	Will be provided during RFP
Payload patch brackets (DC & signal)	1 set	Will be provided during RFP
Digital harness & high-speed video (LVDS) cables	TBD	Will be provided during RFP

c) Preliminary configuration details of Payload Type-3

Type-3 will provide Panchromatic (PAN), Multi-Spectral (MX), Mid-Wave Infrared (MWIR), Longwave infrared (LWIR) bands and a Night Time Light Imaging (NTLI) imaging capability on a single platform. A two-mirror Ritchey-Chretien (RC) telescope with additional field corrector optics is finalized for the optical design of VNIR cameras (PAN and MX).

Telescope shall consist of primary and secondary mirror mounts, metering structure and optical bench. Baffles also shall be considered as part of telescope. Aft Optics is mainly divided into 4 different

modules for independent alignment and integration with telescope. Fold Mirrors, Beam Splitters and their mounts, Field Correction Optics (FCO), Lens Assemblies, Detector Head Assemblies (DHAs), supporting structures, Black Body Calibration System (BBCal) etc. shall be part of aft optics.

Visible Channel Assembly (VCA) consists of beam splitter with its mount & ring, FCO, three DHAs (2DHAs in butting configuration along with DIB card & cold fingers), supporting structure etc.

MWIR Channel Assembly (MCA) consists of beam splitter with its mount & ring, two-fold mirrors, lens assembly and one DHA with DIB card, supporting structure etc.

LWIR Channel Assembly (LCA) consists of one-fold mirror, lens assembly and one DHA with DIB card & thermal elements, supporting structure etc.

Black Body Calibration System (BBCal) consists of one black body plate with mechanism elements for two stepper motors along with supporting structure.

Thermal Management Elements will include thermal interface plate/sink plate, thermal isolators, thermal links, heaters, temperature sensors, MLI etc.

Approximate SWAP is provided in the table below; exact details will be provided during the RFP Phase.

Approx. EOM Size: Dia 800 × 2000 mm

Approx. EOM Mass: 185 kg

Focal Length ~ 5.8 m

Table 3. Details of FIM Components to Be Provided by SAC for Type-3

Package / Element- for one payload	Nos. (Tentative)	Size (mm)/Power (W)/Mass (kg) (Approximate)
Primary, secondary mirrors	1 Set	PM=25 kg, Ø600 mm, SM=1.5 kg, Ø250 mm
Fold Mirrors, Beam Splitters and their mount	01	Combined 5.0 kg, Beam Splitter=1 kg, 200 mm
Field Correction Optics (FCO),	1 set	8.0 kg, Size Ø240 mm
CFRP EOM structure, Trusses, PM & SM baffles FPA Structure	1 set	60.0 kg, Ø800 × 2000 mm
Aft optics assembly (MWIR relay / re-imaging optics, mounts)	1	20.0 kg combined, Max. Size =400 × 200 × 200
Detector— PAN + MX, NTLI	2 + 1	Size=300 × 80 × 80 mm
MWIR IDCA	1	2.0 kg, Size=Ø150 × 200 mm
LWIR IDCA	1	2.0 Kg Size=Ø150 × 200 mm

Package / Element- for one payload	Nos. (Tentative)	Size (mm)/Power (W)/Mass (kg) (Approximate)
No. of electronics packages (Power supply, ICE, PCPE, HDTP)	23	30.0 kg combined, Max Size: 400 × 400 × 200 mm
Optical baffles, Thermal cover and stray-light stops	1 set	NA
Flight thermal elements — heaters, sensors, TIM, MLI; fine control of optical bench, DHA and IDCA heat pipes, thermal tapes, radiators with OSR	1 set	10.0
Payload patch brackets (DC & signal)	1 set	0.5
Digital harness & high-speed video (LVDS) cables	TBD	
Calibration Black Body	1 Set	

d) Preliminary configuration details of Payload Type-4

Type-4 Payload consists of two telescopes which will have a constant pitch bias to be achieved by suitable mounting onto the PPL deck. Payload will consist of telescope, focal plane, camera electronics and mechanical system. Aft focal plane will have additional detector head assembly and its associated electronics & mechanical subsystems for MX bands. TMA design is optimised for PAN and MX channels.

Payload electronics will have the following main functional blocks.

- Front-End Camera Electronics (FECE)
 - a. Detector Interface Board (DIB)
 - b. Bias and clock driver (BCD)
 - c. Data Interface card (DIF)
- Digital Electronics
 - a. Digital control and processing electronics (DCPE)
- Payload controller electronics (PLC)
- Payload Power Supply (PPS)
 - FORE EOM Mass (approx.): 195 kg
 - AFT EOM mass (approx.): 210 kg
 - Overall Envelope of both EOMs with cover: 2400 × 1700 × 2100 (all dimensions in mm)

Focal Length ~ 2 m

Table 4. Details of FIM Components to Be Provided by SAC for Type-4

Package / Element- for one payload	Nos. (Tentative)	Size (mm)/Power (W)/Mass (kg)
Primary, secondary mirrors	2 Primary; 2 Secondary	Primary ~ 750 mm, 50 kg; Secondary: Dia 225 mm, 2 kg
Fold Mirrors, Tertiary mirror	2 Tertiary	Tertiary: 600 × 400 ,27 kg; Fold: 300 × 150, 2 kg
PAN Folding mirror , PAN & MX butting mirror	2 Sets	Fold: 225 × 20, 0.2 kg; Butting: 100 × 20, <0.15 kg
CFRP EOM structure, Trusses, PM & SM baffles FPA Structure	2 sets	110 kg for CFRP structure
Detector— PAN, MX & EvM	2 +2	18 kg (AFT), 17.5 Kg (Fore)
No. of electronics packages (Power supply, ICE, PCPE, HDTP)	26	60 kg Total Raw power: 450 W (Max)
Optical baffles, Thermal cover and stray-light stops	1 set	50 kg
Flight thermal elements — heaters, sensors, TIM, MLI; fine control of optical bench, DHA and IDCA, heat pipes, thermal tapes, radiators with OSR	1 set	
Payload patch brackets (DC & signal)	1 set	
Raw bus, digital harness & high-speed video (LVDS) cables	TBD	

e) Preliminary configuration details of Payload Type-5

There will be five discrete imaging bands with four operating in VNIR (B1 – B4) and one in SWIR (B5) region. Payload -5 consists of five subtypes as detailed below. 5A and 5B are realized using small (< 200 mm) Refractive Optics whereas 5C is realized using the Reflective TMA Optics (< 60 mm). Similarly, for 5D SWIR (single optics cannot cover full FOV, three identical payloads are required to cover the full swath. Similar to 5D, three identical optical heads are proposed to cover the total swath.

Focal Length ~ 600 mm

Table 5. Payload Type-5 Subtype Configurations

Subtype	Configuration	Optical Configuration
5A	4 Band (B1 to B4) VNIR Multispectral & 1 Band of SWIR (Size and mass EOM : 750 × 500 × 600 mm & 70 kg)	Refractive Optics
5B	4 Band (B1 to B4) VNIR Multispectral & 1 Band of SWIR (Size and mass EOM : 750 × 500 × 600 mm & 70 kg)	Refractive Optics
5C	4 Band VNIR Multispectral (Size and mass EOM : 500 × 750 × 700 mm & 75 kg)	TMA
5D	1 Band SWIR (Size and mass EOM : 725 × 325 × 225 mm & 25 kg)	Refractive Optics
5 E-X/Y/Z	Hyperspectral : 3 identical units (Size and mass EOM : 750 × 450 × 300 mm & 25 kg)	TMA

Table 6. Details of FIM Components to Be Provided by SAC for Type-5

Package / Element- for one payload	Nos. (Tentative) / Payload	Size (mm)/Power (W)/Mass (kg)
5A EOM	1	65 kg
5B EOM	1	65 kg
5D EOM	1	21 kg
5C EOM	1	62 kg
5E EOM	1	22 kg
CFRP EOM structure, Trusses, all baffles FPA Structure, Electronics support structure etc.	1 each	100 kg
No. of electronics packages (FECE, DCPE, PPS, PLC etc.)	24	150 kg different sizes ranging from 80 × 80 × 20 mm to 280 × 160 × 100 mm
Optical baffles, Thermal cover and stray-light stops	As per requirement	40 kg
Flight thermal elements — heaters, sensors, TIM, MLI; fine control of optical bench, DHA and IDCA, heat pipes, thermal tapes, radiators with OSR	-	10 kg

Package / Element- for one payload	Nos. (Tentative) / Payload	Size (mm)/Power (W)/Mass (kg)
Payload patch brackets (DC & signal)	TBD	2 kg

7. Development of Electrical, Optical & Mechanical Ground Support Equipment (EGSE, OGSE, CGSE & MGSE)

All electrical support equipment required for AIT is termed as EGSE; all optical test and alignment equipment is termed as OGSE (listed in Annexure-1(a)) and all calibration equipment is termed as CGSE; all mechanical hardware for handling FM deliverables is termed as MGSE. EGSE, OGSE, CGSE and MGSE development will be carried out by the vendor in Phase-1.

a) EGSE (Standard Equipment)

1. Standard equipment and instruments: tentative list in Annexure-1.
2. List of customized hardware to be developed by the vendor is given in Annexure-1, Section (f)(1). Hardware design details will be shared with the vendor as part of the contract (wherever applicable).
3. Checkout Hardware & Software required for AIT as listed in Section (f)(2) of Annexure-1 will be provided by SAC.
4. Integrated T&E of vendor-developed hardware should be as per SAC guidelines and T&E clearance for PCS has to be obtained from SAC before interfacing it with flight hardware.
5. One additional EGSE has to be developed by the vendor to support activities at URSC / ISITE and also to support the parallel execution of multiple sub-phases.
6. Generation of documents and test reports for EGSE hardware development is the vendor's responsibility.

b) MGSE

- MGSE designs will be provided by SAC. The vendor can use these designs to fabricate or modify as required and qualify them as per SAC QA procedures before use.
- The purpose of MGSE includes precise alignment, safe handling and transportation of FM hardware and support for various tests. A typical list of MGSE is given in Annexure-1(g).
- It is primarily the vendor's responsibility to develop and operate all required MGSE for the entire lifecycle of the payload including transportation.
- MGSE shall provide low-shock handling of each mirror-with-MFD, of the CFRP structure, of the DHA and of the IDCA; precision rotation / tilt of the aligned telescope for full-field testing; protective covers for exposed optical surfaces; and interfaces that do not induce mounting-stress-related optical distortion. Details of MGSE including precision requirements along with maximum permissible handling shock and mounting distortion levels will be specified by SAC.
- MGSE certification / clearance process will be as per SAC prescribed guidelines.

c) Optical Ground Support Equipment (OGSE)

Optical Ground Support Equipment (OGSE) is required to test and characterize the optical performance of electro-optical space payloads under controlled laboratory conditions. It includes precision collimators, calibrated light sources, integrating spheres, optical targets and alignment instruments to evaluate parameters such as spatial resolution, modulation transfer function (MTF), field of view, distortion, stray light and optical alignment. OGSE also supports verification of payload

performance before and after environmental testing. A tentative list of standard equipment and instruments is given in Annexure-1.

d) Calibration Ground Support Equipment (CGSE)

Calibration Ground Support Equipment (CGSE) is required to establish the quantitative relationship between the payload's output and known reference inputs, ensuring accurate and traceable measurements. It includes reference detectors, calibrated radiometric sources, wavelength-selection devices and associated data-acquisition systems to determine radiometric responsivity, spectral response, detector non-uniformity, linearity, dark signal and noise. These measurements provide calibration coefficients and uncertainty estimates essential for converting raw payload data into reliable scientific and operational products. A tentative list of standard equipment and instruments is given in Annexure-1.

e) GCU Harness Fabrication

- Vendor shall develop all ground test harnesses for cleanroom and thermovacuum testing.
- All cables have to be fabricated and tested as per ISRO-qualified processes.
- Harness in the vicinity of the optical bench, DHA and IDCA shall be low-outgassing and shall not impose thermal or mechanical load paths onto the payload. Cooler power and telemetry harness shall follow the IDCA supplier's EMI / grounding requirements.
- Annexure-1(h) lists the tentative harness and cable types. SAC QA guidelines for procurement and fabrication will be provided with the contract.
- Optical Fibres Harnessing will also be done by the vendor as per the requirements shared during RFP phase.

f) Non-Flight Component Procurement

This activity will be carried out by the vendor as part of Phase-1.

g) Components for Lab Testing

- Vendor has to procure all non-flight integration components required for integration and testing of the payload.
- Vendor has to design and realize the optical test bench layout: collimator and source mounting, payload rotary / tilt stage for appropriate field coverage, alignment instrument stands and folding-mirror mounts for various gravitational loads as provided in detail during the later phase.
- Vendor has to design and realize suitable test fixtures required to hold the integrated telescope and meet test configuration requirements in terms of orientation and positioning in lab with respect to optical test setup.
- Vendor has to provide clean optical handling consumables and the cleanliness verification means (Annexure-1(e)).
- Vendor also has to develop electrical and electro-optical setups to test and characterize the individual subsystems for performance validation, etc. at their end.
- The list of items is detailed in Annexure-1(k).

h) Components for Thermovacuum Testing

- Vendor has to procure the thermovacuum -compatible electrical integration components required for testing of the payload inside the thermovacuum chamber.
- Vendor has to design and realize the thermovacuum optical test path: a thermovacuum-compatible collimator, Light Source and Black Body and their supports (Annexure-1) for both VNIR and MWIR chains.
- Vendor has to design and realize suitable test fixtures required to hold the integrated telescope and meet test configuration requirements in terms of orientation and positioning during thermovacuum testing in the chamber.
- Vendor has to procure all items required for meeting the thermal requirements of the payload and chamber for the entire thermovacuum cycle (Annexure-1(m)).
- Thermal Control System: vendor is responsible for operating and controlling the thermovacuum chamber as per SAC thermal requirements. Arrangement / procurement of the thermal control system is the vendor's responsibility; details will be shared with the contract and the vendor should be ready with a T&E-cleared system prior to Phase-3C/D.

8. Details of flow of activities

a) Reception of FIM Flight Hardware

- Vendor is responsible for collection of FIM (mirrors with or without MFDs mounted, CFRP structure, aft optics, DHA, IDCA, electronics) from SAC and its safe, purged, shock-logged transportation in containers to the integration site with proper packing.
- Receipt inspection shall include visual inspection of every optical surface under controlled illumination.
- Vendor shall have a setup to test the individual subsystem performance in case required.

b) Telescope Assembly and Alignment

Assembly and alignment of all the mirrors including Aft optics in the structure and achieving the required telescope performance as specified by SAC. Any hardware / software required at this stage to support the Telescope development activities in terms of DHA emulator shall be developed by vendor.

c) EOM & FPA development

- VNIR FPA: Assembly and alignment of VNIR FPA in the telescope focal plane to achieve the required optical performance.
- MWIR and / or SWIR FPA (if applicable for the said assembly): Assembly and alignment of FPA in the telescope focal plane to achieve the required optical performance.
- Registration of VNIR and MWIR boresights with payload cube and generation of alignment data.
- Pre-T&E calibration (geometric, radiometric and spectral, ghost, stray light characterization)
- All alignment residuals, shim values and focal plane offsets shall be recorded in the as-aligned configuration record and cleared by SAC at each stage.

d) Harness Implementation

- FM Harness as FIM will be provided by SAC to the vendor.
- Harness Package Design Review (PDR) should be carried out by the vendor prior to implementation on the FM structure.
- Tentative harness implementation should be carried out prior to electrical testing; final routing and anchoring as per the SAC-approved plan after electrical testing. Harness routing in the optical cavity shall be verified for stray-light impact and cleared by SAC.

e) Thermal Implementation on FM Structure

- All thermal Materials will be provided by SAC.
- Thermal implementation as per the SAC thermal implementation plan: tape / foil heaters, temperature sensors, thermal tapes, TIM (grease, CHO-THERM, PGS), heat pipes during package integration; radiator assembly, MLI closure after successful alignment.
- Only low-outgassing, contamination-controlled materials near optics, DHA and IDCA cold surfaces, strictly as per the approved contamination control plan.

f) Sub-system Integration and Testing

- Mechanical & electrical integration of all sub-systems and interface tests during integration by the vendor, following the SAC-supplied mechanical / electrical assembly sequence including intermediate electrical tests.
- Necessary fixtures required to carry out the above activities are to be designed and realized in advance with prior approval of the design from SAC.
- End-to-end electrical performance verification and report generation.

Note to Vendor: Any modification to the proposed integration plan during AIT requires clearances by SAC experts; it may include repeat / rework of activity as specified by SAC.

g) Payload Testing, Checkout and Final Performance Evaluation

This activity is carried out by the vendor in all the phases as per the SAC test plan. Electrical functionality is evaluated with the PCS; imaging performance with the collimator-based OGSE.

- Test plan detailing interface-level testing and end-to-end characterization will be provided by SAC; test setup readiness with characterisation for each of the mentioned parameters (EGSE, OGSE) and test procedure preparation and approval are the vendor's responsibility.
- Prior approved test plans with all test methodologies and constraints are to be discussed and cleared by SAC before the start of T&E.
- Final payload performance tests are to be executed and reported by the vendor.
- Exact Parameters will be dependent on the payload types and will be provided during RFP Phase.

Table 7. Payload Performance Parameters and Measurements

Performance parameter	Measurement (vendor scope)
Square Wave Response (SWR) / MTF	Bar-target SWR at Nyquist and half-Nyquist, and slanted-edge MTF, at multiple field points and all bands across FOV of the payload, through-focus curves;

Performance parameter	Measurement (vendor scope)
Band-to-Band Registration (BBR)	Sub-pixel registration between PAN, MX and MWIR across the full field; temperature dependence in thermovacuum
Signal-to-Noise Ratio (SNR) / NEDT	SNR at specified reference radiances (integrating sphere) for PAN / MX; NEDT at specified scene temperature (blackbody) for MWIR; noise decomposition (temporal, fixed-pattern, striping)
Radiometric calibration	Radiance-to-count transfer function, linearity, saturation, dark / offset, per-pixel relative gain (uniformity) for all VNIR pixels using a calibrated integrating sphere; MWIR gain / offset using blackbody sources; traceability of sources
Spectral calibration	In-band spectral response and out-of-band rejection per band using a monochromator setup
Geometric / boresight	Line-of-sight of each channel with respect to the payload reference cube; IFOV / sampling; distortion across field / Alignment cube reference generation
Stray light / veiling glare	Off-axis rejection scan with a bright source; ghost identification;
Functional and interface	All modes, TC/TM, data formats, compression, on-board calibration functional check, cooler start-up / steady-state performance
Data archival	All raw image data, processed products, test configurations and environment logs archived in the SAC-approved structure with unique identifiers, checksums and metadata; searchable catalogue; delivered to SAC after each test and at each milestone

- Processing of payload test data, including image-quality, BBR, radiometric and spectral analysis, is the vendor's responsibility; processed data are to be delivered to SAC during each test.
- Anomalies to be reported immediately with the vendor's preliminary root-cause analysis (Section 10.2); further AIT as per SAC guidance.
- Compilation of observations / anomalies, test results and reports during development phase and milestone reviews, and payload containerization for shipment, are the vendor's responsibility.

9. Storage, Handling, Seismic and Contamination Control Requirements

- Vendor is responsible for safe handling of FIM during transportation and AIT activities.
- The FIM flight hardware and all other flight components are to be stored in a controlled environment as prescribed through SAC guidelines.
- Flight optical elements and focal plane assemblies shall be stored in a cleanroom environment with protective covers in place.
- The vendor shall implement, and obtain SAC clearance for a Contamination Control Plan covering particulate and molecular contamination limits, cleanroom entry protocol, witness samples.
- Any damage to the hardware during transportation or during the course of AIT is to be borne by the vendor.

- Vendors shall describe the measures proposed to protect payload hardware, optical assemblies and associated ground equipment against earthquake-induced damage during integration, testing & storage.

10. Physical Security and Data Transfer Requirements

- Physical security of the vendor premises has to be ensured by the vendor during all phases of the contract.
- CCTV cameras shall be provided in the cleanroom with 24 × 7 recording for audit.
- Computer network security at the vendor premises is to be ensured for safeguarding the payload information, test data etc.
- Vendor has to provide test data and results to SAC through a safe network mechanism like SFTP or any other protocol. Given the volume of image data generated during optical payload testing, the vendor shall size the data transfer and local storage arrangement accordingly and obtain SAC clearance for the same.
- The mode of data transfer selected by the vendor should be cleared by SAC.

11. Data Security

Any data related to the contract, including documents, drawings shared by SAC with the vendor, test data, image data and results, should not be used for any other purpose or shared with any other third party. Doing so will constitute a violation of the NDA clause and /or cancellation of the contract / blacklisting of the vendor with legal proceedings.

12. Work Share and Deliverables

Details of responsibilities and deliverables of SAC and the Vendor during all phases of the contract will be as follows:

a) Responsibilities of SAC

- Providing boardroom and on-the-job training (for the first payload) in optical payload AIT activities to the vendor's team, including optical handling, alignment and image-quality evaluation practices.
- Review of results at different stages and providing clearance for further activities and clearance of vendor-generated documents.
- Vetting by SAC for the flight items, OGSE and MGSE for payload handling which are realized by the vendor.

b) Deliverables from SAC

The list of deliverables / responsibilities from SAC is as shown below:

- Free Issue Material
- AIT implementation plan as co-generated during phase-1, approved mechanical / electrical / optical drawings, optical integration and alignment sequence, alignment and focus tolerance budgets, optical performance, etc.

- Test plans and associated documents for test procedure preparations, including the optical performance test plan as generated during phase-1.
- Contamination control specifications and cleanliness limits applicable to the payload.
- Checkout hardware & Software as per Annexure-1.

SAC reserves the right to modify the terms & conditions of EOI and SAC deliverables before the RFP. Any modifications after RFP will be as per mutual agreement.

c) Responsibilities and Deliverables of Vendor

- Providing / arranging all the required infrastructure like cleanroom (with laminar-flow optical integration area), optical alignment and metrology facility, thermo-vacuum facility etc., and consumables like cleanroom garments, optical cleaning consumables, etc., to carry out the AIT activities.
- All the activities listed in this EOI.
- Adherence to storage, contamination control, security and data requirements mentioned in this EOI.
- Participation in all the review deliberations related to AIT test plans, test results and observed non-conformances. The respective team member(s) working in specific domains of AIT will be responsible for data presentation during AIT reviews.
- Required details to be assimilated during training stages by the vendor team and all the documents as listed have to be systematically generated. A logbook and history sheet are to be maintained by the vendor.
- During the execution of AIT activities by the vendor under Phases 2 and 3, generation of all the documents for plans / procedures / records of non-conformances and close-outs etc. is mandatory, which provides an assessment of the 'as-built' payload, including the as-aligned optical configuration record. SAC reserves the right to scrutinize the deliverables by the vendor team under this category. The deliverables by the vendor team under this category will be proprietary to SAC with no claim from the vendor team.

13. Workforce Qualification and Capability Requirements

a) Educational Qualification

This contract envisages different categories of workforce viz. Coordinator, Engineers, Supervisors and Technicians as per the requirement of the payload. The details of various educational qualification requirements of the Vendor Workforce for the different categories are mentioned below:

Beyond educational qualifications, the vendor team shall collectively hold the following skill profile, evidenced in Forms D and E and verified during the facility visit and Phase-1.

Table 8. Educational Qualification Requirements

Sl. No.	Designation	Qualification and Work Experience	Desirable Skills
1	Coordinator	i. B.E / B.Tech / Equivalent (MSc, MS, Mtech), first class, in the relevant engineering / science	Optical alignment engineering

Sl. No.	Designation	Qualification and Work Experience	Desirable Skills
		discipline (Mechanical, Electrical / Electronics, Computer Science, Optics / Applied Physics / Instrumentation) with min. 60% marks or equivalent CGPA Grade. ii. Graduates with at least 10 years of relevant industry experience in AIT activities of space-based payloads / satellites, preferably including optical / electro-optical payloads.	Interferometric wavefront measurement; Zernike decomposition; sensitivity-matrix based computer-aided alignment of multi-mirror systems; theodolite / autocollimator / laser-tracker metrology; shim determination Opto-mechanical integration Handling and integration of mirrors with MFDs on CFRP structures; stress-free mounting; CTE-matched shim design; contamination control; MGSE operation
2	Engineers	i. B.E / B.Tech / Equivalent (MSc, MS, Mtech), first class, in the relevant engineering discipline (Mechanical, Electrical / Electronics, Computer Science, Optics / Applied Physics / Instrumentation) with min. 60% marks or equivalent CGPA Grade. ii. Graduates with at least 3 years of relevant industry experience only will be considered. iii. At least two engineers in the deployed team shall have demonstrated experience in optical alignment / opto-mechanical integration / image-quality evaluation.	Focal plane / detector engineering (VNIR) DHA 6-DOF alignment; through-focus SWR analysis; butting continuity verification; detector bias / clock operation; fixed-pattern noise and striping diagnosis IR detector and cryocooler engineering (MWIR) IDCA handling, dewar vacuum health, cryocooler operation and telemetry, cold-stop alignment, NEDT measurement Image-quality and radiometric analysis SWR / MTF, BBR, SNR / NEDT, linearity, uniformity, spectral response computation from raw image data; uncertainty budgeting; traceability of sources
3	Supervisors	i. Diploma pass in the relevant engineering discipline (Mechanical, Electrical / Electronics, Instrumentation) with min. 60% marks or equivalent CGPA Grade. ii. Diploma holders with at least 1 year of relevant industry experience only will be considered.	Payload electrical / checkout PCS operation, TC/TM, LVDS video acquisition, harness, EMI-EMC precautions, power conditioning Thermal / environmental test Thermal implementation, thermovacuum operation with optical port, thermal control system
4	Technicians	i. ITI in the relevant trade (Mechanical, Electrical / Electronics) with min. 60% marks or equivalent CGPA Grade. ii. Hi-Rel certification for fabricators, as per ISRO-PAX 300 standard, from any of the ISRO centres. iii. ITI holders with at least 1 year of relevant industry experience only will be considered.	QA / QC (electrical, mechanical, optical cleanliness) Independent QA per ISRO guidelines; NC management; cleanliness verification Data / software Test automation, data archival and cataloguing, analysis toolchain maintenance

Sl. No.	Designation	Qualification and Work Experience	Desirable Skills
		iv. Technicians deployed for optical handling operations shall have documented cleanroom and optics-handling training.	

14. Facility Details & Response requirements

Vendor shall provide the following details of the available facilities and provide responses in the formats attached in the annexures.

Table 9. Response Requirements and Form Details

Sl. No.	Criteria	Response Form
1	Industry Details	Forms A & I
2	Facility Infrastructure	Form F
2 (A)	<p>Cleanroom and optical integration environment:</p> <ul style="list-style-type: none"> • ISO Class 8 (Class 100,000) cleanroom with minimum dimensions of 30 m × 20 m each • Within the cleanroom, a dedicated ISO Class 7 (Class 10,000) or better laminar-flow optical integration bay of minimum 6 m × 6 m for handling of exposed optical surfaces and focal plane assemblies. • 5-tonne crane facility, where the hook bottom height (H = 10m) dimension is the minimum crane hook height above the floor. (Alternative crane types instead of overhead cranes are accepted) • Minimum door opening: 3 m (W) × 4.0 m (H) between airlock and cleanroom. • Environment control with RH 55 ± 5% and temperature 23 ± 2 °C. Temperature gradient across the optical integration bay shall not exceed 0.5 °C/m. • Vibration-isolated optical table / seismically isolated foundation in the optical test area, adequate for interferometric and MTF-class measurements. • Light-tight / dark-room capability in the optical test area with controlled stray illumination for radiometric and stray-light measurements. • GN2 purge distribution network with regulated, filtered, dry nitrogen at the payload and at the optics storage cabinets. • Particle fall-out witness plate stations and provision for NVR / molecular contamination witness sampling. • Payload Checkout Area with work tables & air-conditioned facility, with UPS power supply, 15 A sockets & LAN connectivity; it can be either inside the cleanroom or in a separate checkout lab, as per space availability at vendor premises. 	Compliance to be provided for availability at Vendor Premises

Sl. No.	Criteria	Response Form
	<p>Notes:</p> <ol style="list-style-type: none"> 1. The cleanroom facility should be owned and an ISRO-approved facility. 2. Request for utilization of SAC / ISRO cleanrooms for AIT activities in Phase-3 under any agreement shall not be entertained for this contract. <p>Transit area (airlock) should be suitable for receiving a payload container having dimensions of approximately 2.5 m diameter with 3 m height, with a suitable unloading platform (mobile crane) adjacent to the airlock room / door. Door height at the entry of the airlock should have compatible dimensions to position the container inside.</p> <p>The following are required inside the cleanroom:</p> <ul style="list-style-type: none"> • Three-phase supply 40 A, interface with 4 kW & 15 A wall sockets (preferably BCH). • 4 × 15 A raw power – 2 Nos (0.3 kW); 4 × 15 A UPS power – 4 Nos (0.25 kW); 32 A ELMCB outlet – 1 No (4 kW). • ESD work tables with minimum dimensions 1.5 m (L) × 0.75 m (W) × 0.8 m (H), with 15 A & 5 A outlet. • UPS supply – 35 approx. 04 Nos per bay / payload, with proper earthing facility. • Particle count monitor, humidity & temperature monitor equipment for measuring the environment inside the cleanroom (log of the same to be maintained). • Air shower entry for the cleanroom. • ESD floor throughout the cleanroom, ESD garments & footwear for all entering the cleanroom; low-linting cleanroom garments of the class appropriate to the optical integration bay. 	
2 (B)	<p>Electronics / Harness Fabrication Lab having work benches with:</p> <ul style="list-style-type: none"> • Soldering Station • Fabrication tools as per Annexure-1 <p>Optical cleaning and inspection station with controlled illumination, inspection optics and approved solvents.</p>	Compliance to be provided for availability at Vendor Premises
2 (C)	<p>Thermo-vacuum chamber:</p> <ul style="list-style-type: none"> • The thermovacuum chamber should be able to accommodate the entire payload & associated test set-up and other thermal elements required for environmental control of the chamber during the test. • A chamber of 5.5 m diameter and 7.5 m depth was used for thermovacuum testing of earlier payloads of similar configuration. The dimensions of the thermovacuum facility that will be used by the vendor for T&E of the five types of optical payloads can be of similar size or should be able to accommodate the FM payload and all ground elements. • The thermovacuum chamber should have temperature control capability of –100 °C to +70 °C for shroud and –10 °C to +60 °C for DUT, and pressure holding capacity of less than or equal to 10⁻⁶ torr. • The chamber shall be provided with an optical window / port of adequate clear aperture and optical quality, with in-chamber folding 	Compliance to be provided for availability at Vendor Premises

Sl. No.	Criteria	Response Form
	<p>optics or collimator interface, to permit in-situ measurement of focus and image quality of the payload during thermo-vacuum testing.</p> <ul style="list-style-type: none"> • The chamber shall employ oil-free (dry) pumping and contamination-controlled internal surfaces; TQCM / witness-sample monitoring of molecular contamination during the test cycle shall be available. • Payload checkout area is required to cater to test requirements during thermovacuum testing. • Vibration test facility requirement -shaker, handling area, vibration fixtures, measurement/instrumentation etc. • In addition to the shroud, the chamber should be capable of accommodating cryo plates that can be maintained at a temperature different from that of the shroud. 	
2 (D)	<p>All areas in the cleanroom / airlock where the payload will be handled are to meet the following requirements:</p> <ul style="list-style-type: none"> • Site Security • Access Control with CCTV Surveillance system • Fire Safety systems (clean-agent type, suitable for optics and electronics; sprinkler-type suppression shall not discharge over exposed flight optics) 	Form H; Compliance to be provided for availability at Vendor Premises
2 (E)	Test Equipment Capability , including optical alignment metrology, VNIR and MWIR collimator / source equipment and the OGSE concept against Annexure-1(a)	Form G – Details to be provided
2 (F)	<p>Integration analytics and debug capability (Section 10.2):</p> <ul style="list-style-type: none"> • As-built optical modelling capability • Image-quality / radiometric analysis toolchain • Anomaly-resolution process and past root-cause reports • Data archival and test-history database 	Form L and Form D; describe toolchain, licences and evidence of use
2(G)	Vibration test facility- shaker, levels, handling area, test engineers etc.	
3	<p>Technical Manpower:</p> <ul style="list-style-type: none"> • Refer Section 13 for details of technical qualifications of the manpower. 	Forms D & E. Manpower required under each category to execute the contract in the given timeline should be provided by the Vendor.
4	Past experience of skilled manpower involved in Payload Integration and Testing activities	Forms B & C
4 (A)	The lead Vendor shall have experience of AIT Realization of at least one electro-optical imaging payload with aperture size of more than 200 mm	Mention the number of payloads / spacecraft realized

Sl. No.	Criteria	Response Form
4 (B)	AIT design / implementation guidelines followed for space-based applications; supporting documents to be provided in relation to: <ul style="list-style-type: none"> • EMI-EMC precautions taken during AIT • ESD handling • Contamination control and cleanliness verification for optical hardware • Optical alignment and metrology practices 	Mention the list of documents generated
5	Financial Strength of the lead vendor: Revenue from operations	Form J – Mention the average revenue for the last 3 years
6	Quality Management Standards: <ul style="list-style-type: none"> • Quality standards followed by the industry comprising parameters like overall quality management architecture, reporting mechanism, non-conformance management system, quality control practices, records maintenance, onsite activity QMS, internal review mechanism, etc. • Format of reports, logs, etc. • Hi-Rel (as per ISRO PAX 300) certified technicians / operators for fabrication activities; number of technicians / operators available. 	Form L. Details of quality standards to be shared; formats of reports, logs etc. to be shared as annexures; previous work order references related to design reviews & non-conformance management to be provided for reference; mention the number of workforce available.

15. Manpower Estimate for Each Optical Payload AIT Operations

Vendor should provide the details of technical manpower required, as prescribed in the table below. The contract should be executed within the delivery timeline mentioned in the contract.

Table 10. Tentative Manpower Estimate

Optical Payload AIT (for 1 payload)	Engineers (Man-days)	Diploma Holders (Man-days)	Technicians (Man-days)
Estimate	640	624	416 (Phase-2) + 156 (Phase-2,3)

This skilled team is to cater for activities across Electrical & Mechanical Integration, Optical Integration & Alignment, QA – Electrical & Mechanical, Payload Checkout and Thermal aspects during various phases of Payload AIT activities. Typically, this corresponds to a team size of 6–7 engineers, 6 Diploma holders and 8 Technicians (technician requirement will be maximum (~8)).

16. Evaluation Criteria

a) Vendor requisites at the time of EOI submission

1. A vendor may not transfer, sub-let or novate its allocated type to another industry without SAC consent; the SCM, key-personnel and facility commitments are type-specific.
2. The vendor shall maintain confidentiality and sign an NDA with SAC and should not share confidential information with any person outside the authorised team without permission. Adequate measures shall be suggested by Vendor to meet this.
3. No Consortium is allowed but vendor can subcontract with SAC's consent.
4. The lead vendor shall have an equipped cleanroom (minimum size of 30 m x 20 m for each type of payload) as per requirements or shall have the land purchased and should have an approved plan, requisite government approvals, and financial approvals
5. The technical evaluation will be done considering the expertise available with respect to complex ground support equipment, optical metrology and environmental test facilities. Industries are expected to gain the expertise towards development of complex ground support systems, optical ground support equipment, test equipment and environmental test facilities to enable industry to do the end-to-end payload building independently. Along with the above mentioned criteria, all the Points mentioned in section 14: facility and response requirements and the parameters in this EOI will be used to select / reject a vendor.

b) Vendor requisites at the time of RFP submission

1. Vendor shall submit proof of availability/indent of required test setups (optical, electrical and mechanical) for payload test and characterization at the time of RFP submission.
2. Vendor shall provide a plan along with relevant proof that its facility will be equipped to take up AIT of subsequent payloads at its premises within 12 months from RFP issue (Clean room readiness) and 24 Months from RFP issue (availability of all equipment)
3. SAC may split the RFP of five different types of payloads in a lot as deemed necessary, based on this EOI. In this case, all sections of this EOI will be applicable to all the RFP's.

c) Maximum Award Ceiling and Distribution of Work

1. To ensure timely execution of the payloads within the stipulated delivery schedule, adequate availability of critical integration and test facilities, and mitigation of schedule concentration risk, SAC reserves the right to decide the maximum quantity awarded to any vendor.
2. Vendors may submit offers for any or all of the payloads for which they meet the prescribed qualification requirements. Participation in, or obtaining the highest eligible ranking for, more than two payloads shall not confer entitlement to an award exceeding the above ceiling.
3. The ceiling shall apply cumulatively to all awards under this tender, including awards issued through separate purchase orders or contracts. Allocation shall be made in accordance with the evaluation and award methodology specified in the RFP, subject to applicable purchase-preference provisions.
4. Vendors shall submit a facility-loading and resource-deployment plan identifying existing commitments, availability of critical equipment, integration and test facilities, and personnel required to meet the delivery schedule for the quantity proposed for award.

d) General Criteria

- The Vendor should be a company registered under the Indian Companies Act 1956 or a firm registered as a Limited Liability Partnership (registered under LLP Act, 2008). The industry should have been in existence for a minimum of five (5) years in India and should be in India.
- The vendor should not have been blacklisted by any Central / State Government institution. A signed declaration to this effect must be submitted along with the techno-commercial bids.
- SAC will constitute a Technical Review & Evaluation Committee (TREC) to evaluate the responses of the vendors.
- The TREC constituted by SAC shall evaluate the responses to the EOI and all supporting documents & documentary evidence. Inability to submit requisite supporting documents or documentary evidence by the vendor may lead to rejection of the EOI response of that vendor.
- Each of the responses shall be evaluated to validate compliance of the vendors according to the eligibility criteria, technical evaluation forms and the supporting documents specified in this document.
- To evaluate the proposals, SAC reserves the right to visit the premises of industries participating in the EOI, with a notice of 48 hours. The evaluation of vendors will be based on response forms and verification of the same during the industry visit.
- Along with the EOI response forms, a detailed presentation on their proposals in the form of a soft copy is to be submitted.
- The technical proposal will be evaluated on the basis of the vendor's experience, its understanding of the scope of services, facility infrastructure, proposed methodology and work plan, skilled manpower and the financial strength of the industry.
- The vendor shall suitably address safety measures taken for assurance of the flight hardware and support accessories supplied by SAC, including measures for protection of flight optical surfaces from contamination and damage.
- The vendor is responsible for safe and secure transportation of Free Issue Material (FIM) and the assembled payload.

e) Indicative terms and reservation of rights

- The EOI identifies its terms and conditions as indicative. SAC reserves the right to proceed, or not proceed, with a subsequent RFP/s. Participation in the EOI should therefore not be presented as a commitment to award work

f) Personnel replacement and continuity

Any replacement of deployed personnel should be with personnel of comparable calibre and relevant competence. The vendor shall undertake a responsibility focussed approach through clear interfaces, issue escalation and responsibility for resolution.

17. Modalities of Contract Execution

The details of payment milestones will be mentioned in the contract. Provisions for milestone payments will be incorporated in the contract depending on the completion of activity in each phase / sub-phase. The vendor shall provide details of the suggested milestone and acceptance criteria for

each. SAC will decide the scheme finally, the vendor's suggestions may or may not be accepted, in full or in part.

18. Response Forms and Annexures

a) Form-A: General Details of the Industry

Table 11. Form-A — General Details of the Industry

Sl. No.	Particulars	Details
1	Name of the Industry	
2	Year of Establishment	
3	Core capabilities of the industry — brief profile of the industry, not more than 2 pages, to be mentioned. (Any other report/s can be provided as Annexure.)	
4	Head office location and address with contact number & email ID	
5	Local address in Ahmedabad, if any, with contact number & email ID	
6	Addresses of manufacturing and / or operational setup in India (highlight the address where SAC representatives will visit for support and audit)	
7	Corporate website URL	

Note: Relevant documents shall be enclosed as Annexure.

b) Form-B: Experience in Aerospace Sector

In case the industry has / has had any Purchase Order / Work Order / Contract in the last 5 to 6 years involving skilled manpower engaged in Payload Integration and Testing activities, provide the details of each of the work orders in the specified format.

Table 12. Form-B — Experience in the Aerospace Sector

Purchase Order Details	Details
Name of the Aerospace Industry	
Scope of work	
PO Details	
Present Status of the PO	
Type of System*	
Application**	
Is any part of the above work sub-contracted to other industries? If yes, provide the details.	

Purchase Order Details	Details
Name of the sub-contractors	
Description of activity outsourced to sub-contractors	

* Indicate whether it is optical / Opto-mechanical / electronics / electrical / mechanical / propulsion / software or any other system.

** Mention if the system is for on-board or ground or any other use.

Note: The copies of the above purchase orders are to be enclosed as Annexure.

c) Form-C: Prior Experience with Government / Public Sector

Does the industry have similar experience of providing technical / skilled manpower support to any Government / Public Sector Industry (Aerospace Sector)? If yes, provide the following details.

Table 13. Form-C — Prior Experience with Government / Public Sector

Sl. No.	Name of the organization supported	Scope of work	No. of personnel deployed	Remark
1				
2				
3				

Note: Relevant documents shall be enclosed as Annexure.

d) Form-D: Industry Expert Manpower

Manpower strength (in the following streams / disciplines).

Table 14. Form-D — Industry Expert Manpower

Sl. No.	Streams / Disciplines	Engineering	Diploma	ITI
1	Mechanical			
2	Electronics and Communications			
3	Computer Science			
4	Optics / Applied Physics / Instrumentation			
5	Others			
6	Total			

Note: Relevant documents shall be enclosed as Annexure.

e) Form-E: Technical Hierarchical Structure

Mention the levels of technical hierarchical structure (from entry level to highest cadre) of your organization.

Table 15. Form-E — Technical Hierarchical Structure

Level	Designation / Cadre	Typical Qualification	Number on Rolls
1			
2			
3			
4			
5			
6			

Note: Relevant documents shall be enclosed as Annexure.

f) Form-F: Infrastructure Capabilities

List of major infrastructure presently available to build systems / sub-systems related to the aerospace sector established in India.

Table 16. Form-F — Infrastructure Capabilities

Sl. No.	Name of Infrastructure / Facility	Year of Commissioning	Brief Specifications *	Utilization Factor (%)**	Own / Lease / Third Party
1	Cleanroom (state ISO class)				
2	Laminar-flow Optical Integration Bay				
3	Air Lock				
4	Checkout Area				
5	Optical Alignment & Metrology Facility (theodolite / autocollimator / laser tracker / interferometer)				
6	Collimator-based Optical Test Facility (MTF / image quality / radiometric, dark-room capable)				
7	Optical Cleaning & Inspection Facility				
7a	MWIR Test Capability (blackbodies, IR collimator path, cryocooler operation)				

Sl. No.	Name of Infrastructure / Facility	Year of Commissioning	Brief Specifications *	Utilization Factor (%)**	Own / Lease / Third Party
8	Contamination Control & Cleanliness Monitoring Facility (particle counting, PFO witness plates, NVR sampling, GN2 purge)				
9	Electronics Fabrication / Harness Fabrication & Testing Facility				
10	Mechanical Workshop Facility				
11	Environment Test Facility – Thermal				
12	Environment Test Facility – Thermo-vacuum (state optical port availability)				
13	EMI / EMC Test Facility				
14	Thermal Fabrication and Testing				
15	Inspection and Testing Facility				
16	Environment Test Facility – Vibration				

* Kindly specify key parameters like dimensions, cleanliness level, temperature range and stability, relative humidity control, vibration isolation performance, ultimate pressure, working volume, clear aperture and optical quality of windows, wavelength range, frequency range and power range, wherever applicable.

** No. of days utilized / year.

Note: Relevant documents shall be enclosed as Annexure.

g) Form-G: Infrastructure & Instrument Details

Table 17. Form-G — Infrastructure and Instrument Details

Sl. No.	Name & Model number of Infrastructure / Facility / Instrument	Year of Procurement	Utilization Factor (%)**	Remarks (if any)
1				
2				
3				
4				

Sl. No.	Name & Model number of Infrastructure / Facility / Instrument	Year of Procurement	Utilization Factor (%)**	Remarks (if any)
5				
6				
7				
8				

** No. of days utilized / year.

- All or some of the facilities listed by the vendor may be visited and evaluated as part of the technical evaluation process, at the sole discretion of SAC. Industries need to cooperate in showing their facilities, failing which they would be disqualified.

Note: Relevant documents, Photographs / brochures of the above listed facilities shall be enclosed as Annexure.

h) Form-H: Site Security Details

Table 18. Form-H — Site Security Details

Sl. No.	Details of Safety Features	Compliance (Yes / No)	Remarks
1	Site Security		
2	CCTV Access Control		
3	Fire Safety System (clean-agent type in optics areas)		

Note: Relevant documents shall be enclosed as Annexure.

i) Form-I: Foreign Industry Partnership

Are you an offset partner / sub-contractor to any foreign industry (prime contractor of any major aerospace sector related contracts from India)? If yes, provide the details in the given format.

Table 19. Form-I — Foreign Industry Partnership

Sl. No.	Name of the Foreign Industry with Address	Name of the project (specify total contract value)	Responsibility of Prime Contractor	Responsibility of offset partner (your firm) (specify total sub-contract value)
1				
2				

Note: Relevant documents shall be enclosed as Annexure.

j) Form-J: Financial Details

Financial information of the industry / lead industry in case of consortium.

Table 20. Form-J — Financial Details

Heads	FY 2022-23	FY 2023-24	FY 2024-25	FY 2025-26
Revenue from operations (in INR Crores)				
EBTD (Earnings Before Tax and Depreciation) / EBITDA				
% of Revenue from Aerospace Segment / Unit				
Net Worth				
Share capital				
% of shareholding by Indians				
% of shareholding by foreigners				

Mandatory supporting documents to be provided as annexures:

1. Auditor-certified statements for the last three years — FY 2022-23, FY 2023-24 ,FY 2024-25 and FY 2025-26 (please provide the profit and loss statement and balance sheet).
2. Unaudited statements certified by the company auditors for the latest year 2024-25 (in case the auditor-certified statement for 2024-25 is not available). Certification by the company auditors supporting the revenue break-up.

k) Form-K: Acceptance of Compliance Matrix – to be filled by industry
Table 21. Form-K — Acceptance of Compliance Matrix

Sr no	Description	Compliance (Yes / No)	Remarks
1.	Acceptance to EOI objectives		
2.	Acceptance to Procedure for finalizing contract		
3.	Acceptance to Scope of Work		
4.	Acceptance to Tenure of Contract		
5.	Acceptance to Statement of Work		
6.	Acceptance to Storage, Handling and Contamination Control Requirements		
7.	Acceptance to Physical Security and Data Transfer Requirements		
8.	Acceptance to Data Security		
9.	Acceptance to Work Share & Deliverables		

Sr no	Description	Compliance (Yes / No)	Remarks
10.	Acceptance to Manpower Qualification & Skill-set requirements		
11.	Acceptance to Technical Evaluation Matrix		
12.	Acceptance to Manpower Estimate		
13.	Acceptance to Evaluation Criteria / Terms & Conditions		
14.	Acceptance to Terms & Conditions: General		
15.	Acceptance to Modalities of Contract Execution		
16.	EOI Response Format duly filled		

I) Form-L: Quality Management

Table 22. Form-L — Quality Management

Sl. No.	Particulars	Response
1	State the quality policy of the industry (max 200 words). Type the overall quality management system and mention quality department reporting, non-conformance management system, quality control practices, records maintenance, onsite activity QMS and internal review mechanism.	
2	Templates of reports, logs, etc. Empty templates of documents related to quality management to be provided.	
3	Contamination control plan and cleanliness verification procedure applicable to optical hardware; templates of cleanroom environment, particle fall-out and NVR logs.	
4	Integration analytics and debug capability, optical modelling software and trained users, image-analysis toolchain (describe, with sample outputs), anomaly-resolution procedure and two anonymised root-cause reports from past work, data archival architecture.	
5	Quality standards / certification obtained by the Industry [tick the appropriate box]: AS9100 Rev C / ISO 9001 / Others / (if others, kindly mention)	

Note: Relevant documents shall be enclosed as Annexure.

19. Procedure for RFP Pursuance

Further to receipt of EOI responses from the industry and technical evaluation of the same, SAC reserves the right to continue or cancel the further RFP process.

20. Sub-system Acceptance, Joint Issue Resolution and Mitigation Plan

Every FIM sub-system is accepted at handover against an exhaustive, jointly witnessed parameter sheet. The measured values become the contractual baseline for that item. When an issue arises during integration, the Joint Anomaly Resolution Board compares the current state with the baseline and applies the responsibility rules. Detailed mechanism and responsibilities will be provided in RFP.

a) Acceptance protocol

1. SAC issues the acceptance sheet template per sub-system with the contract; parameters, methods, instruments and tolerances are agreed in different phases
2. Handover inspection is performed jointly at SAC (or at the vendor for items shipped directly), witnessed by SAC QA and vendor QA, using SAC instruments for different phases
3. The signed sheet, raw data files and photographs are archived in the joint test-history database and referenced by unique FIM serial number.
4. The same sheet is re-filled at defined checkpoints (after transport, before integration, after alignment freeze, after thermovacuum) so that any drift can be located in time.
5. Detailed mechanism and responsibilities will be provided in RFP.

b) Acceptance parameters per sub-system

Table 23. Sub-system Acceptance Parameters

FIM sub-system	Acceptance parameters to be measured and recorded at handover (exhaustive list to be finalised in Phase-2/3)
Primary, secondary, tertiary mirrors, QM with MFDs; fold mirror(s)	
CFRP structure, optical bench, panels	
Aft optics assembly (dichroic, MWIR relay, mounts)	
DHA — PAN + MX, optically-buttet modules	
MWIR IDCA (detector, dewar, cryocooler, cold shield) and cooler electronics	
Electronics packages (proximity, video, digital, power, mechanism, calibration)	
On-board calibration assembly and cover mechanism	
Flight and checkout software	

c) Joint Anomaly Resolution Board (JARB) and responsibility rules

A standing JARB is constituted at contract signature with a SAC chair, a vendor co-chair, SAC and vendor QA, the SAC optical designer, and the vendor optical lead. Detailed mechanism and responsibilities will be provided in RFP.

1. Quarantine and data capture: stop work on the affected item; capture all raw data, environment logs, photographs and the SCM record of the operation in progress.
2. Re-measurement against the acceptance baseline (Section 20(b)) using the same method where possible.
3. Fault-tree analysis led by the vendor (Section 10.2) with SAC input; hypothesis tests agreed and executed jointly.
4. Root-cause classification and responsibility assignment per the rules below; corrective and preventive action; procedure update; closure record in the joint database.

Table 24. JARB Responsibility and Consequences

Finding of the JARB	Responsibility	Cost and schedule consequence

d) Mitigation plan when an issue arises during integration

Table 25. Mitigation Plan during Integration

Issue class	Immediate mitigation	Recovery path	Preventive measure built into the framework

21. Annexure-1: List of Components / Material / HW / SW to be developed / procured by vendor

a) Optical Set-ups (OGSE) Required for the Payload type-1 & 2

The vendor shall provide, as part of its EOI response, its own estimate and concept of the optical ground support equipment for this configuration. OGSE for Type A is mentioned as below, for the remaining types, it shall be scaled according to the payload specifications as mentioned in the respective payload table. Reference collimators used in the OGSE will have typical focal length three times the payload focal length and reference flats surface quality shall be better than $\lambda/100$.

Table 26. Optical Setups Required for Payload Types 1 and 2

#	Set-up	Purpose	Indicative setup requirements	Minimum Qty
1	Telescope alignment setup	Telescope alignment	1.5 m reference flat, interferometer in visible and IR range	1
2	Main collimator (VNIR + MWIR)	System-level SWR / MTF, BBR, focus, boresight, radiometric and spectral tests	1.5m diameter collimator	1
3	Payload mounting Fixture	360° rotation about optical axis, tilt about other two axes +/-10 deg, vertical translation	Commensurate with payload size	1-lab, 1-thermovacuum (fixed)
4	Collimator mounting platform	With a tip-tilt mechanism and translation in the horizontal and vertical directions	Commensurate with collimator size	1-lab , 1-Thermovac
5	VNIR radiometric source	SNR, radiometric calibration, uniformity	1.5 m diameter NIST traceable calibration source	1 sphere, 1 transfer radiometer
6	MWIR sources	NEDT, MWIR radiometric calibration, focus, narcissus	1.5 m diameter Blackbody source (thermovacuum compatible)	1
7	Spectral calibration source	Band response, out-of-band rejection	Monochromator (wide band)	1
8	Stray-light / dark facility	Veiling glare, off-axis rejection	Specialized setup to be developed	1

b) Type-Specific Variations to the Setups

Table 27. Type-Specific Variations to the Setups

Clause	Type-A	Type-B	Type-C	Type-D	Type- E
MGSE	This will be specified in detail during the RFP Phase. The OGSE and MGSE have to be scaled as per the Optics size.				
CGSE					
EGSE					
OGSE					
THERMOVACUUM					
Alignment					
Performance suite additions					

c) Tentative List of Standard Instruments and Equipment for CGSE

Table 28. Standard Instruments and Equipment for CGSE

Sl. No.	Description
1	Spectroradiometer / monochromator covering Visible/ SWIR/MWIR for spectral response measurement
2	Calibrated radiometer / photometer with traceable detector head
3	Phase-shifting interferometer with transmission flats and spheres for wavefront verification
4	Electronic autocollimator and theodolite set for alignment and line-of-sight measurement
5	Laser tracker / CMM-class metrology system for Opto-mechanical measurement
6	Airborne particle counter, surface particle detector and NVR analysis capability for cleanliness verification

d) Standard EGSE

Table 29. Standard EGSE

1	Logic Analyzer for timing signal verification of 32 channels
2	Multi-lane high-speed acquisition system for 9 DHA + 4 MWIR modules
3	Oscilloscope (10 GS/s, 2 GHz)
4	Oscilloscope (500 MS/s, 500 MHz)
5	Digital Multimeter
6	DC power supply, DC to 60 V, 40 Ampere
7	Arbitrary Waveform Generator (baseband to 1 GHz) for detector clock and pattern generation

8	Spectrum Analyzer (baseband to 3 GHz) for clock, noise and EMI diagnostics
9	PXIe Chassis
10	Workstation with image-processing capability and adequate mass storage

e) Tentative List of Standard Tools & Material Required for Payload AIT

Table 30. Standard Tools and Materials Required for Payload AIT

Sl. No.	Description
1	Fabrication tools (wire stripper, crimping tool, hot gun, etc.) for DC harness, high-speed video cable and flexible RF cable fabrication
2	Harness anchoring material (saddles, cable ties, screw locks, etc.)
3	EMI mitigation material (EMI cloth / mesh, CHO-bond, etc.)
4	Consumable items (Kapton tape, araldite, etc.)
5	Optical handling and cleaning consumables (lint-free wipes, lens tissue, spectroscopic-grade solvents, drag-wipe and peelable first-contact cleaning materials, powder-free cleanroom gloves)
6	Protective optical covers, purge fittings, GN2 regulators and point-of-use filters
7	Cleanliness verification consumables (particle fall-out witness plates, NVR witness coupons, tape-lift kits)
8	Mechanical assembly tools: calibrated torque wrenches, different types of Allen keys, ratchet-based assembly tools with various adaptors and attachments. Handling tools: slings and ropes for instrument/payload handling with eye bolts and D-shackles, etc.

f) Tentative List of Customized EGSE

f (1) — Hardware developed by Vendor

Table 31. Customized EGSE — Hardware Developed by the Vendor

Sl. No.	Description
1 (a)	Digital tele-command & telemetry simulator using I/O cards / LabJack
1 (b)	FPGA-based multi-lane digital/optical data recorder for detector video
1 (c)	Thermal Control System
1 (d)	Detector bias and clock driver breakout / simulation unit
1 (e)	Collimator target-wheel, rotary-stage, source and blackbody control unit (OGSE control) with test automation interface
1 (f)	Cryocooler drive / telemetry interface and IDCA housekeeping acquisition

f (2) — Software provided by SAC to Vendor

Table 32. Customized EGSE — Software Provided by SAC

Sl. No.	Description
2 (a)	Raw bus supply and logging software
2 (b)	TC / TM operating software
2 (c)	OBC simulator software (MIL-STD-1553)
2 (d)	Payload image data processing software (MTF, radiometric transfer, SNR, registration analysis)
2 (e)	Data acquisition software
2 (f)	Temperature readout software
2(g)	Analytics and Debug software

g) Tentative List of Customized MGSE (details will vary for different types of payloads/EOMs).

Table 33. Customized MGSE

Sl. No.	Description
1	Fixture (for payload handling) with 4 nos. wire ropes with CG alignment facility.
2	Platforms for working at different heights (2 Nos)
3	Support frame structure for payload fixity
4	Dummy payload structure (for harness implementation and anchoring)
5	Integration fixture (2 Nos) for holding payload at different positions and orientations with respect to optical test setups.
6	Interface structure between FM payload and integration fixture
7	Interface plate (to hold the ground calibration / target assembly)
8	Support structure for the laboratory optical test set-up, including collimator bench and alignment mounts
9	Clamps and brackets for holding optical test hardware, targets, folding mirrors and protective covers
10	Dedicated handling / lifting tooling/fixtures for each mirror-with-MFD (M1, M2, M3, M4, etc. and similar large mirrors), shock-limited and MFD-interface compliant
11	CFRP structure handling fixture and integration trolley, with moisture / purge cover
12	DHA handling and 6-DOF alignment fixture with ESD and cleanliness protection
13	IDCA handling fixture with dewar and cooler protection, and cooler heat-rejection interface for ground operation

Sl. No.	Description
14	Alignment reference cube and metrology instrument stands
15	Protective covers for the telescope entrance aperture and focal plane assemblies
16	Platform for working persons
17	Cleanliness-controlled, GN2 purge-capable transport container with shock logger
18	Tilt fixture (for thermovacuum), gravity conditions simulation alignment-preserving and shock-limited
19	Interface plate (for assembly of FM payload on tilt fixture in thermovacuum)
20	IR heater holding structure (for thermovacuum)
21	Different types of containers for sub-assemblies and payload assembly safe transportation from one place to other places with shock and vibration isolation and monitoring.

h) Tentative Details of Ground DC Harness, High-Speed Video Cables

Table 34. Ground DC Harness and High-Speed Video Cables

Sl. No.	Description
1	Optical cable of varying lengths
2	DC connectors, both plug and socket (pin configuration 9, 15, 25, 50, 78 (HD), 26 (HD)), Micro-D, Nano-D
3	Twisted pair harness of different gauges
4	Single wire of different gauges and colours
5	Spec 55 single wire of different gauges and colours
6	Spec 55 TP wire of different gauges and colours
7	TPS wire of different gauges
8	LVDS / high-speed differential video cable assemblies for detector data transfer and recording, including micro-D and high-density connectors for the detector head interface

k) Details of Non-Flight Components for Lab Testing

Table 37. Non-Flight Components for Lab Testing

Sl. No.	Description
1	Non-flight harness for testing
2	Non-flight high-speed video and optical cables
3	Co-axial attenuators
4	Terminations and other optical adapters

Sl. No.	Description
5	DC connector savers and RF savers
6	All types of connector type buffers / savers.
7	Optical targets and reticles (slit, bar, pinhole, edge and resolution charts)
8	Calibrated radiance source, integrating sphere lamps and spares
9	Neutral density and band-pass filters
10	Alignment reference cubes, optical flats and folding mirrors for OGSE
11	MWIR targets and MWIR-transmitting filters / attenuators
12	DHA and IDCA break-out / connector-saver harness for stand-alone detector checks

l) Details of Non-Flight Components for Thermovacuum Testing

Table 38. Non-Flight Components for Thermovacuum Testing

Sl. No.	Description
1	Thermovacuum -compatible broadband (VNIR + MWIR, e.g. sapphire / CaF ₂) optical window / port assembly with mounting flange, wavefront-qualified over the clear aperture
2	MWIR cold reference / controlled-background arrangement for in-vacuum NEDT and stability (configuration per SAC)
3	Cryocooler heat-rejection interface to chamber cold plate and cooler telemetry feed-through
4	In-chamber folding mirror / collimator interface assembly with its support and alignment mount
5	Thermovacuum flange for DC as well as for high-speed video and RF connections from inside and outside of the chamber
6	DC connectors
7	MLI blanket for the full payload
8	Kapton tape
9	Thermal sensors for monitoring the payload temperature
10	DC and signal connections from outside of the flange up to the GCU rack
11	TQCM and witness-sample holders for molecular contamination monitoring during the test cycle

m) Details of Non-Flight Components for Thermovacuum Chamber

Table 39. Non-Flight Components for the Thermovacuum Chamber

Sl. No.	Description
1	Thermal elements such as IR lamps, cryocoolers, shrouds and associated controllers

Sl. No.	Description
2	Optical-grade chamber window and its protective shutter / cover
3	Oil-free (dry) pumping consumables and spares

22. Annexure-2: S/C Level (Phase-2/3) Tests

Table 40. Spacecraft-Level Tests

Sl. No.	Test
1	Autonomous tests
2	Disassembled Mode tests
3	Assembled Mode tests
4	Spacecraft level thermo-vacuum test
5	Post-transportation optical alignment / line-of-sight verification and optical surface cleanliness inspection
6	Spacecraft-level end-to-end imaging and radiometric functional check using collimator-based OGSE (SWR, BBR, SNR spot-check; MWIR cooler start-up and NEDT spot-check)

23. Reliability and Quality Assurance Philosophy during Realization and Testing

SAC's QA philosophy has evolved based on zero-defect tolerance, unattended operation in hostile environments, and mission success over lifecycle cost, with QA embedded from inception rather than post-build inspection. All outsourced activities shall comply with SAC Reliability and Quality Assurance requirements. Execution shall be carried out through SAC-approved quality plans, while SAC retains full authority for quality surveillance, audit, and final acceptance. Quality shall be built in at every lifecycle stage, with zero tolerance for undocumented deviations. While outsourcing, SAC follows a model where:

- Process control and execution are performed by external partners
- Final acceptance, surveillance, and audit authority remains with ISRO

SAC will provide the necessary inputs and specific components/packages/sub-systems, if required, essential for carrying out the activity. SAC will supply necessary technical data and instructions as needed.

The following is a brief outline of QA aspects to be ensured during realization of the payload:

a) Quality Management Requirements

- Quality Assurance Plan shall be approved before the start of realization
- Independent Quality & Reliability organization shall exist at the vendor/supplier
- Clear QA roles, escalation paths, and acceptance authority shall be defined
- SAC retains audit, witness, and stop-work authority
- All open issues shall be closed or waivers approved before acceptance

b) Configuration & Change Control

- Approved Configuration Management Plan (QMP) shall be available
- Configuration baselines shall be established and controlled
- Change Control Board (CCB) shall be in place; deviations and waivers (if any) shall be formally approved and ISRO approval shall be obtained.
- Full requirements-to-verification traceability shall be maintained
- No undocumented design or process changes are allowed, and digital configuration records shall be retained through mission life

c) Vendor Requirements

- Certification of technical human resources by SAC/ ISRO for carrying out fabrication and inspection activity.
- Experience in inventory management (EEE components, materials and consumables) for electronic and mechanical systems including procurement, storage and handling (project management).
- End Item Data Package (EIDP) shall be evaluated by SAC for overall technical compliance.

d) Supplier & Sub-Tier Control

- Suppliers shall control the entire supply chain, including sub-vendors
- An approved vendor list shall be maintained for all critical items and from SAC/ISRO Qualified Vendors list
- QA requirements shall be flowed down to Sub-Tier suppliers
- Mandatory incoming inspection & lot acceptance tests
- Periodic supplier audits shall be conducted and tracked

e) Materials, Parts & EEE Assurance

- Use of space-qualified materials and EEE parts
- Components to be procured based on Specification & R&QA requirements provided by SAC.
- Raw materials and consumables procured by Vendor for fabrication shall be as per R&QA requirements provided by SAC.
- Incoming inspection / testing, full lot traceability, storage and re-test plans in place

f) Manufacturing & Fabrication Processes

- Operator (Fabricators/Inspectors) certification for all electronic fabrication & assembly activities as per ISRO-TS-300.
- Implement workmanship practices throughout all phases of manufacturing, assembly and integration, to ensure acceptable and consistent workmanship quality levels.
- Statistical process control shall be applied for critical process parameters
- Sensitive items shall be processed or manufactured, inspected and tested in a controlled environment to prevent any degradation.
- Implement workmanship practices throughout all phases of manufacturing, assembly and integration, to ensure acceptable and consistent workmanship quality levels.
- A process shall be implemented for preservation of vacuum packing of PCBs, storage of EEE parts, sub-assemblies, packages and spacecraft.
- Shelf life details of consumables shall be maintained
- Fabrication and testing facilities shall meet the standards of ISRO-TS-300.
- Usage of ESD apparel as specified in ISRO-PAX-300 and ESD control handbook
- Work instructions and inspection sign-offs shall be enforced

g) Equipment Control

- Identification and maintenance of tooling and equipment used for manufacturing, assembly and integration
- All tooling and equipment shall be calibrated for accuracy and performance at adequate intervals
- Tooling and equipment shall be approved by Quality Assurance prior to use.
- Tools and equipment shall be properly stored to prevent misuse, damage and deterioration and unnecessary tools shall be removed from working areas.

- Metrology and Calibration records shall be maintained, with associated certification.
- Ground Checkout Units shall undergo T&E before their use with subsystems and integrated payloads. Software used in the GCU shall be reviewed and cleared by SAC.

h) Inspection, Testing & Verification

- Verification must prove functional, environmental, and reliability compliance
- Mandatory Inspection Points (MIP) shall be identified by QA at relevant stages.
- Inspection shall be carried out on a 100% basis at all stages of activity, and records shall be maintained
- Functional and Environmental testing shall be as per SAC-approved test plans
- Test coverage must be complete and justified.
- QA SAC witnessing and test data clearance
- Test failures shall be analysed and formally dispositioned
- Final acceptance by joint review board led by ISRO

i) Assembly, Integration & Testing

- Conduct of AIT activities as per approved procedures, checklists and log sheets
- Environmental Control as per applicable ISRO standards.
- Verification of test Coverage during Integrated Payload Testing.
- Mandatory Inspection before stage clearances

j) Safety Precautions

- Vendor shall adhere to all the safety guidelines while handling components, cards, and packages during testing and transporting
- ESD protection measures such as wearing ESD overcoats, shoes / slippers, wristbands, grounding and other measures as per ESD protection guidelines shall be complied with.
- Components, PCBs and electronic packages shall not be handled without ESD protection.

k) Non-Conformance & Failure Management

- Formal NCR system shall be implemented to review all non-conformances (NCs) observed during fabrication and testing phases
- Root Cause Analysis (RCA) and Failure Analysis (FA) are mandatory for failures
- Corrective & Preventive Actions (CAPA) shall be tracked to closure
- Segregation of non-conforming products
- All Non-conformances shall be reported to SAC for disposition.

l) Delivery, Handling & Transport Assurance

- Contamination control, ESD protection, and handling procedures shall be enforced
- Qualified transport containers shall be used
- Environmental monitoring during transit.
- Formal QA handover at delivery point.