

भारत सरकार / Government of India

अंतरिक्ष विभाग / Department of Space

इसरो नोदन कॉम्प्लेक्स / ISRO Propulsion Complex,

महेंद्रगिरि / Mahendragiri

तमिल नाडु / Tamil Nadu-627133

स.सं.: आईपीआरसी/सीटीई/आईसीईटी/ई.ओ.आई.-01/2024-25

दिनांक: 23-12-2024

Ref. No.: IPRC/CTE/ICET/EoI-01/2024-25

Date: 23-12-2024

एन.जी.एल.वी. परियोजना के लिए एकीकृत क्रायोजेनिक इंजन एवं चरण परीक्षण सुविधा
(आई.सी.ई.टी.) में तरल प्रणालियों के संवर्धन के लिए अभिरुचि की अभिव्यक्ति (ई.ओ.आई.) हेतु
आमंत्रण

INVITATION FOR EXPRESSION OF INTEREST (EOI)

FOR AUGMENTATION TO FLUID SYSTEMS AT

INTEGRATED CRYOGENIC ENGINE AND STAGE TEST FACILITY (ICET) FOR

NGLV PROJECT

भारत सरकार के अंतरिक्ष विभाग के अंतर्गत भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) का इसरो नोदन कॉम्प्लेक्स (आईपीआरसी) भारतीय प्रमोचन यानों के द्रव नोदन इंजनों और चरणों के समुच्चयन, एकीकरण और परीक्षण के लिए इसरो का प्रमुख केंद्र है।

ISRO Propulsion Complex (IPRC) of Indian Space Research Organisation (ISRO) under Department of Space, Government of India is the lead Centre of ISRO for Assembly, Integration & Testing of liquid propulsion Engines and Stages of Indian Launch Vehicles.

इस अभिरुचि की अभिव्यक्ति (ई.ओ.आई.) का मुख्य उद्देश्य एक विक्रेता (एक भारतीय कंपनी) की पहचान करना और उसे योग्य बनाना है जो भारतीय अंतरिक्ष कार्यक्रम के अगली पीढ़ी के प्रमोचन यान (एनजीएलवी) परियोजना के एलओएक्स-मीथेन इंजनों के परीक्षण के लिए आईसीईटी सुविधा में तरल प्रणालियों में संवर्धन कर सके। भारत के वे विक्रेता जिनके पास तरल प्रणालियों / क्रायोजेनिक प्रणालियों से जुड़ी परियोजनाओं की स्थापना का अनुभव है, वे इस ई.ओ.आई. का प्रत्युत्तर दे सकते हैं।

This Expression of Interest (EOI) is primarily aimed to identify and qualify a Vendor (an Indian Company) who can take up Augmentation to Fluid Systems at ICET facility for testing LOX-Methane Engines of Next Generation Launch Vehicle (NGLV) Project of Indian Space Programme. Vendors from India who have experience in establishing projects involving Fluid Systems / Cryogenic Systems shall respond to this EoI.

a. ईओआई की प्रतिक्रिया/Response to Eol

- I. विक्रेताओं को सलाह दी जाती है कि वे ई.ओ.आई. दस्तावेज़ में दिए गए सभी निर्देशों, नियमों और शर्तों, प्रपत्रों, आवश्यकताओं और अन्य सूचनाओं का ध्यानपूर्वक अध्ययन करें। ई.ओ.आई. प्रस्तुत करना ई.ओ.आई. दस्तावेज़ों के सावधानीपूर्वक अध्ययन और जांच के बाद किया गया माना जाएगा, जिसमें इसके निहितार्थों की पूरी समझ हो।

Vendors are advised to study all the instructions; Terms and Conditions; Forms; Requirements and other information in the Eol documents carefully. The submission of Eol shall be deemed to have been done after a careful study and examination of the Eol documents with full understanding of its implications.
- II. आईपीआरसी किसी भी अतिरिक्त जानकारी के लिए अनुरोध करने का अधिकार सुरक्षित रखता है और किसी भी विक्रेता की ई.ओ.आई. प्रतिक्रिया को अस्वीकार करने का अधिकार भी सुरक्षित रखता है, यदि आईपीआरसी की राय में, योग्यता या डेटा अधूरा है या यदि विक्रेता को काम को संतोषजनक ढंग से निष्पादित करने के लिए योग्य नहीं पाया जाता है।

IPRC reserves the right to request for any additional information and also reserves the right to reject the Eol response of any vendor, if in the opinion of IPRC, the qualification or data is incomplete or if the vendor is found not qualified to satisfactorily execute the work.
- III. विक्रेता ई.ओ.आई. दस्तावेज़ की तैयारी और प्रस्तुतीकरण से जुड़ी सभी लागतों और खर्चों को वहन करेगा, जिसमें ई.ओ.आई. के बाद स्पष्टीकरण, चर्चा, तकनीकी और अन्य प्रस्तुतियाँ शामिल हैं और आईपीआरसी किसी भी मामले में ई.ओ.आई. प्रक्रिया के परिणाम की परवाह किए बिना ऐसी लागतों के लिए जिम्मेदार या उत्तरदायी नहीं होगा। साथ ही, विक्रेता ई.ओ.आई. प्रस्तुत करने के संबंध में उनके द्वारा किए गए किसी भी लागत, शुल्क और व्यय का दावा करने का हकदार नहीं होगा।

Vendor shall bear all costs and expenses associated with preparation and submission of Eol document including post Eol clarifications, discussions, technical and other presentations and IPRC shall in no case be responsible or liable for such costs, regardless of the outcome of the Eol process. Also, the vendor shall not be entitled to claim any costs, charges and expenses incidental to or incurred by them in connection with the submission of the Eol.
- IV. इस ई.ओ.आई. की प्रतिक्रिया सभी मामलों में पूर्ण और संपूर्ण होना चाहिए। ई.ओ.आई. दस्तावेज़ द्वारा अपेक्षित सभी जानकारी प्रस्तुत करने में विफलता या ई.ओ.आई. दस्तावेज़ों के लिए हर तरह से पर्याप्त रूप से उत्तरदायी न होने वाले प्रस्ताव को प्रस्तुत करना कंपनी/फर्म(मौ) के जोखिम पर होगा और इसके परिणामस्वरूप दस्तावेज़ को अस्वीकार किया जा सकता है।

The response to this Eol should be full and complete in all respects. Failure to furnish all the information required by the Eol document or submission of proposal not substantially responsive to the Eol documents to every respect will be at the risk of the Company/ Firm(s) and may result in rejection of the document.

- v. ई.ओ.आई. के संबंध में मत-याचना पर सख्त प्रतिबंध रहेगा तथा एजेंसी द्वारा प्रस्तुत ऐसे मत-याचित ई.ओ.आई. को अस्वीकार कर दिया जाएगा।

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

- vi. यह ई.ओ.आई. दस्तावेज़ कोई प्रस्ताव नहीं है और इसे किसी प्रतिबद्धता के साथ जारी नहीं किया गया है। आईपीआरसी बिना कोई कारण बताए किसी भी स्तर पर ई.ओ.आई. के आमंत्रण को संशोधित करने या वापस लेने या उसके किसी भी भाग को बदलने का अधिकार सुरक्षित रखता है।

This Eol document is not an offer and is issued with no commitment. IPRC reserves the right to modify or withdraw the invitation to Eol or change any part thereof at any stage without assigning any reasons what so ever.

- vii. इस ई.ओ.आई. के लिए यदि कोई परिशिष्ट/शुद्धिपत्र हो तो उसे हमारी वेबसाइट www.isro.gov.in पर डाला जाएगा। विक्रेता नियमित रूप से निगरानी करें।

Addendum/Corrigendum, if any, to this Eol, will be hosted at our website, www.isro.gov.in. Vendors shall regularly monitor.

b. संवाद बैठक/Interaction Meeting

आईपीआरसी में एक संवाद बैठक आयोजित की जाएगी ताकि शामिल गतिविधियों को बेहतर ढंग से समझा जा सके, यदि कोई संदेह हो तो उसे दूर किया जा सके और यदि आवश्यक हो तो साइट का दौरा किया जा सके। इच्छुक विक्रेता(ओं) से अनुरोध है कि वे नीचे निर्धारित पूर्व-ई.ओ.आई. बैठक में भाग लें:

An interaction meeting is arranged at IPRC in order to have a better understanding of the activities involved, clarify doubts, if any, and to visit site, if required. The interested Vendor(s) are hereby requested to take part in the Pre-Eol meeting scheduled as below:

दिनांक/Date : 21-01-2025

समय/Time : 10:00 बजे भा.मा.स./Hours IST

स्थान/Venue : इसरो नोदन कॉम्प्लेक्स, महेंद्रगिरि/ISRO Propulsion Complex, Mahendragiri,

तिरुनेलवेली, तमिल नाडु – 627133, भारत/Tirunelveli, Tamil Nadu – 627133, India

संपर्क बिन्दु/Focal point : क्रय एवं भंडार अधिकारी, क्रय स.1/Purchase & Stores Officer, PURGP1

संपर्क संख्या/Contact Number 04637 281552 / मोबाइल/Mobile : 9498438074

ईमेल/Email: psogroup1@iprc.gov.in

इच्छुक विक्रेता(ओं) को सुरक्षा मंजूरी की व्यवस्था करने के लिए दिनांक 16-01-2025 से पूर्व ही संवाद बैठक में भाग लेने वाले प्रतिनिधियों का विवरण संपर्क बिन्दु को उपलब्ध कराना होगा। प्रतिनिधियों को पूर्व-ई.ओ.आई. बैठक में भाग लेने के लिए कंपनी/फर्म/संगठन द्वारा जारी किया गया “प्राधिकरण पत्र” साथ लाना होगा।

Interested Vendor(s) shall provide the details of the representative(s) taking part in the interaction meeting well before 16-01-2025 to the Focal Point in order to arrange for Security clearance. Representatives shall carry an “Authorization Letter” issued by Company/ Firm/ Organization for attending the Pre-Eol meeting.

कृपया ध्यान दें कि किसी भी परिस्थिति में पूर्व-ई.ओ.आई. बैठक को आगे बढ़ाने/स्थगित करने के किसी भी अनुरोध पर विचार नहीं किया जाएगा। **ई.ओ.आई. प्रस्तुत करने के लिए पूर्व-ई.ओ.आई. बैठक में भाग लेना अनिवार्य आवश्यकता नहीं है।**

Please note that any request for advancing/ postponement of Pre-Eol meeting will not be entertained under any circumstance. **Attending Pre-Eol meeting is not an essential requirement for submitting Eol.**

तालिका-1: अनुसूची/Table-1: Schedule

संवाद बैठक/Interaction meeting	21-01-2025 10.00 बजे/Hrs
ई.ओ.आई. पर प्रतिक्रिया प्रस्तुत करने की अंतिम तिथि Last date for submission of response to Eol	04-02-2025 16.00 बजे/Hrs
ई.ओ.आई. खोलने की तिथि Opening date of Eol	05-02-2025 14.00 बजे/Hrs

ई.ओ.आई. की पूरी प्रतिक्रिया आईपीआरसी को नीचे दिए गए पते पर उपर्युक्त तिथि से पूर्व अवश्य प्राप्त होना चाहिए। संलग्नक-1 में उल्लिखित नियमों और शर्तों के अनुसार निर्धारित प्रारूप में ई.ओ.आई. की प्रतिक्रिया एक सीलबंद लिफाफे में प्रस्तुत किया जाएगा, जिस पर हमारी संदर्भ संख्या और ई.ओ.आई. के लिए नियत तिथि लिखी होगी। प्रस्तुत ई.ओ.आई. के सभी पृष्ठों पर क्रमांक अंकित होना चाहिए और प्राधिकृत हस्ताक्षरकर्ता द्वारा हस्ताक्षर किए जाने चाहिए।

Complete response to Eol must be received at IPRC to the address given below, not later than date specified above. Response to Eol in the prescribed format as per the terms & conditions mentioned in Attachment-1 shall be submitted in a sealed cover super scribed with our Ref. No. and Due date for Eol. All the pages of the Eol submitted must be numbered and signed by the authorized signatory.

प्रेषिती/Addressee:

प्रधान, क्रय एवं भंडार/Head, Purchase & Stores,

इसरो नोदन कॉम्प्लेक्स, महेंद्रगिरि

ISRO Propulsion Complex, Mahendragiri,

तिरुनेलवेली, तमिल नाडु/Tirunelveli, Tamil Nadu – 627133, भारत/India

ईमेल द्वारा ई.ओ.आई. प्रस्तुत करना स्वीकार नहीं किया जाएगा। किसी भी प्रकार की देरी के कारण ई.ओ.आई. प्राप्त न होने के लिए आईपीआरसी जिम्मेदार नहीं होगा और निर्धारित समय के अंदर ई.ओ.आई. की सुपुर्दगी सुनिश्चित करना ठेकेदार की एकमात्र जिम्मेदारी होगी।

Submission of Eol by email will not be accepted. IPRC shall not be responsible for non-receipt of Eol due to any type of delays and it shall be the sole responsibility of the Vendor to ensure delivery of the Eol within the time fixed.

कृपया ध्यान दें कि ई.ओ.आई. पर प्रतिक्रिया प्रस्तुत करने की अंतिम तिथि बढ़ाने के किसी भी अनुरोध पर किसी भी परिस्थिति में विचार नहीं किया जाएगा।

Please note that any request for extension of last date for submission of response to Eol will not be entertained under any circumstance.

PROJECT SYNOPSIS FOR

Augmentation to Fluid system of Integrated Cryogenic Engine & stage test facility (ICET) for NGLV project

December 2024



ISRO Propulsion Complex
Indian Space Research Organization
Department of Space, Government of India
Mahendragiri 627133
Tirunelveli District, Tamil Nadu State, India



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Definitions

“Expression of Interest”	Expression of Interest (EOI) is this document specifying requirements of systems to be realized, scope of work involved, eligibility
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criteria/conditions for short-listing of Bidders and details of credentials to be submitted for evaluation.

- “Department” ISRO Propulsion Complex (IPRC) represented by Head, Purchase & Stores acting on behalf of the President of India.
- “Respondent” The Vendor participating in the Expression of Interest (EOI) either as a single party or as a lead party representing a prospective consortium.
- “Consortium” A group of Vendors constituted and lead by the respondent in response to this EOI and subsequent establishment process.
- “Bidder” The Respondent screened-in and shortlisted during evaluation process of EOI and participating in the subsequent Request for Proposal (RFP) process.
- “Contractor” The successful Bidder chosen by the Department, responsible & accountable to the Department for executing the works under the Contract and include legal personal representative(s)/successor(s)/assign(s) of the Contractor’s firm or company or the person(s) composing the Contractor’s firm or company.
- “Contract” The formal agreement signed by Department and Contractor for execution of work.
- “Site” The existing test facility at IPRC, Mahendragiri in which proposed work is to be executed.

1. **INTRODUCTION**

The ISRO Propulsion Complex (IPRC) of Indian Space Research Organization (ISRO) (hereinafter referred to as “Department”) has established “Integrated

Cryogenic Engine and stage Test facility (ICET)” at Mahendragiri in Tirunelveli District, Tamil Nadu state to carry out performance evaluation of Cryogenic propulsion system of ISRO’s launch vehicles using Liquid Hydrogen (LH2) + Liquid Oxygen (LOX) as propellants. The existing test facility mainly consists of Structural system, Cryogenic & Non-cryogenic fluid systems, Safety system and associated Instrumentation system. Towards conducting performance evaluation of Propulsion system of ISRO’s future launch vehicle viz. NGLV, using Liquid Methane (LCH4) + LOX as propellants, it’s intended to augment the both Cryogenic & Non-cryogenic fluid systems of this test facility.

The work package under this proposed augmentation comprises following major systems:

- Liquid Methane (LCH4) System
- Liquid Oxygen (LOX) System
- Liquid Nitrogen (LN2) System
- Gas systems consisting of Gaseous Methane (GCH4) System, Gaseous Hydrogen (GH2) System, Gaseous Nitrogen (GN2) System and Gaseous Helium (GHe) System
- Cooling Water System
- Associated Field Instrumentation System

This “Project Synopsis” document gives the overall scope of work and system description of the proposed package viz. “Augmentation to fluid system of ICET facility for NGLV project”. An Expression of Interest (EoI) is herein invited from respondents. The respondent shall submit the following documents:

- Expression of Interest as per the format given in **Attachment-2**
- Non-Disclosure Agreement (NDA) (to be executed on ₹ 100 stamp paper) as per the format given in **Attachment-3** to the effect of maintaining confidentiality of the documents to be provided in the Request For Proposal (RFP) by the Department.
- Consortium agreement (to be executed on ₹ 100 stamp paper) between/ among Prime contractor and Co-contractor(s), if applicable.
- Respondent’s profile to be filled up online in electronic form in the blank cells of the table under “Item specification– Respondent’s profile” as **Attachment-**

4 of the tender enquiry along with scanned copies of necessary supporting documentary evidence to be uploaded. (Do not leave any cell blank; Fill up as “Not applicable” if necessary.)

Based on the Respondent’s profile, the Department will evaluate their capability and shortlist the “Capable Bidders”. The Department, will organize a Pre-Qualification (PQ) meeting with the interested Respondents. The Department will issue the RFP document giving detailed technical specification, scope of work, commercial terms & conditions to the Capable Bidders. The Department will organize a pre-bid meeting with the Capable Bidders to facilitate proper understanding of the requirements. The Capable Bidders shall submit the bid in 2 parts viz (i) Techno-commercial (non-priced) bid and (ii) Price bid. Upon evaluation of Techno-commercial bid and post-bid techno-commercial meeting, if necessary, the Department will shortlist the “Suitable Bidders” and place them on equal footing. The Department will open the price bids of the Suitable Bidders, hold post-bid price negotiation meeting, if necessary, and award the Contract based on lowest-priced bid.

2. **SCOPE OF WORK**

2.1. **SCOPE OF DEPARTMENT**

Toward augmentation of ICET, the Department shall provide the following:

- Front-End Engineering Design (FEED) document comprising the following.
 - ✓ Process & Instrumentation Diagrams - P&IDs (along with RFP)
 - ✓ Major specification of materials and services (along with RFP)
 - ✓ Equipment Layout (along with RFP)
 - ✓ Process design basis (upon award of Contract)
 - ✓ Isometric of the existing piping circuits for interfacing with proposed augmentation (upon award of Contract)
- Review of Detail engineering
- Details of the existing process circuits required for finalizing the interface locations for the piping meant for proposed augmentation (upon award of contract)

- Details of interface elements to be realized by the Contractor viz Tanker interfaces, test article interfaces, etc (upon award of contract)
- Free issue of capacitance level sensors
- Existing systems planned to be augmented at ICET facility under this proposal will be brought to inert & safe condition and will be made available to the Contractor for onsite works
- Electricity and Water on chargeable basis during onsite works
- Process fluids for commissioning
- Foundations for new LOX tank, LCH₄ knock-out drum, GCH₄ cylinders & Water tanks
- Generation of procedures for pre commissioning and commissioning activities
- Commissioning of cryogenic circuits in 2 phases i.e. Initially with LN₂ followed by Performance Validation Trial Run (PVTR) with actual propellants viz. LCH₄ & LOX. For water and gas systems, the circuits shall be validated with requisite trials.

2.2. **SCOPE OF WORK BY CONTRACTOR**

The scope of work by the Contractor shall be as follows:

- Review of Process design basis done by the Department
- Hazards & Operability (HAZOP) Analysis
- Detail engineering comprising
 - Finalizing the interface locations in existing system, Layout for routing of piping, Preparation of isometric drawings
 - Thermo-structural analysis of tank & piping (cool-down, thermal compensation, flexibility, forces & moments on supports, etc); Pressure drop & temperature rise estimation; Flexibility analysis - especially for large sized piping, etc.
 - Quality Assurance Plan
 - Purchase specification of materials and services; Selection of sub-vendors

- Procurement of materials
- Shop fabrication and testing
- Transportation of materials to site
- Design & realization of Structural works as described in section 5.2.10
- Onsite erection/ construction
- Arranging Third-Party Inspection (TPI)
- Acceptance of Pre-commissioning and commissioning procedures generated by Department
- Pre-commissioning of systems viz. Leak check, Functional check of EP & Control valves, Response time check, etc.
- Participating in commissioning to demonstrate proper functioning of the augmented systems and carry out correction, if any, required to match the performance of the augmented systems with intended objectives
- Preparation of As-built drawings / isometrics

3. **GENERAL TERMS & CONDITIONS**

- 3.1. Execution period: The execution period reckoned from the date of award of Contract to the date of commissioning & final acceptance of the system shall be **21 months**. Time is the essence of the Contract. Any delay in execution beyond the stipulated period shall invoke Liquidated Damages (LD) to be imposed on the Contractor @ 0.5 % of the price of uncompleted portion (unsupplied materials or non-rendered services) per week of delay or part thereof subject to maximum of 10 % of the total Contract price.
- 3.2. Security Deposit: The Contractor shall submit a Security Deposit (SD) for a sum equal to 5% of the total Contract price while commencing the work.
- 3.3. Warranty: The systems shall be warranted for satisfactory performance for a period of 12 months from the date of final acceptance of the system. The Contractor shall submit a Performance Bank Guarantee (PBG) for a sum equal to 5% of the total Contract price.
- 3.4. Inspection: The pre-delivery inspection of materials bought-out from sub-vendors and onsite inspection of construction/ erection activities shall be performed by a

reputed Third-Party Inspection Agency (TPIA) such as Lloyds, TUV, Bureau Veritas, etc. The scope of inspection shall be as per Quality Assurance Plan (QAP) to be mutually agreed upon to skeletal level in the Contract and to fine level during detail engineering/ procurement. The Contractor shall arrange for and coordinate with the TPIA.

- 3.5. The bought-out materials shall be sourced from sub-vendors who are specified in RFP. In case the Vendor opted additional sub-vendors, same shall be mutually agreed upon based on the credentials of sub-vendors.

4. **PRE-QUALIFICATION CRITERIA (PQC)**

Based on the Bidder's profile to be submitted along with the EoI, the following shall be the Pre-Qualification Criteria (PQC) for screening-in the Capable Bidders so as to be provided with RFP document for participating in the bidding process further:

- 4.1. Mode of execution: The Contract is to be executed in either of the following modes:

Mode 1: A Sole / Prime Contractor who possesses financial soundness & prior experience as per section 4.3. and technical capability as per section 4.4. can execute the Contract.

Mode 2: A Prime Contractor who possesses financial soundness & prior experience as per section 4.3. only, can execute the Contract in consortium with other Co-Contractor(s) / Sub contractor(s) who possess(es) technical capability as per section 4.4. The Prime Contractor shall be responsible and directly accountable to the Department for complete fulfillment of the contractual obligations including those of the Co-Contractor(s) / Sub contractor(s). The Prime Contractor shall submit the EoI and fill up the Respondent's profile including those details on behalf of the Co-Contractor(s) / Sub contractor(s). The Prime Contractor and Co-Contractor(s) shall submit an agreement to the effect of working in consortium along with EoI. There shall not be any change of Co-Contractor(s) / Sub contractor(s) permitted during the subsequent phase of bidding and Contract execution, except under Force majeure circumstances.

- 4.2. The Respondent, whether the Sole contractor or Prime Contractor of a consortium, shall be a registered Indian company, owned by Resident Indian citizens and with a majority of the Board of Directors being Resident Indian citizens. The copies of certificate of Incorporation detailing the company details

and GST registration certificate shall be provided as proof for the same. However, the Co-Contractor shall be an Indian or a Foreign company.

- 4.3. Financial soundness & prior experience: The Contractor must comply with the following financial soundness and prior experience criteria. Escalation @ 7 % per year may be added on the annual turnover as well as price of previously completed works to arrive at the present value as on 31/03/2024.
- 4.3.1. The average annual financial turnover during last 3 years ending 31/03/2024 shall be at least ₹ 27 Crore.
- 4.3.2. The Company must have made profit in at least 2 years out of 3 years ending 31/03/2024 as per audited balance sheets. The copies of audited balance sheets shall be provided.
- 4.3.3. The price of works (including taxes) successfully completed involving Double walled vacuum insulated tank or vacuum insulated piping system or Cryogenic equipments, during last 10 years ending 30/11/2024, shall be as follows. The work completion/ final acceptance certificate issued by the client in favor of the Contractor must be dated between 01/12/2014 and 30/11/2024. The copies of Purchase Order (PO) & Work completion/ Final acceptance certificate shall be provided.
- a. 1 work of price not less than ₹ 54 Crore
 - b. 2 works with price of each work not less than ₹ 36 Crore
 - c. 3 works with price of each work not less than ₹ 27 Crore
- 4.4. Technical capability of Contractor: The quantum of works successfully completed by the Sole contractor or consortium of Prime Contractor & Co-Contractor(s) during last 10 years ending 30/11/2024 shall be as follows. The work completion/ final acceptance certificate issued by the client in favor of the Contractor must be dated between 01/12/2014 and 30/11/2024. The copies of PO & Work completion/ Final acceptance certificate shall be provided. In case of non-completion of projected project, the completion certificate of related work package (as per section 4.4.1 & 4.4.2, given below) may be submitted.
- 4.4.1. Design & fabrication of Double walled vacuum insulated tank of gross volume not less than 100 m³, Maximum Allowable Working Pressure (MAWP) of not less than 0.3 MPa(a) for LOX/ LN2/ LNG/ LH2/ LHe service. **AND**

- 4.4.2. Design, analysis, fabrication & erection of Super-Insulated (SI) piping of size not less than DN 250, Schedule 5S and total length of not less than 25 m. The Super Insulated Piping circuit shall include elements such as Bends, Flow components, etc.

5. **SYSTEM DESCRIPTION**

The description of existing systems of ICET facility and proposed augmentation in the present EoI are as follows:

5.1. **EXISTING SYSTEMS**

- 5.1.1. The ICET facility is established at IPRC, located in Kanyakumari – Madurai National Highway (NH7) near Kavalkinaru junction at a distance of 20 km northward from Kanyakumari.
- 5.1.2. The facility has test stand structure of twin bay configuration for testing engine and stage. The Structural & Mechanical System (SMS) mainly consists of Loading frames, Super structures, Flame deflector system, Material handling equipments, Working platforms in super structure, etc.
- 5.1.3. The Facility Fluid System (FFS) is divided into Propellant Fluid System (PFS) and Service Fluids System (SFS). The PFS consists of Liquid Hydrogen (LH2) & Liquid Oxygen (LOX) systems. The SFS consisting of Liquid Nitrogen (LN2) system, Gaseous Hydrogen (GH2) system, Gaseous Helium (GHe) system, Gaseous Nitrogen (GN2) system, Ejector system, De-Mineralized (DM) Water system and Cooling Water (CW) system provide the service requirements. Presently, these systems having Super-Insulated (SI) tanks, SI piping, Flow components, High pressure gas cylinders, Measurements, etc are established. The proposed augmentation is over and above these existing systems.
- 5.1.4. The Safety & Fire protection System (S&FS) comprises Detectors for monitoring H2 & O2 concentration, Water based Fire protection system, Fire alarms, etc.
- 5.1.5. The Instrumentation system consists of Control system, Measurement system, Data Acquisition system, Field Instrumentation such as pressure, temperature, level, etc.

5.2. **PROPOSED AUGMENTATION**

5.2.1. **LIQUID OXYGEN SYSTEM**

The LOX system has to cater to maximum LOX flow rate requirement of 380 kg/s at a pressure of 1.1 MPa to the test article for performance evaluation. Hence, it is planned to augment the system with a new SI tank of 125 m³ water capacity (WC) & Maximum Allowable Working Pressure (MAWP) of 2 MPa and a SI pipe circuit of DN 300 size & 3.7 MPa MAWP from the tank to the test bay. The SI piping circuit also consists of Cryogenic Flow components such as Electro-Pneumatic (EP) valves, Control valves, Filters, Manual valves, Safety relief valves, Burst discs, etc. Also, a new start-up SI tank of 15 m³ WC & 2.5 MPa MAWP is planned. The inner pipe of SI circuit also has fluid & surface temperature sensors at specific locations for monitoring cool-down & process operation. The LOX/ GO₂ disposal from the process circuits is done at the existing LOX disposal pit located at a distance of about 50 m from the run tanks at a lower elevation. The Process & Instrumentation Diagram (P&ID) of LOX system will be given along with RFP document. All necessary civil foundations for the equipment are under the scope of the Department.

5.2.2. **LIQUID METHANE (LCH₄) SYSTEM**

This system is to supply Liquid Methane (LCH₄) at a flow rate of 150 kg/s and the required pressure of 0.5 MPa at the inlet to the test article. The planned augmentation under this system is to extend a SI piping circuit of size DN 300 from one of the existing Liquid Hydrogen tanks of 250 m³ WC to the test bay. The existing tank has a boom assembly with level sensor/ temperature sensors. This interface along with the boom has to be suitably modified to provide a dip pipe of DN 300 size with vacuum jacket from the tank and the level/ temperature sensors are to be accordingly placed along with the dip pipe. The piping circuit further consists of Cryogenic Flow components such as Electro Pneumatic valves, Control valves, Filters, Manual valves, Safety relief valves, Burst discs, ejector system for run tank & start-up tank, etc. Also, a new start-up SI tank of 15 m³ WC and of 2.5 MPa, MAWP is planned. The inner pipe of SI piping circuit also has fluid & surface temperature sensors at specific locations for monitoring cool-down process/ operation. In the LCH₄ disposal circuit, a foam-insulated tank called 'Flash drum' of 30 m³ WC, 0.6 MPa, MAWP to separate the vapours to burn yard is also included. The Process & Instrumentation Diagram of LCH₄ system will be given along with RFP document. All necessary civil foundations for the equipment are under the scope of the Department.

5.2.3. **LIQUID NITROGEN (LN₂) SYSTEM**

The LN₂ system has to supply cold GN₂ for pre-cool down of both LOX & LCH₄ piping circuits of DN 300 size and the test article. Under the proposed augmentation, an SI piping circuit of DN 50 size & 3.7 MPa, MAWP is extended

from the existing LN2 system to the test bay. The circuit also consists of EP valves, Control valves, Safety relieving systems, Instrumentation, etc.

The jackets of above Cryogenic system piping (LCH4, LOX & LN2) shall possess vacuum measurement ports and evacuation ports at their outer pipes. The existing vacuum piping that ply nearby, is to be extended to these evacuation ports located at salient distances.

5.2.4. **GASEOUS METHANE SYSTEM**

Gaseous Methane (GCH4) is a new system to be realized and required for catering to the ignitor requirements in the test article. Towards this, 4 numbers of GCH4 cylinder quads each having 6 cylinders of 0.075 m³ WC each & 20 MPa working pressure are planned. Also, the piping circuit consists of flow components such as Pressure regulators, Valves, Filters, Safety relieving systems, etc. is to be realized.

5.2.5. **GASEOUS NITROGEN SYSTEM**

Gaseous Nitrogen is required for meeting the purge & command requirements of both test facility & test article. While most of the existing systems present will be utilized, the augmentation is required for, command gas supply for proposed EP & Control valves, purge requirements of LOX & LCH4 systems, pressurization requirements of new LOX tanks, purge requirements at test bay & in test article, etc. These circuits consist of Pressure regulators, Control valves, Safety relieving systems, Measurements, Valves, Filters, etc.

5.2.6. **GASEOUS HYDROGEN SYSTEM:**

Gaseous Hydrogen is required for pressurization of LCH4 tanks, GH2 supply to ignitors at burn yard. These circuits are to be extended from the existing GH2 withdrawal circuits from HP cylinders and required flow components viz. Pressure regulators, Control valves, Valves, etc. have to be incorporated in these circuits.

5.2.7. **GASEOUS HELIUM SYSTEM:**

Gaseous Helium is required for purge requirements of test article and commanding Test article valves. The augmentation is for realization of new purge circuit and command gas circuit with all necessary flow components, tapped off from the available GHe circuits.

5.2.8. **COOLING WATER SYSTEM:**

Water is used for cooling the plume of Engine during the hot fire testing at test bay. The augmentation includes supply of 2 nos. of water tanks of 25 m³ WC & 2.5 MPa, MAWP and realization of about 250 m length of DN500 piping circuit (of Carbon steel material) with associated flow components from these tanks to test bay.

5.2.9. **FIELD INSTRUMENTATION SYSTEM**

The field instruments such as Fluid temperature & Surface temperature sensors are to be provided in the inner pipeline at different locations. Similarly, the inner vessel of new tanks is to be provided with surface temperature sensors at discrete locations. Also, the new LOX & LCH₄ tanks have to be provided with sensor boom having Fluid temperatures & capacitance level sensors at discrete elevations as per P&IDs. The Contractor's scope is to procure and install these sensors in piping/ boom and connect cabling up to racks in Cable Terminal Room (CTR) including necessary junction boxes, etc.

5.2.10. **STRUCTURAL SYSTEM**

Two start-up tanks for LOX and LCH₄ are planned to be co-located on the test stand structure. Hence, extension of structure from the existing super structure for erection of these tanks is to be done. Also, the extension of working platform above the new LOX tank of 125 m³ WC from the existing platforms is to be carried out. The design of these structural works lies with the scope of Department and design output will be provided. Based on this, GADs & Fabrication drawings of structural platforms shall be generated and executed by the Contractor.

Also, the Lightning Protection System (LPS) is to be extended for the new LOX tank. In addition, all the structural works related to piping circuits, flow components in the circuits, etc. are to be done suitably as per site conditions.

5.2.11. **SAFETY & FIRE PROTECTION SYSTEM:**

The augmentation to Safety & Fire Protection system involves realization of Water deluge system involving CS piping circuits with flow components for new tanks under LOX & LCH₄ systems. Also, extension of water pipes with minor relocation of existing Water monitors at site is to be done.

Attachment-2

Company Letter head

No: _____

Date: _____

Head, Purchase & Stores,
Purchase & Stores Section,
ISRO Propulsion Complex,
Indian Space research Organization,
Department of Space, Government of India,
Mahendragiri 627133,
Tirunelveli District, Tamil Nadu state, India.

Sir/ Madam,

Sub: Submission of Expression of Interest

Ref: Your Tender enquiry No: _____

With respect to your Notice vide above-referred Tender enquiry, we hereby submit our Expression of Interest to participate in the Bidding for Augmentation to Fluid system of ICET facility for NGLV project. We attach the relevant documents requested in your Notice.

Thanking you,

Yours faithfully

(Signature of Authorized Signatory)

Name: _____

Designation: _____

Department: _____

NON- DISCLOSURE AGREEMENT

I / We, being _____
having our office at _____
_____ being interested to participate in the bidding for Augmentation to
Fluid system of ICET facility for NGLV project vide Tender Enquiry No.
_____ dated _____ by Govt. of India., Dept. of
Space, ISRO Propulsion Complex, Mahendragiri, Tamilnadu – 627 133 (hereinafter
referred to as IPRC), do hereby declare that:-

1. Any information submitted or given by IPRC to me/ us shall be treated by me/ us in strict confidence.
2. The term 'information' comprises of technical knowledge of any nature (documents, data, materials, process details and the like) whether patented or not.
3. I/ We understand and agree that the penalties detailed in the Indian Official Secrets Act, 1923 for breach of trust in maintain the confidentiality of the said technical knowledge shall be suffered not only by our Company/ Organization as body corporate, but also individually on its Chief Executive and me.
4. The provision of the Indian Official Secrets Act, 1923 (XIX of 1923) shall apply to me/ us with reference to exchange and use of information provided by IPRC to me/ us during the course of working for the project.
5. I/ We shall not make public any knowledge or information which IPRC shall have disclosed or may hereafter disclose to me/ us incident to the placing of any order on us.

Signed by _____ :

Name :

Designation:

Countersigned by:

Authorized signatory of Contract with name & address

// Company Seal //

Place:

Date:

Witness: 1. _____ 2. _____

RESPONDENT'S PROFILE

S No	Department's questionnaire	Respondent's reply
1.	Specify name of the Company.	
2.	Specify the Company's Postal address, Phone number (landline and mobile), Fax number, Email ID, Website & Contact person.	
3.	Specify type of the Company (whether Government or Public sector or Private sector).	
4.	Specify year of establishment of the Company.	
5.	Specify whether you are Indian-based company or Foreign company with office in India or Foreign company.	
6.	Specify annual financial turnover of the Company for the financial year ending 31/03/2022. Attach Annual Report, audited balance sheet and profit & loss account.	
7.	Specify annual financial turnover of the Company for the financial year ending 31/03/2023. Attach Annual Report, audited balance sheet and profit & loss account.	
8.	Specify annual financial turnover of the Company for the financial year ending 31/03/2024. Attach Annual Report, audited balance sheet and profit & loss account.	
9.	Specify profit/ loss of the Company for the financial year ending 31/03/2022. Attach Annual Report, audited balance sheet and profit & loss account	
10.	Specify profit/ loss of the Company for the financial year ending 31/03/2023. Attach Annual Report, audited balance sheet and profit & loss account	

S No	Department's questionnaire	Respondent's reply
11.	Specify profit/ loss of the Company for the financial year ending 31/03/2024. Attach Annual Report, audited balance sheet and profit & loss account	
12.	Specify the price of work # 1 successfully completed during last 10 years ending 30/11/2024. (Refer Section 4.3.3. of Project synopsis.) Attach copies of Work order/ Contract and Work completion/ Final acceptance certificate issued by the Client.	
13.	Specify the price of work # 2 successfully completed during last 10 years ending 30/11/2024. (Refer Section 4.3.3. of Project synopsis.) Attach copies of Work order/ Contract and Work completion/ Final acceptance certificate issued by the Client.	
14.	Specify the price of work # 3 successfully completed during last 10 years ending 30/11/2024. (Refer Section 4.3.3. of Project synopsis.) Attach copies of Work order/ Contract and Work completion/ Final acceptance certificate issued by the Client.	
15.	Specify the Type of insulation, Maximum gross volume and Maximum Allowable Working Pressure (MAWP) of Cryogenic tank involving design & fabrication under work # 1 successfully completed during last 10 years ending 30/11/2024. (Refer Section 4.4.1 of Project synopsis.) Specify whether the work is done by you (Respondent) or Co-contractor(s). Attach copies of Work order/ Contract and Work completion/ Final acceptance certificate issued by the Client.	

S No	Department's questionnaire	Respondent's reply
16.	Specify the maximum length of SI cryogenic piping of size more than or equal to DN 250 and wall thickness more than or equal to Sch 5S involving plant piping design, detail engineering, analysis, fabrication & erection under work # 1 successfully completed during last 10 years ending 30/11/2024. (Refer Section 4.4.2. of Project synopsis.) Specify whether the work is done by you (Bidder) or sub-contractor. Attach copies of Work order/ Contract and Work completion/ Final acceptance certificate issued by the Client.	
17.	Specify details of infrastructural facilities available with the bidder such as equipments, machineries, tools, test facilities, design & analysis software tools, etc.	
18.	Specify details of human resources viz technical staff in each field such as design & engineering, procurement, fabrication, construction, erection & commissioning. Attach organization chart.	
19.	Confirm whether the Expression of Interest (Eoi) is uploaded.	
20.	Confirm whether the Non-Disclosure Agreement (NDA) is uploaded.	
21.	Any other remark(s) that you wish to add?	