

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
ISRO INERTIAL SYSTEMS UNIT (IISU)
THIRUVANANTHAPURAM**

**Tender for Supply, installation and commissioning of Vacuum Spiral
Orbit Tribometer**

Bids to be submitted online

**Tender No.: IISU/PURCHASE UNIT IX (IISU PURCHASE)/IU202300653001 dated
30-04-2024**

A. Tender Details

Tender No : **IISU/PURCHASE UNIT IX (IISU PURCHASE)/IU202300653001**

Tender Date : **30-04-2024**

Tender Classification: **GOODS**

Purchase Entity : **PURCHASE UNIT IX (IISU PURCHASE)**

Centre : **ISRO INERTIAL SYSTEMS UNIT (IISU)**

Supply, installation and commissioning of Vacuum Spiral Orbit Tribometer

Supply, installation and commissioning of Vacuum Spiral Orbit Tribometer

A.1 Tender Schedule

Bid Submission Start Date : **01-05-2024 09:35**

Bid Clarification Due Date : **13-05-2024 11:00**

Bid Submission Due Date : **27-05-2024 14:00**

Bid Opening Date : **27-05-2024 16:00**

Price Bid Opening Date : **03-06-2024 11:00**

B. Tender Attachments

NA

Instructions To Vendors

1. Conditions for BIDDER FROM A COUNTRY WHICH SHARES LAND BORDER WITH INDIA

1. Any bidder from a country which shares a land border with India will be eligible to bid in this tender, only if the bidder is registered with the Competent Authority.

Competent Authority for the purpose of registration shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

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

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

2. PROFORMA FOR INSTRUCTIONS TO TENDERERS AND TERMS & CONDITIONS OF TENDER where the indent value is Rs. 2.00 lakhs & above for FOREIGN SUPPLY items

1. 10. Instructions / Operation Manual containing all assembly details including wiring diagrams should be sent wherever necessary in duplicate. All documents / correspondence should be in English language only.

2. 10. PORT OF ENTRY:

Thiruvananthapuram International Airport For Air Cargoes And Kochi Sea Port For Ocean Vessel Cargoes

3. 11. CONSIGNEE:

Purchase & Stores Officer(Stores), Composites Entity, Vikram Sarabhai Space Centre, Vattiyookavu, Thiruvananthapuram 695013.. Ph:04712569141

4. 11. The Purchaser reserves the right to accept or reject the lowest or any offer in whole or part without assigning any reason.

5. 12. It is expressly agreed that the acceptance of the Stores Contracted for is subject to final approval

in writing by the Purchaser.

6. 12. SHIPPING MARKS.

The mark on the shipping documents such as invoice, bill of lading and on the packages should be as follows:

PURCHASE ORDER NO.

DATED

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
VIKRAM SARABHAI SPACE CENTRE
COMPOSITES ENTITY

Destination: VATTIYOORKAVU, THIRUVANANTHAPURAM-695013

Port of Entry:

7. 13. a) Part shipment is not allowed unless specifically agreed to by us.

b) As far as possible stores should be despatched by Indian Flag Vessels / Air India through any Agency nominated by us.

8. 13. INSURANCE OF THE STORES:

The necessity or otherwise of insurance will be as indicated in the Purchase Order.

9. 14. CONTRACTOR'S DEFAULT LIABILITY:

14.1 The purchaser may upon written notice of default to the Contractor terminate the Contract in whole or in part in circumstances detailed hereunder:

a) If in the judgement of the Purchaser the Contractor fails to make delivery of Stores within the time specified in the Contract/agreement or within the period for which extension has been granted by the Purchaser to the Contractor.

b) If in the judgment of the Purchaser the Contractor fails to comply with any of the other provisions of this Contract.

10. 14. Inspection / Test Certificate should be provided for the goods after testing it thoroughly at the Contractor's works. If any Inspection by Lloyds or any other testing agency is considered necessary, it shall be arranged by Contractors.

11. 15. In the event the Purchaser terminates the Contract in whole or in part as provided in Clause 14 the Purchaser reserves the right to Purchase, upon such terms and in such a manner as he may deem appropriate, stores similar to that terminated and the Contractor shall be liable to the Purchaser for any

additional costs for such similar stores and/or for liquidated damages for delay as defined in Clause 19 until such reasonable time as may be required for the final supply of stores.

15.1 If this Contract is terminated as provided in Clause 14 the Purchaser in addition to any other rights provided in this Article, may require the Contractor to transfer title and deliver to the Purchaser under any of the following clauses in the manner and as directed by the Purchaser:

- a) Any completed stores.
- b) Such partially completed stores, drawing, information and Contract rights (hereinafter called manufacturing material) as the Contractor has specifically produced or acquired for the performance of the Contract as terminated. The Purchaser shall pay to the Contractor the Contract price for completed stores delivered to and accepted, by the purchaser and for manufacturing material delivered and accepted.

15.2 In the event the Purchaser does not terminate the Contract as provided in Clause 14, the Contractor shall continue the performance of the Contract in which case he shall be liable to the purchaser for liquidated damages for delay as set out in Clause 19 until the stores are accepted.

12. 15. Where erection or assembly or commissioning is a part of the Contract, it should be done immediately on notification. The Contractor shall be responsible for any loss/damage sustained due to delay in fulfilling this responsibility.

13. 16. For items having shelf life, those with maximum shelf life should be supplied if order is placed.

14. 16. REPLACEMENT:

If the stores or any portion thereof is damaged or lost during transit, the Purchaser shall give notice to the Contractor setting forth particulars of such stores damaged or lost during transit. The replacement of such stores shall be effected by the Contractor within a reasonable time to avoid unnecessary delay in the intended usage of the Stores. In case the purchaser agrees, the price towards replacement items shall be paid by the purchaser on the basis of original price quoted in the tender or as reasonably worked out from the tender.

15. 17. REJECTION :

In the event that any of the stores supplied by the Contractor is found defective in material or workmanship or otherwise not in conformity with the requirements of the Contract specifications, the purchaser shall either reject the stores or request the Contractor, in writing, to rectify the same. The Contractor, on receipt of such notification, shall either rectify or replace the defective stores free of cost to the purchaser. If the Contractor fails to do so, the purchaser may at his option either

- a) replace or rectify such defective stores and recover the extra cost so involved from the Contractor, or
- b) terminate the Contract for default as provided under clause 14 above, or
- c) acquire the defective stores at a reduced price considered equitable under the circumstances. The provision of this article shall not prejudice the Purchaser's rights under clause 19.

16. 18. EXTENSION OF TIME:

If the completion of supply of stores is delayed due to reason of force majeure such as acts of god, acts of public enemy, acts of Government, fires, floods, epidemics, quarantine restriction, strikes, freight embargoes, etc., the Contractor shall give notice within 15 days to the purchaser in writing of his claim for an extension of time. The purchaser on receipt of such notice after verification, if necessary, may agree to extend the Contract delivery date as may be reasonable but without prejudice to other terms and conditions of the Contract.

17. 19. DELAY IN COMPLETION / LIQUIDATED DAMAGES:

If the Contractor fails to deliver the stores within the time specified in the Contract or any extension thereof, the purchaser shall recover from the Contractor as liquidated damages a sum of one-half of one percent (0.5 percent) of the Contract price of the undelivered stores for each calendar week of delay. The total liquidated damages shall not exceed ten percent (10 percent) of the Contract price of the unit or units so delayed. Stores will be deemed to have been delivered only when all their component parts are also delivered. If certain components are not delivered in time, the stores will be considered as delayed until such time as the missing parts are delivered.

18. 1. Quotation/Open Authorization shall be submitted online [only] complying the specified schedule with technical specifications, including pamphlets and catalogues.

19. 20. GUARANTEE & REPLACEMENT:

- a) The Contractor shall guarantee that the stores supplied shall comply fully with the specifications laid down for material, workmanship and performance.
- b) For a period of twelve months after the acceptance of the stores, if any defects are discovered therein or any defects therein are found to have developed under proper use arising from faulty materials, design or workmanship, the Contractor shall remedy such defects at his own cost provided he is called upon to do so within a period of 14 months from the date of acceptance thereof by the Purchaser who shall state in writing in what respect the stores or any parts thereof are faulty.
- c) If in the opinion of the purchaser it becomes necessary to replace or renew any defective stores, such replacements or renewals shall be made by the Contractor free of all costs to the purchaser provided the notice informing the Contractor of the defect is given by the purchaser in this regard within the said period of 14 months from the date of acceptance thereof.
- d) Should the Contractor fail to rectify the defects, the purchaser shall have the right to reject or repair or replace at the cost of the Contractor the whole or any portion of the defective stores.
- e) The decision of the Purchaser, notwithstanding any prior approval or acceptance or inspection thereof on behalf of the purchaser, as to whether or not the stores supplied by the Contractor are defective or any defects has developed within the said period of 12 months or as to whether the nature of the defects requires renewal or replacement shall be final, conclusive and binding on the Contractor.
- f) To fulfill guarantee conditions outlined in Clause 20 (a) to (e) above, the Contractor shall, at the

option of the purchaser, furnish a Bank Guarantee (as prescribed by the purchaser - Bank Guarantee format enclosed) from a Bank approved by the purchaser for an amount equivalent to 3% of the value of the Contract along with first shipment documents. On the performance and completion of the Contract in all respects, the Bank Guarantee will be returned to the Contractor without any interest.

g) All the replacement stores shall also be guaranteed for a period of 12 months from the date of arrival of stores at purchaser's site.

h) Even while the 12 months guarantee applies to all stores, in case where a greater period is called for by our specifications, then such a specification shall apply, and in such cases, the period of 14 months referred to in Clause 20 (b) and (c) shall be asked for guarantee period plus two months.

20. 21. REQUIREMENT OF ADDITIONAL NUMBERS OF THE STORES/SPARE PARTS ORDERED:

The Contractor shall also undertake the supply of additional number of items covered by the order as considered necessary by the purchaser at a later date, the actual price to be paid shall be mutually agreed to after negotiations.

21. 22. PACKING:

a) The Contractor wherever applicable shall pack and crate all stores for sea / air shipment as applicable in a manner suitable for export to a tropical humid climate, in accordance with internationally accepted export practices and in such a manner so as to protect it from damage and deterioration in transit by road, rail or sea for space qualified stores. The Contractors shall be held responsible for all damages due to improper packing.

b) The Contractor shall ensure that each box / unit of shipment is legible and properly marked for correct identification. The failure to comply with this requirement shall make the Contractor liable for additional expenses involved.

c) The Contractor shall notify the purchaser of the date of shipment from the port of embarkation as well as the expected date of arrival of such shipment at the designated port of arrival.

d) The Contractor shall give complete shipment information concerning the weight, size, content of each packages, etc.

e) Transshipment of equipment shall not be permitted except with the written permission of the purchaser.

f) Apart from the despatch documents negotiated through Bank, the following documents shall also be airmailed to the purchaser within 7 days from the date of shipment by sea and within 3 days in case of air-consignments:

a) Commercial Bill of Lading / Air Way Bill / Post parcel Receipt. (Two Non-negotiable copies)

b) Invoice (3 copies)

c) Packing List (3 copies)

d) Test Certificate (3 copies)

e) Certificate of Origin.

The Contractor shall also ensure that one copy of the packing list is enclosed in each case.

22. 23. ARBITRATION:

If at any time any question, dispute or difference whatsoever shall arise between the purchaser and the Contractor upon or in connection with this Contract, either party may forthwith give to the other notice in writing of the existence of such question, dispute or difference and the same shall be referred to the adjudication of two arbitrators, one to be nominated by purchaser, other by a Contractor and in the event of any difference of opinion, the arbitrators will refer the matter to the umpire. The arbitration shall be conducted in accordance with the rules and procedure for arbitration of the International Chamber of Commerce at Paris. The expenses of the arbitrators and umpire shall be paid as may be determined by them. However, the venue of such arbitration should be in India.

23. 24. LANGUAGE AND MEASURES:

All documents pertaining to the Contract including specification, schedule, notice, correspondence, operating and maintenance instructions, drawings or any other writings shall be written in English language. The metric system of measurement shall be used exclusively in the Contract.

24. 25. INDEMNITY:

The Contractor shall warrant and be deemed to have warranted that all Stores supplied against this Contract are free and clean of infringement of any patent, copyright or trade mark and shall at all times indemnify the purchaser against all claims which may be made in respect of stores for infringement of any right protected by Patent, Registration of design or Trade Mark, and shall take all risk of accident or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for the sufficiency of all the means used by him for the fulfillment of the Contract.

25. 26. COUNTER TERMS AND CONDITIONS OF SUPPLIERS:

Where counter terms and conditions/printed or cyclostyled conditions have been offered by the supplier, the same shall not be deemed to have been accepted by the purchaser unless specific written acceptance thereof is obtained.

26. 27. SECURITY INTEREST:

On each item to be delivered under this Contract, including an item of work in progress in respect of which payments have been made in accordance with the terms of the Contract, purchaser shall have a security interest in such items which shall be deemed to be released only at the time when the applicable deliverable item is finally accepted and delivered to the purchaser in accordance with the terms of the Contract. Such security interest of the purchaser shall constitute a prior charge as against any other charge or interest created in respect of such items by any entity.

27. 28. BANK CHARGES:

While the purchaser shall bear the bank charge payable to his Bankers (State Bank of India), the Contractor shall bear the Bank charges payable to his Bankers including the cheques towards advising

amendment commissions.

28. 29. TRAINING:

The Contractor shall, if required by the purchaser, provide facilities for the practical training of Purchaser's engineering / technical personnel from India and for their active association on the manufacturing processes throughout the manufacturing period of the Contract / stores, number of such personnel to be mutually agreed upon.

29. 2. A Proforma Invoice may also be given which should contain the following Information:

- a) The FOB/FCA value, the C & F value for import by Sea freight / Air freight up to and for air parcel post up to Trivandrum should be separately indicated.
- b) Agency Commission: The amount of commission included in the price and Payable to the Indian Agent of the Contractor shall be paid directly to the Indian Agent by the Purchaser in equivalent Indian Rupees on the basis of an Invoice from him applying T.T. buying rate of exchange ruling on the date of placement of the Purchase Order and which shall not be subject to any further exchange variations. This payment will be released to the Indian Agent immediately after Customs clearance of the goods in India.
- c) The Contractor shall invoice only for the net amount payable to him, after deducting the amount of Agency Commission included in the invoice which will be paid to the Indian Agent directly by the Purchaser. However, the Contractor's invoice should separately reflect the amount of commission payable to his Indian Agent.
- d) The earliest delivery period and country of origin of the Stores.
- e) Banker's name, address, telephone/fax Nos. & e-Mail ID of the Contractor.
- f) The approximate net and gross weight and dimensions of packages / cases.
- g) Recommended spares for satisfactory operation for a minimum period of one year.
- h) Details of any technical service, if required for erection, assembly, commissioning and demonstration.

30. 2. PRICES:

Tenders offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotations with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variations.

31. 30. APPLICABLE LAW:

The Contract shall be interpreted, construed and governed by the laws of India.

32. 3. TERMS OF PAYMENT:

3.1 Being a Department of the Government of India, the normal terms of payment are by Sight Draft. However other terms of payment like establishment of Letter of Credit may be considered by the Purchaser on such terms and conditions as may be agreed upon.

3.2 The Sight Draft / Letter of Credit will be operative on presentation of the undermentioned documents:

- a) Original Bill of Lading / Airway Bill
- b) Commercially certified invoices describing the stores delivered, quantity, unit rate and their total value, in triplicate. The invoice should indicate the discounts, if any, and Agency Commission separately.
- c) Packing List showing individual dimensions and weight of packages.
- d) Country of Origin Certificate in duplicate.
- e) Test Certificate.
- f) Declaration by the Seller that the contents in each case are not less than those entered in the invoices and the quality of the Stores are guaranteed as per the specifications asked for by the Purchaser.
- g) Warrantee and guarantee Certificate/s vide Clause 20 hereinbelow

33. 3. The FOB/FCA and C & F prices quoted should be inclusive of all taxes, levies, duties arising in the tenderer's country.

34. 4. IMPORTANT LICENCE:

Reference to Import License No. & date and Contract number & date shall be prominently indicated in all the documents vide para 3.2

35. 4. The offer should be valid for a minimum period of 90 days (Single Part Tender) / 180 days (Two Part Tender) from the due date of opening of the tender.

36. 5. DEMURRAGE:

Supplier shall bear demurrage charges, if any, incurred by the purchaser due to delayed presentation of shipping documents as prescribed in para 3.2 to the bankers within a reasonable time (say within 10-12 days) from the date of bill of lading for sea consignments and within 3-4 days from the date of Air Way Bill for air consignments.

37. 5. Samples, if called for, should be sent free of all charges.

38. 6. ADDRESS OF INDIAN AGENTS:

39. 6. Late and delayed tenders will not be considered. Quotations by cable must be followed by detailed offers.

40. 7. GUARANTEED TIME DELIVERY:

The time for and the date of delivery stipulated in the Purchase Order shall be deemed to be the essence of the Contract. Delivery must be completed within the date specified therein.

41. 7. Offers made by Indian Agents on behalf of their Principals, should be supported by the proforma invoice of their Principals.

42. 8. INSPECTION AND ACCEPTANCE TEST:

8.1 The Purchaser's representatives shall also be entitled at all reasonable times during manufacture to inspect, examine and test on the Contractor's premises the material and workmanship of all stores to be supplied under this Contract and if part of the said stores is being manufactured on other premises, the Contractor shall obtain for the purchaser's representative permission to inspect, examine and test as if the equipment were being manufactured on the Contractor's premises. Such inspection, examination and testing shall not release the Contractor from the obligations under this Contract.

8.2 For tests on the premises of the Contractor or of any of his sub-Contractors, the Contractor shall provide free of cost assistance, labour, material, electricity, fuel and instruments as may be required or as may be reasonably needed by the purchaser's representative to carry out the tests efficiently.

8.3 When the stores have passed the specified test, the purchaser's representative shall furnish a certificate to the effect in writing to the Contractor. The Contractor shall provide copies of the test/s certificates to the purchaser as may be required.

43. 8. The details of Import Licence will be furnished in the Purchase Order.

44. 9. MODE OF DESPATCH:

Generally, stores should be despatched through Indian Flagged Vessel / Air India or through any other Agency nominated by the purchaser. A copy of the invoice and packing list should invariably be kept inside each of the packages.

45. 9. The authority of person signing the tender, if called for, shall be produced.

46. DEPARTMENT OF SPACE

VIKRAM SARABHAI SPACE CENTRE
CMSE, VATTIYOORKAVU P.O.,
THIRUVANANTHAPURAM- 695 013

47. FORM 22 FOR FOREIGN CASE

48. II. TERMS AND CONDITIONS

1. DEFINITIONS:

(a) The term 'Purchaser' shall mean the President of India or his successors or assignees.

(b) The term 'Contractor' shall mean, the person, firm or company with whom or with which the order for the supply of stores is placed and shall be deemed to include the Contractor's Successors, representatives, heirs, executors and administrators unless excluded by the Contract.

(c) The term 'Purchase Order' shall mean the communication signed on behalf of the Purchaser by an officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and

conditions mentioned or referred to in the said communication accepting the Tender or offer of the Contractor for supply of stores of plant, machinery or equipment of part thereof.

(d) The term 'Stores' shall mean what the Contractor agrees to supply under the Contract as specified in the Purchase Order.

3. PPP Make in India(Non- Divisible Items-All Classes of Suppliers)

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

2. a) The subject item falls under Non-divisible category. b) The offers are sought from all classes of suppliers.

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

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

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

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

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

8. 'L1' means the lowest technically accepted tender / bid / quotation (i.e. lowest landed cost including duties, taxes and freight & Insurance).
9. 'Local content' means the amount of value added in India (i.e. indigenous items/services added in the offered products/ services/ works) be the total value of the item offered (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties/IGST) as a proportion of the total value (excluding net domestic indirect taxes), in percent.
10. 'Margin of purchase preference' means the maximum extent to which the price quoted by the "Class-I local supplier" above the L1 (landed cost).
11. Purchase Preference Policy:- Goods/Works which are not divisible (ie., required quantity is 1 or as a package) and Services:
- If L1 is from a 'Class-I local supplier', the contract will be awarded to L1 bidder.
 - If L1 is not from a 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price subject to local supplier's quoted price falling within the margin of purchase preference (i.e. 20%) and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price (inclusive of duties, taxes and freight & insurance).
 - In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on, and order/contract shall be awarded accordingly. In case where none of the 'Class-I local supplier' within the margin of purchase preference agree to match the L1 price, then the order/contract shall be awarded to the original L1 Bidder.
12. The 'Class-I & II local supplier' should provide a "Self Certification" along with technical offer indicating that the item offered meets the minimum local content [as per Sl. No.(3)] as called for in the tender and provide the percentage of local content along with details of the location(s) at which the local value addition is made. In case of two bid tenders, it is mandatory to indicate compliance to MLC(minimum Local Content) in technical bid zone.
13. The ink-signed certificate shall be provided on vendors letter head along with the offer (in case of online tender, copy of ink-signed certificate shall be uploaded along with your offer under concerned tab. Original in Hard copy shall be produced on request). In case of non-submission of certificate, the purchase preference shall not apply.
14. The margin of Purchase Preference shall be up to 20%.
15. The Public Procurement (Preference to Make in India), Order 2017 issued by Govt. of India indicates that if there are any general or specific restrictive clauses to restrict participation of Indian companies in those countries procurement tenders, reciprocity clause need to be invoked as per the order. Hence, if ISRO or Govt. of India come across that Indian suppliers of an item are not allowed to

participate and / or compete in procurement by your government, the bid submitted by you will be not be considered and excluded from eligibility for procurement. Please note this point.

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

C. Bid Templates

C.1 Technical Bid - Supply, installation and commissioning of Vacuum Spiral Orbit Tribometer

1. Vacuum tribometer- Supply, installation and commissioning of Vacuum Spiral Orbit tribometer

Item specifications for Vacuum tribometer

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Vacuum Tribometer	a) Shall be able to operate in rotational mode under high vacuum and thermal environments ; b) The tribometer should be compact, robust, made of high-quality parts and materials. System shall fully confirm to the following test standards:ASTM F 2661, ASTM G99, DIN EN 1071DIN ISO 7148, ISO 20808; c) The tribometer shall be capable of evaluation of rolling and sliding friction and wear characteristics of lubricants, materials, and greases under varying thermo-vacuum conditions	Yes / No / Explain		
2	Prior history of installation	The party should have minimum one installation of spiral orbit tribometer in reputed international/national laboratories and details of installation including contact email/telephone number of the user shall be provided.	Yes / No / Explain		

3	Mounting	The entire unit shall be floor mounted, standalone unit with shock absorbing, vibration damping feet	Yes / No / Explain		
4	Tribology functionality modules	Rotary drive (Rotational Mode) with a) Ball on disc adapter; b) Pin on disc adapter; c) Spiral orbit Tribometer	Yes / No / Explain		
5	Vacuum level	From 10 ⁻⁶ mbar vacuum to 1 atm with option for chamber backfilling with different gases (nitrogen/argon etc.)	Yes / No / Explain		
6	Test Configuration	The two specimens (lower and upper) are installed within test chamber. Lower specimen is rotated and upper specimen (stationary) is pressed against the lower specimen with a controlled normal load. Friction force and torque are measured at the upper specimen and the tests shall be conducted in the range of pressure and temperature specified.	Yes / No / Explain		
7	Test Load	a) Test load range: 2 to 2000N.; b) Maximum normal load: 2000 N or higher; c) Accuracy: 0.05% of the full-scale range or better; d) Resolution: ≤ 0.1N; e) In case different load cells are being offered to cover the load range, range, accuracy and resolution of each load cell shall be separately mentioned in the technical offer; f) Loading method: Servo controlled electromechanical gear spring system or similar systems	Yes / No / Explain		

8	Test duration	Minimum of 1 min to a maximum of 1000 hour (or more) with resolution \leq 1millisec and accuracy of $>$ 99%	Yes / No / Explain		
9	Motor	a) Shall be capable of rotating in both directions (CW and CCW), b) Maximum disc dimension to be driven by the motor - \varnothing 100 mm or higher; c) Disc rotation speed range: 1 rpm (or less) to 2000 rpm or better with speed resolution \leq 0.01 rpm; d) Angular resolution: 0.01 degrees or better	Yes / No / Explain		
10	Spiral Orbit Specimen Holder Set	a)The system shall include a specimen holder set to evaluate the lifetime of fluid lubricants under vacuum conditions as per ASTM F 2661-07; b) The party shall offer full accessories for performing spiral orbit tribometer tests including adapters, sensors and test specimens; c)The following accessories shall be supplied: Discs \varnothing 50.8 x 10 mm - Qty: 10 Nos., Guide plates \varnothing 12.5 mm x 6 mm - Qty: 10 Nos, Steel balls \varnothing 12.7 mm - Qty: 200 Nos	Yes / No / Explain		
11	Temperature control	a)Resistance heating elements or circulation system to allow for precise and homogeneous sample temperature control from - 20 °C to +200 °C or better; b) Heating power/Cooling power - 300 W or better	Yes / No / Explain		

12	Calibration of the equipment	Following parameters shall be calibrated after system installation at our site and service personnel should also perform re-calibration at site as part of periodic maintenance of the system. a) Normal load calibration; b) Tangential force calibration; c) Rotational speed calibration, d) Radial movement calibration, e) Axial movement calibration	Yes / No / Explain		
13	Temperature and humidity measurements	In-built humidity and temperature sensor shall be integrated with the software. Temperature sensor shall monitor the specimen temperature and humidity sensor shall monitor the humidity levels within the test chamber. a) Temperature sensor range: -20 °C to +200 °C or better; b) Temperature sensor resolution: 0.01 °C or better; c) Temperature sensor repeatability: ±0.1 °C or better; d) Temperature sensor accuracy: ±0.2 °C or better; e) Humidity sensor range: 0 to 100 %RH; f) Humidity sensor resolution: 0.1 %RH or better; g) Humidity sensor repeatability: ±0.1 % RH	Yes / No / Explain		
14	Radial motion Stage Specifications	Radial movement shall have an eccentricity drive a) Maximum speed 5 mm/s or higher; b) Range shall be min. 0 to 40 mm with a resolution 0.01 mm or better	Yes / No / Explain		

15	Software and control system	<p>The Tribometer operation and data display software shall have following features: a) Continuous real time data acquisition of friction signal during measurement; b) High resolution spatially and time-resolved position and friction signal analysis shall be displayed with at least 1000 data points per period. Also, X-Y-Plots of all recorded parameters shall be available. c) The data shall be possible to export to .xlsx, .csv, .txt formats and the charts to .bmp, .jpg, .pdf formats. d) Windows 11 compatibility e) Adjustable acquisition frequency in Hz; f) Option for averaging acquired parameters with different time intervals ranging from 1 ms to 1 s; g) Automatic report generation for a set of measurements; h)First lap synchronization: Each test can be started at the same position of the circle</p>	Yes / No / Explain		
----	-----------------------------	---	--------------------	--	--

16	Measurement parameters	<p>a) Standard data acquisition channels with sampling rates from 1Hz to 1kHz: i) Normal force/Applied force measured within the test load unit; ii) Friction force; iii) Friction torque; iv) Measurement of radial displacement; v) Measurement of rotational speed of the rotation drive; vi) Measurement of pressure within the test chamber; vii) Temperature at lower specimen (reference temperature for the temperature controller); viii) Test chamber temperature; ix) Additional temperature sensor::</p> <p>b) High speed channels with sample rates from 1kHz to 100kHz: i) Friction force; ii) Friction torque; iii) Angular Position</p>	Yes / No / Explain		
17	Friction force and torque	<p>a) Separate sensors shall be used for normal load and friction force measurements; b) Max. measurable friction force : 400 N or higher; c) Max. measurable friction torque: 40 Nm or higher; d) accuracy/Resolution of the friction force/torque: 0.5% of the measured value or better</p>	Yes / No / Explain		

18	Data acquisition and processing system	<p>Processor : Intel Core i7, 13th Generation or better; Processor Speed : Quad core or higher, Min. 3.2Ghz or higher; L3 Cache: 12 MB or More; Memory: Min. 8GB DDR4/3200MHz - SDRAM, Expandable to 64GB or more; Graphics Subsystem : Nvidia make with min. 2 GB dedicated graphics memory; Hard Disk Drive: 300 GB or higher NVMe M2 Solid State Drive, 1 TB 3.5" SATA (7200RPM or higher); Ports : Integrated USB Type A 3.0/3.1, Type C 3.1, Display Port 1.4, HDMI Port 1.4; Network Interface : Integrated 1000 Mbps Ethernet with RJ-45 connect; Monitor: OEM min 23" LCD/LED Monitor; Operating System : Licensed Windows 11 Professional Edition (64 Bit) with Recovery CD or Recovery Mechanism; Other: a) PC should be compatible with the Software to be supplied along with the equipment; b) Licensed Microsoft Office package shall be installed in the system; c) The Backups for OS software and other major software including the tribometer software shall be provided as separate discs/ thumb drives</p>	Yes / No / Explain		
----	--	---	--------------------	--	--

19	Electronics	a) The electronic circuitry should be built using high quality electronics and should be coated with suitable coatings to protect it from condensed water and coastal climate; b) The electronic circuitry must have adequate cooling.	Yes / No / Explain		
----	-------------	--	--------------------	--	--

20	Vacuum chamber	<p>a) Chamber material shall be of High quality vacuum compatible, non-magnetic, non-corrosive material welded with sheet thickness of 20mm or more). The party shall provide the chamber dimensions; b) Rings /gasket should be suitable to the thermo-vacuum environments. O rings /gasket should be from reputed manufacturers (Preferable material: Viton) for high vacuum sealing. The location of O rings in the test system shall be mentioned clearly in the schematic drawing to be attached with technical offer; c) Inside the vacuum chamber there should not be any outgassing material, which will affect the vacuum performance and cause contamination over continuous operation; e) The chamber design should be capable of maintaining pressure $< 5 \times 10^{-7}$ mbar; f) View port of 150 mm diameter or larger made of Quartz with direct view of testing shall be provided on the door; g) The chamber door shall be configured and designed taking into account of easy accessibility of all the internal systems (specimens, test modules, sensors) for operation; h) Chamber door shall be of double hinge type (to ensure uniform compression</p>	Yes / No / Explain		
----	----------------	--	--------------------	--	--

		<p>on the O ring) with locking mechanism; i) Chamber should be leak tested through MSLD for leak rates better than 1×10^{-9} mbar l / s (Helium) and test certificates shall be supplied along with the item; j) Ports shall be available for vacuum pumps, gauges, other essential items for connecting the vacuum pumps(roughing pump and turbo-molecular pump) at the time of installation.</p>			
--	--	--	--	--	--

21	Vacuum Pumps	<p>The party shall supply the suitable vacuum pumps required for achieving the vacuum levels specified with the following min. specification: a) Roughing pump: Displacement >15 m³/hr; Peak pumping speed >14 m³/hr; Ultimate vacuum < 0.01 mbar; Leak tightness < 1 x 10⁻⁶ mbar l/s; Max. continuous inlet pressure: 200 mbar or lower; Voltage/Frequency: 230V/50Hz; Preferred makes: Pfeiffer, Edwards:: b) Turbo-molecular pump: Ultimate pressure: 10⁻⁶ Pa or better; Pumping speed (Air/N₂): >260 l/s; Compression ratio (Air/N₂) >1x10⁹; Critical backing pressure: 1500 Pa; Max. allowable continuous backing pressure (Air/N₂): 100 Pa; Voltage/Frequency : 230V/50Hz; Preferred makes :Pfeiffer, Edwards::Suitable controller shall also be supplied with the pump</p>	Yes / No / Explain		
22	Any other details/ requirement	Any other accessories apart from the mandatory accessories and systems mentioned above may be quoted separately under optional accessories.	Yes / No / Explain		
23	Power supply	The equipment shall be either single phase 240V, 50Hz or 3 phase 400 V, 50 Hz	Yes / No / Explain		

24	Safety provisions	<p>a) Automated cut-off values for test parameters (friction force, friction torque and temperature) shall be provided to enable stoppage of tests; b) System shall have built-in safety features to stop tests in case of any mechanical /electrical malfunction and an audible alarm shall be provided c) System shall be provided with light indicators at top for indicating state of operation.</p>	Yes / No / Explain		
25	Pre-dispatch Inspection (PDI), Training and Acceptance criteria / Performance specifications	<p>a) Pre-dispatch Inspection (PDI) will be carried out at the Manufactures site/supplier's site before dispatch; b) Training must be given to IISU Personnel during Pre-dispatch Inspection (PDI); c) During Pre-dispatch Inspection (PDI), Operation, maintenance and Trouble shooting of the system shall be demonstrated; d) The system shall be leak tested to the required level; e) Base pressure $<5 \times 10^{-2}$ mbar to be demonstrated with dry Pump; f) High vacuum $<1 \times 10^{-6}$ mbar to be demonstrated with Turbo Molecular Pump; g) Spiral orbit tribometer function and Rotary module function should be demonstrated with standard samples in dry and lubricated conditions. Tests shall be performed on user supplied specimens (balls, discs and lubricants).</p>	Yes / No / Explain		

26	Installation and commissioning	<p>a) Installation and commissioning of the equipment along with all utilities and Instrumentation is to be carried out at ISRO Inertial System Unit (IISU); b) Acceptance criteria / Performance specifications must be met during installation and commissioning at IISU; c) The manufacturer shall have an Indian authorized Agent (responsible for installation, commissioning, and servicing of the equipment) and the latest certificate to that effect should be submitted along with technical offer; d) Party shall provide the pre-installation requirements (if any) to user before the delivery of the equipment; e) Party / their Indian agent should quote and supply all the necessary accessories/ spares and consumables required to install and commission so that the equipment is received under ready to commission state; f) Party/ Indian agent shall install and commission the equipment within 3 weeks of delivery of the equipment. Installation, Method development, calibration and troubleshooting etc., wherever applicable, is in the scope of the vendor.</p>	Yes / No / Explain		
----	--------------------------------	--	--------------------	--	--

27	Operator training	Any expert from OEM and/or any OEM Certified Trained expert to provide training for all the mentioned ASTM, DIN and ISO methods along with user defined methods at site till demonstration of performance of the system is completed at the satisfaction of the user by conducting appropriate test runs, to at least 3 number of IISU personnel. The training shall be for duration of minimum 3 days.	Yes / No / Explain		
28	Documentation /Manual	Two sets of instruction manuals (hard copy and soft copy) for operation, maintenance of the system, Trouble shooting , service manual, spare list, part lists, mechanical drawings and air, water and electrical diagrams (English) to be provided along with system.	Yes / No / Explain		

29	Warranty	<p>a) Warranty of all the total system is to be provided for THREE YEARS from the date of installation (including the software i.e. the equipment should have 3-year warranty for maintenance, upgrade in software and complete replacement for any component/unit against any manufacturing/operational defects, issue in software). Warranty and Test certificates for all the components including accessories like pumps, gauges from OEMs to be provided. OEM certificate should be attached from the manufacturer; b)The 3 year warranty/guarantee term will start from date of completion of commissioning of equipment at the IISU site. c) The Factory Acceptance may be done at the vendor's site but the Final Acceptance Test run should be conducted at our site after commissioning during which the party will demonstrate all the applications given in the specification. d) All the items included in the main equipment should be mentioned clearly with part numbers and prices shall be specified for each item; e) The party has to demonstrate all the features as per scope of work, they claim and mentioned in specification and</p>	Yes / No / Explain		
----	----------	--	--------------------	--	--

		compliance.; f) Party should provide new software free of cost within warranty period if there is any new development / upgrades by the manufacturer.			
30	AMC/Maintenance	a) Party shall provide separately quote for the AMC support for a period of 2 years beyond the warranty period.; b) Scope of AMC should cover the servicing and maintenance of all the subsystem including original equipment manufacturers (OEM) as a turnkey basis. c) Vendor shall commit to provide service support and spare/ consumables for a period of not less than 10 years and this shall be explicitly mentioned in the technical offer. d) This system is required to function with highest up time hence minimum down time preferred would be less than 96 hours from the date of intimation.	Yes / No / Explain		
31	Price bid cost break up	Sub system wise cost break up details should be provided for all components	Yes / No / Explain		
32	Equipment layout	Equipment layout, drawings with actual dimensions, utilities etc. shall be provided to customer	Yes / No / Explain		
33	Compliance Statement	All technical compliance shall be supported by technical leaflet or statement from manufacturer. Any blank left shall be taken as non compliance.	Yes / No / Explain		

34	Realization time frame	Total time frame for the realization of the item at IISU site shall be provided.	Yes / No / Explain		
35	User list with contacts	User list (with contacts email address, phone number and full address) of the offered system shall be provided with the offer.	Yes / No / Explain		
36	General Terms and conditions	a) The models quoted by the party shall be latest, upgradable and remain in the suppliers marketing range.; b) The model quoted shall not become obsolete for the next five years minimum.; c) IISU shall be kept informed well in advance in case the equipment is being phased out/modified/or there is a software upgrade.	Yes / No / Explain		

Document : Compliance table

Document : specification

Common Specifications (Applicable for all items)

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Item	Supply, installation and commissioning of Vacuum Spiral Orbit tribometer	Yes / No / Explain		

2	Vacuum Tribometer	a) Shall be able to operate in rotational mode under high vacuum and thermal environments ; b) The tribometer should be compact, robust, made of high-quality parts and materials. System shall fully confirm to the following test standards:ASTM F 2661, ASTM G99, DIN EN 1071DIN ISO 7148, ISO 20808; c) The tribometer shall be capable of evaluation of rolling and sliding friction and wear characteristics of lubricants, materials, and greases under varying thermo-vacuum conditions	Yes / No / Explain		
3	Prior history of installation	The party should have minimum one installation of spiral orbit tribometer in reputed international/national laboratories and details of installation including contact email/telephone number of the user shall be provided.	Yes / No / Explain		
4	Mounting	The entire unit shall be floor mounted, standalone unit with shock absorbing, vibration damping feet	Yes / No / Explain		
5	Tribology functionality modules	Rotary drive (Rotational Mode) with a) Ball on disc adapter; b) Pin on disc adapter; c) Spiral orbit Tribometer	Yes / No / Explain		
6	Vacuum level	From 10 ⁻⁶ mbar vacuum to 1 atm with option for chamber backfilling with different gases (nitrogen/argon etc.)	Yes / No / Explain		

7	Test Configuration	The two specimens (lower and upper) are installed within test chamber. Lower specimen is rotated and upper specimen (stationary) is pressed against the lower specimen with a controlled normal load. Friction force and torque are measured at the upper specimen and the tests shall be conducted in the range of pressure and temperature specified.	Yes / No / Explain		
8	Test Load	a) Test load range: 2 to 2000N.; b) Maximum normal load: 2000 N or higher; c) Accuracy: 0.05% of the full-scale range or better; d) Resolution: $\leq 0.1\text{N}$; e) In case different load cells are being offered to cover the load range, range, accuracy and resolution of each load cell shall be separately mentioned in the technical offer; f) Loading method: Servo controlled electromechanical gear spring system or similar systems	Yes / No / Explain		
9	Test duration	Minimum of 1 min to a maximum of 1000 hour (or more) with resolution $\leq 1\text{millisec}$ and accuracy of $> 99\%$	Yes / No / Explain		
10	Motor	a) Shall be capable of rotating in both directions (CW and CCW), b) Maximum disc dimension to be driven by the motor - $\text{Ø}100\text{ mm}$ or higher; c) Disc rotation speed range: 1 rpm (or less) to 2000 rpm or better with speed resolution $\leq 0.01\text{ rpm}$; d) Angular resolution: 0.01 degrees or better	Yes / No / Explain		

11	Spiral Orbit Specimen Holder Set	a)The system shall include a specimen holder set to evaluate the lifetime of fluid lubricants under vacuum conditions as per ASTM F 2661-07; b) The party shall offer full accessories for performing spiral orbit tribometer tests including adapters, sensors and test specimens; c)The following accessories shall be supplied: Discs Ø 50.8 x 10 mm - Qty: 10 Nos., Guide plates Ø 12.5 mm x 6 mm - Qty: 10 Nos, Steel balls Ø 12.7 mm - Qty: 200 Nos	Yes / No / Explain		
12	Temperature control	a)Resistance heating elements or circulation system to allow for precise and homogeneous sample temperature control from -20 °C to +200 °C or better; b) Heating power/Cooling power - 300 W or better	Yes / No / Explain		
13	Calibration of the equipment	Following parameters shall be calibrated after system installation at our site and service personnel should also perform re-calibration at site as part of periodic maintenance of the system. a) Normal load calibration; b) Tangential force calibration; c) Rotational speed calibration, d) Radial movement calibration, e) Axial movement calibration	Yes / No / Explain		

14	Temperature and humidity measurements	In-built humidity and temperature sensor shall be integrated with the software. Temperature sensor shall monitor the specimen temperature and humidity sensor shall monitor the humidity levels within the test chamber. a) Temperature sensor range: -20°C to +200°C or better; b) Temperature sensor resolution: 0.01 °C or better; c) Temperature sensor repeatability: ±0.1°C or better; d) Temperature sensor accuracy: ±0.2°C or better; e) Humidity sensor range: 0 to 100 %RH; f) Humidity sensor resolution: 0.1 %RH or better; g) Humidity sensor repeatability: ±0.1 % RH	Yes / No / Explain		
15	Radial motion Stage Specifications	Radial movement shall have an eccentricity drive a) Maximum speed 5 mm/s or higher; b) Range shall be min. 0 to 40 mm with a resolution 0.01 mm or better	Yes / No / Explain		

16	Software and control system	<p>The Tribometer operation and data display software shall have following features: a) Continuous real time data acquisition of friction signal during measurement; b) High resolution spatially and time-resolved position and friction signal analysis shall be displayed with at least 1000 data points per period. Also, X-Y-Plots of all recorded parameters shall be available. c) The data shall be possible to export to .xlsx, .csv, .txt formats and the charts to .bmp, .jpg, .pdf formats. d) Windows 11 compatibility e) Adjustable acquisition frequency in Hz; f) Option for averaging acquired parameters with different time intervals ranging from 1 ms to 1 s; g) Automatic report generation for a set of measurements; h)First lap synchronization: Each test can be started at the same position of the circle</p>	Yes / No / Explain		
----	-----------------------------	---	--------------------	--	--

17	Measurement parameters	<p>a) Standard data acquisition channels with sampling rates from 1Hz to 1kHz: i) Normal force/Applied force measured within the test load unit; ii) Friction force; iii) Friction torque; iv) Measurement of radial displacement; v) Measurement of rotational speed of the rotation drive; vi) Measurement of pressure within the test chamber; vii) Temperature at lower specimen (reference temperature for the temperature controller); viii) Test chamber temperature; ix) Additional temperature sensor::</p> <p>b) High speed channels with sample rates from 1kHz to 100kHz: i) Friction force; ii) Friction torque; iii) Angular Position</p>	Yes / No / Explain		
18	Friction force and torque	<p>a) Separate sensors shall be used for normal load and friction force measurements; b) Max. measurable friction force : 400 N or higher; c) Max. measurable friction torque: 40 Nm or higher; d) accuracy/Resolution of the friction force/torque: 0.5% of the measured value or better</p>	Yes / No / Explain		

19	Data acquisition and processing system	<p>Processor : Intel Core i7, 13th Generation or better; Processor Speed : Quad core or higher, Min. 3.2Ghz or higher; L3 Cache: 12 MB or More; Memory: Min. 8GB DDR4/3200MHz - SDRAM, Expandable to 64GB or more; Graphics Subsystem : Nvidia make with min. 2 GB dedicated graphics memory; Hard Disk Drive: 300 GB or higher NVMe M2 Solid State Drive, 1 TB 3.5" SATA (7200RPM or higher); Ports : Integrated USB Type A 3.0/3.1, Type C 3.1, Display Port 1.4, HDMI Port 1.4; Network Interface : Integrated 1000 Mbps Ethernet with RJ-45 connect; Monitor: OEM min 23" LCD/LED Monitor; Operating System : Licensed Windows 11 Professional Edition (64 Bit) with Recovery CD or Recovery Mechanism; Other: a) PC should be compatible with the Software to be supplied along with the equipment; b) Licensed Microsoft Office package shall be installed in the system; c) The Backups for OS software and other major software including the tribometer software shall be provided as separate discs/ thumb drives</p>	Yes / No / Explain		
----	--	---	--------------------	--	--

20	Electronics	a) The electronic circuitry should be built using high quality electronics and should be coated with suitable coatings to protect it from condensed water and coastal climate; b) The electronic circuitry must have adequate cooling.	Yes / No / Explain		
----	-------------	--	--------------------	--	--

21	Vacuum chamber	<p>a) Chamber material shall be of High quality vacuum compatible, non-magnetic, non-corrosive material welded with sheet thickness of 20mm or more). The party shall provide the chamber dimensions; b) Rings /gasket should be suitable to the thermo-vacuum environments. O rings /gasket should be from reputed manufacturers (Preferable material: Viton) for high vacuum sealing. The location of O rings in the test system shall be mentioned clearly in the schematic drawing to be attached with technical offer; c) Inside the vacuum chamber there should not be any outgassing material, which will affect the vacuum performance and cause contamination over continuous operation; e) The chamber design should be capable of maintaining pressure <math>5 \times 10^{-7}</math> mbar; f) View port of 150 mm diameter or larger made of Quartz with direct view of testing shall be provided on the door; g) The chamber door shall be configured and designed taking into account of easy accessibility of all the internal systems (specimens, test modules, sensors) for operation; h) Chamber door shall be of double hinge type (to ensure uniform compression on the O ring) with locking mechanism; i) Chamber should be leak tested through MSLD for leak rates better than 1×10^{-9}</p>	Yes / No / Explain		
----	----------------	---	--------------------	--	--

		mbar l / s (Helium) and test certificates shall be supplied along with the item; j) Ports shall be available for vacuum pumps, gauges, other essential items for connecting the vacuum pumps(roughing pump and turbo-molecular pump) at the time of installation.			
22	Vacuum Pumps	The party shall supply the suitable vacuum pumps required for achieving the vacuum levels specified with the following min. specification: a) Roughing pump: Displacement >15 m ³ /hr; Peak pumping speed >14 m ³ /hr; Ultimate vacuum < 0.01 mbar; Leak tightness < 1 x 10 ⁻⁶ mbar l/s; Max. continuous inlet pressure: 200 mbar or lower; Voltage/Frequency: 230V/50Hz; Preferred makes: Pfeiffer, Edwards:: b) Turbo-molecular pump: Ultimate pressure: 10 ⁻⁶ Pa or better; Pumping speed (Air/N ₂): >260 l/s; Compression ratio (Air/N ₂) >1x10 ⁹ ; Critical backing pressure: 1500 Pa; Max. allowable continuous backing pressure (Air/N ₂): 100 Pa; Voltage/Frequency : 230V/50Hz; Preferred makes :Pfeiffer, Edwards::Suitable controller shall also be supplied with the pump	Yes / No / Explain		

23	Any other details/ requirement	Any other accessories apart from the mandatory accessories and systems mentioned above may be quoted separately under optional accessories.	Yes / No / Explain		
24	Power supply	The equipment shall be either single phase 240V, 50Hz or 3 phase 400 V, 50 Hz	Yes / No / Explain		
25	Safety provisions	a) Automated cut-off values for test parameters (friction force, friction torque and temperature) shall be provided to enable stoppage of tests; b) System shall have built-in safety features to stop tests in case of any mechanical /electrical malfunction and an audible alarm shall be provided c) System shall be provided with light indicators at top for indicating state of operation.	Yes / No / Explain		

26	Pre-dispatch Inspection (PDI), Training and Acceptance criteria / Performance specifications	<p>a) Pre-dispatch Inspection (PDI) will be carried out at the Manufactures site/supplier's site before dispatch; b) Training must be given to IISU Personnel during Pre-dispatch Inspection (PDI); c) During Pre-dispatch Inspection (PDI), Operation, maintenance and Trouble shooting of the system shall be demonstrated; d) The system shall be leak tested to the required level; e) Base pressure $<5 \times 10^{-2}$ mbar to be demonstrated with dry Pump; f) High vacuum $<1 \times 10^{-6}$ mbar to be demonstrated with Turbo Molecular Pump; g) Spiral orbit tribometer function and Rotary module function should be demonstrated with standard samples in dry and lubricated conditions. Tests shall be performed on user supplied specimens (balls, discs and lubricants).</p>	Yes / No / Explain		
----	--	--	--------------------	--	--

27	Installation and commissioning	<p>a) Installation and commissioning of the equipment along with all utilities and Instrumentation is to be carried out at ISRO Inertial System Unit (IISU); b) Acceptance criteria / Performance specifications must be met during installation and commissioning at IISU; c) The manufacturer shall have an Indian authorized Agent (responsible for installation, commissioning, and servicing of the equipment) and the latest certificate to that effect should be submitted along with technical offer; d) Party shall provide the pre-installation requirements (if any) to user before the delivery of the equipment; e) Party / their Indian agent should quote and supply all the necessary accessories/ spares and consumables required to install and commission so that the equipment is received under ready to commission state; f) Party/ Indian agent shall install and commission the equipment within 3 weeks of delivery of the equipment. Installation, Method development, calibration and troubleshooting etc., wherever applicable, is in the scope of the vendor.</p>	Yes / No / Explain		
----	--------------------------------	--	--------------------	--	--

28	Operator training	Any expert from OEM and/or any OEM Certified Trained expert to provide training for all the mentioned ASTM, DIN and ISO methods along with user defined methods at site till demonstration of performance of the system is completed at the satisfaction of the user by conducting appropriate test runs, to at least 3 number of IISU personnel. The training shall be for duration of minimum 3 days.	Yes / No / Explain		
29	Documentation /Manual	Two sets of instruction manuals (hard copy and soft copy) for operation, maintenance of the system, Trouble shooting , service manual, spare list, part lists, mechanical drawings and air, water and electrical diagrams (English) to be provided along with system.	Yes / No / Explain		

30	Warranty	<p>a) Warranty of all the total system is to be provided for THREE YEARS from the date of installation (including the software i.e. the equipment should have 3-year warranty for maintenance, upgrade in software and complete replacement for any component/unit against any manufacturing/operational defects, issue in software). Warranty and Test certificates for all the components including accessories like pumps, gauges from OEMs to be provided. OEM certificate should be attached from the manufacturer; b) The 3 year warranty/guarantee term will start from date of completion of commissioning of equipment at the IISU site. c) The Factory Acceptance may be done at the vendor's site but the Final Acceptance Test run should be conducted at our site after commissioning during which the party will demonstrate all the applications given in the specification. d) All the items included in the main equipment should be mentioned clearly with part numbers and prices shall be specified for each item; e) The party has to demonstrate all the features as per scope of work, they claim and mentioned in specification and compliance.; f) Party should provide new software free of cost within warranty period if there is any new</p>	Yes / No / Explain		
----	----------	---	--------------------	--	--

		development / upgrades by the manufacturer.			
31	AMC/Maintenance	a) Party shall provide separately quote for the AMC support for a period of 2 years beyond the warranty period.; b) Scope of AMC should cover the servicing and maintenance of all the subsystem including original equipment manufacturers (OEM) as a turnkey basis. c) Vendor shall commit to provide service support and spare/consumables for a period of not less than 10 years and this shall be explicitly mentioned in the technical offer. d) This system is required to function with highest up time hence minimum down time preferred would be less than 96 hours from the date of intimation.	Yes / No / Explain		
32	Price bid cost break up	Sub system wise cost break up details should be provided for all components	Yes / No / Explain		
33	Equipment layout	Equipment layout, drawings with actual dimensions, utilities etc. shall be provided to customer	Yes / No / Explain		
34	Compliance Statement	All technical compliance shall be supported by technical leaflet or statement from manufacturer. Any blank left shall be taken as non compliance.	Yes / No / Explain		
35	Realization time frame	Total time frame for the realization of the item at IISU site shall be provided.	Yes / No / Explain		
36	User list with contacts	User list (with contacts email address, phone number and full address) of the offered system shall be provided with the offer.	Yes / No / Explain		

37	General Terms and conditions	a) The models quoted by the party shall be latest, upgradable and remain in the suppliers marketing range.; b) The model quoted shall not become obsolete for the next five years minimum.; c) IISU shall be kept informed well in advance in case the equipment is being phased out/modified/or there is a software upgrade.	Yes / No / Explain		
----	------------------------------	---	--------------------	--	--

Supporting Documents required from Vendor

1. As per the attached specification

5 additional documents can be uploaded by the vendor

C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	The party shall either be the OEM or an authorised distributor of the OEM. Certificate of authorisation shall be attached with the offer.	Yes / No / Explain	
2	Party shall submit a duly filled compliance sheet for all the requirements (as per the attached annexure). Offers received without the duly filled compliance sheet will not be accepted.	Yes / No / Explain	
3	Delivery period: Since LD is applicable, mention delivery period and installation period separately.	Yes / No / Explain	
4	Delivery Term: FOR IISU. In case of Ex-Works, please indicate packing, forwarding & freight charges up to IISU, separately.	Yes / No / Explain	
5	Payment term: 100% within 30 days after receipt and acceptance of item for indigenous/Sight Draft for import cases.	Yes / No / Explain	
6	Mode of despatch	Yes / No / Explain	
7	No insurance is required at our cost.	Yes / No / Explain	
8	PO ordering address in full with Contact Person Name, E-mail id, Phone No. [also attach your Quotation in PDF format]	Yes / No / Explain	
9	Please furnish your Bank details, Account No., SWIFT code, IFSC code etc for PFMS verification for payment, in case of PO.	Yes / No / Explain	
10	Any other points	Yes / No / Explain	
11	This tender is proposed as a Public Tender Two part. Techno commercial bid and price bid shall not be submitted together. No price details should be mentioned in the Techno-commercial bid.	Yes / No / Explain	

12	We do not open PART-II (Price Bid), if PART-I (Technical & commercial Offer) does not meet with our technical specification requirements. The technical documents need to be attached online as a single pdf file without any price information, technical bid containing price details will be treated as rejected.	Yes / No / Explain	
13	Price bid opening date indicated in the schedule is tentative only. Actual date will determine after evaluation of techno commercial bid.	Yes / No / Explain	
14	Liquidated Damages(L/D clause @ 0.5% subject to maximum 10% of the order value is applicable beyond the promised delivery schedule.)	Yes / No / Explain	
15	Security Deposit: In the event of placement of order, you should submit Security Deposit at 3% of the order value of the P.O. The Security Deposit shall valid for a period of 60 days beyond the date of completion and acceptance of P.O/Contract. The Security Deposit will be discharged without any interest after completion and acceptance of the Contractual obligations.	Yes / No / Explain	
16	Warranty: 03 years. PBG 3% is applicable.	Yes / No / Explain	
17	Quote Validity: Minimum 120 days	Yes / No / Explain	

C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	Vacuum tribometer- Supply, installation and commissioning of Vacuum Spiral Orbit tribometer	1.00 Unit		-		

Common charges (Applicable for all items)

Freight charge	
P&F Charges	