## Schedule Display - LPSCB

**Tender Ref. No:** LPSCB/PUR/2019E0151301 **Tender Ref. Date:** 03-04-2019

### Schedule : Single Submission MultiOpening, Two Part

| Seq No | Buyer Stage | Supplier Stage | Start Date & Time | Expiry Date & Time |
|---|---|---|---|---|
| 1 | Tender Release | - | 03-04-2019 10:00 | 08-04-2019 10:00 |
| 2 | - | Tender download | 08-04-2019 10:01 | 07-05-2019 14:00 |
| 3 | - | Bid Submission | 08-04-2019 10:01 | 07-05-2019 14:00 |
| 4 | Bid Sealing | - | 07-05-2019 14:01 | 07-05-2019 16:00 |
| 5 | - | Open Authorisation | 07-05-2019 16:01 | 09-05-2019 10:00 |
| 6 | Tender Opening | - | 09-05-2019 10:01 | 27-05-2019 12:00 |
| 7 | Tender Evaluation | - | 09-05-2019 10:01 | 27-05-2019 12:00 |
| 8 | Price Bid Opening | - | 27-05-2019 12:01 | 30-09-2019 17:00 |
| 9 | Price Bid Evaluation | - | 27-05-2019 12:01 | 30-09-2019 17:00 |
| 10 | PO Release | - | 27-05-2019 12:01 | 30-09-2019 17:00 |

## Tender Details

**Tender No:** LPSCB/PUR/2019E0151301

**Tender Date:** 03/04/2019

**Purchase Entity:** PURCHASE

## Tender Attachments

**Scope of Work/Terms and Conditions( to Supplier)**

A**ttachment - I:**

IDT00248800000000000isro08501.pdf

A**ttachment - II:**

**Technical Write-up/Drawings (to Supplier)**

A**ttachment - I:**

IDT00248800000000000isro05401.pdf

A**ttachment - II:**

IDT00248800000000000isro05402.pdf

A**ttachment - III:**

IDT00248800000000000isro05403.pdf

A**ttachment - IV:**

A**ttachment - V:**

**INSTRUCTION TO TENDERERS (PT)**

**Instruction to Vendors (PT)**

I**NSTRUCTION TO TENDERERS (PT):**

1. Interested tenderers may, at their option, login to https://eprocure.isro.gov.in and submit your offers .

2. TENDER FEE NOT APPLICABLE

3. EARNEST MONEY DEPOSIT NOT APPLICABLE:

4. Indian agents while quoting on behalf of their principals are requested to attach necessary authorization letter from their Principals in their bid.

5. The offer should be valid for a minimum period of 120 days from the date of opening.

6. Bids will not be entertained after the due date and time.

7. Request for the extension of the due date will not be considered.

8. Sr. Head, Purchase and Stores, LPSC, Bangalore, reserves the right to accept or reject any bid in part or full without assigning any reason thereof.

**LPSC , BANGALORE**

**INSTRUCTION TO VENDORS SINGLE or TWO_PART (PT)**

**Instruction to Vendors (PT)**

I**NSTRUCTION TO TENDERER(PT):**

GENERAL INSTRUCTION TO TENDERERS

1. This requirement can be quoted only through online e-procurement mode using ISRO portal https://eprocure.isro.gov.in. The document will be available in CPP Portal also. No manual tender will be considered.

2. The vendors have to get themselves registered in above site to download the tender details. To register in above ISRO portal(https://eprocure.isro.gov.in) the vendors need to have Class - III Digital Certificate The Digital Certificate can be obtained from any digital certifying authority. The following e-tokens with their current drivers are tested and working fine with our system. Aladdin, Vasco, Starkey, Moser baer, E-pass-2003, Safenet-2032, WD Proxkey Grey / SPC Token and Trustkey.

3. The parties are advised to download the tender and submit the bid on online at least two days prior to Tender Closing Date to avoid last minute network problem. The due date shall not be extended due to network or computer related problems.

4. TENDER FEE NOT APPLICABLE.

5. This being a two part tender that is Technical & Commercial Part - I and Price Part - II separately, the tenders should not attach any documents containing Pricing information along with Technical & Commercial Bid. Normally we do not open PART-II (Commercial Offer), if PART-I (Technical Offer) does not meet with our technical specification requirements.

6. Our Tender Enquiry contains technical requirements and specification. The detailed Technical Specification of your offer should be covered in the Technical Part. The Technical Documents need to be attached online as a single PDF file without any prior information. The tenders attachment containing Price details will be treated as unsolicited offers and rejected.

7. The quote should indicate quantity wise unit rate separately which have to be filled online. The Prices are to be mentioned both in figures as well as in words. The GST, Duties etc., are to be calculated and indicated in the column provided in online forms explicitly.

8. Bidders are expected to comply with the technical & commercial and other terms and conditions given in vendor specified terms of this tender. In case of any deviation, the reasons thereof should be clearly specified in the vendor specified terms column.

9. The vendors have to compulsorily submit the compliance statement online otherwise their offer will not be considered for further evaluation. Before entering the compliance statement, vendors are advised to refer the detailed specification provided in the Technical Writeup/ Drawings  document. The specification offered by the vendors may also be indicated in the compliance statement wherever necessary.

10. The Technical Specification / Drawing / Product Catalogues / Works carried by vendor / Make offered etc. as a single PDF file without any financial details has to uploaded online mode by the vendor. This being TWO PART TENDER the PDF document uploaded should not contain any commercial/pricing details. If the attached PDF contains any pricing detail the offer will be treated as unsolicited and will be summarily rejected.

11. Original Equipment Manufacturer (OEM) or their representative can submit bid to LPSC. Indian agents while quoting on behalf of their principals are requested to attach necessary authorization letter from their Principals in their bid.

12. Instructions on Indian Agent (if any):- Bidders are required to provide the following information in respect of their authorised Indian Agent, if any, alongwith technical bid as the same is mandatory as is required for consideration of the bid. Name, Address, Telephone no. , fax no., email of the Indian Agent including the contact person.

13. A letter from the OEM in the current date certifying that the said Indian Agent is their authorised Indian Agent and also indicating the responsibilities/role of the Indian Agent under the proposed purchase. Remuneration /service charges payable to the Indian Agent under the proposed purchase.

14. In a tender either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same Item/Product in this Tender.

15. If an agent submits Bid on behalf of the Principal/OEM the same agent shall not submit a bid on behalf of another Principal/OEM in this tender for the same Item/Product.

16. The offer should be valid for a minimum period of 120 days from the due date.

17. Bids will not be entertained after the due date and time.

18. The vendors who have submitted the bids before the closing have to give Open Authorization as per schedule after the tender closing date.

19. The vendors may contact 020-25315555 and E-mail: support.isro@nextenders.com for any technical assistance in vendor registration and bid submission.

20. Once the offer is submitted in on line mode by the vendor and Bid Sealing is done by LPSC, vendor will not be able to provide revised offer.

21. Request for the extension of the due date will not be considered.

22. The exact date and time of opening of price bid of successful tenderers will be intimated later.

23. Tender which are not prepared in terms of these instructions are liable to be rejected.

24. Based on the response to the e-Public Tender Notice, LPSC reserves theright to change any milestone date of the tendering activity.

25. LPSC reserves the right to verify all claims made by the bidder.

26. Tender Opening : The Technical and Commercial Bid [Part-I] will be opened on the specified day mentioned in the schedule and incase any further clarification/ discussion are required, such clarification/discussion shall be called for before opening the Price Bid.

27. Tenderers can participate in the said tender opening on for which, the representative of the firm shall be duly authorized by Competent Authority. Against proper authorization only such representatives shall be allowed to attend the tender opening.

28. Sr. Head, Purchase and Stores, LPSC, Bangalore, reserves the right to accept or reject any/or all the tenders in part or full without assigning any reasons thereof.

29. EARNEST MONEY DEPOSIT NOT APPLICABLE:

30. Fax & Email offers are not accepted.

31. In case of any clarification to be sought to this Tender you may please contact Purchase and Stores Officer (PSO) through Email: purchase@lpscb.gov.in and Ph No: 080 250 37 170/171/140

**LPSC , BANGALORE**

**STANDARD TERMS AND CONDITIONS (PT)**

**Instruction to Vendors (PT)**

S**TANDARD TERMS AND CONDITIONS (PT):**

<font size=3>STANDARD TERMS AND CONDITIONS

1.Instruction to Indigenous Suppliers:

a)Our Normal payment terms are 100% within 30 days after receipt and acceptance of the item at our site. Please confirm acceptance in your quotation.

b)Please specify GST percentage, if any, in your offer.

2.Instruction to foreign Suppliers:-

a)Our normal payment term is SIGHT DRAFT, Please confirm acceptance in your offer, if you insist for L/C, and all bank charges shall be to your account. Confirm acceptance.

b)Please specify whether any export clearance is required in case of an order on you.

c)Warranty/Guarantee applicable for the item shall be mentioned in your offer

d)Special Certification for packing Material: as per Plant Quarantine (Regulation of Control into India) Order 2003, Articles packed with packing material of plant origin viz., hay, straw, wood shavings, wood chips, saw dust, wood waste, wooden pallets, Dunn age Mats, wooden packages, coir pith, pear or sphagnum moss etc., will be allowed entry by Customs only with a Phytosanitary Certificate. In case if a Purchase Order, if you propose to us any of the above material for packing such a certificate issued by your local Plant Quarantine Authority shall be furnished.

e)Confirm whether any Export License is required and for which End User Certificate is to be provided by us, in case of an Order on you. (Enclose format for EUC, if applicable)

f)Either Indian Agent on behalf of the foreign principles or the foreign principal directly can quote against this order, but not both. In either case an Indian agent cannot represent more than one principal against the same tender.

g) In a tender either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously for the same Item/Product in this Tender.

h) If an agent submits Bid on behalf of the Principal/OEM the same agent shall not submit a bid on behalf of another Principal/OEM in this tender for the same Item/Product.

i) In case the quote is on Indian Rupee (Outside High Sea Sale), the price shall include GST and duties if any. We shall not able to provide any duty or GST exemption/concession certificates. If the item quote is of USA / France / Germany / Japan make, please quote for all-inclusive price since we prefer to get the item on FOR destination basis.

3.Purchase / Price preference to MSEs

Purchase/Price preference will be applicable to the product reservation admissible to the Micro and Small Enterprises. Purchase/Price Preference shall be extended to the MSEs under the Public Procurement Policy for MSEs formulated under the Micro, Small and Medium Enterprises Development Act, 2006. The participating MSEs in a tender, quoting price within the band of L-1 + 15% may also be allowed to supply a portion of the requirement by bringing down their price to the L-1 price, in a situation where L-1 price is from someone other than an MSE. Such MSEs may be allowed to supply upto 20% of the total tendered value. In case of more than one such eligible MSE, the supply will be shared equally.

4.Warranty

You shall provide applicable warranty for the items offered by you without fail. For the applicable period you shall provide necessary warranty certificate.

5.Performance Bank Guarantee

Towards the performance of the systems during the warranty period you shall submit a performance bank guarantee equivalent to 10% of the order value to cover the warranty period. This PBG shall be interest free and the same shall be returned to you on successful completion of all contractual obligations. The said PBG shall have a further claim period of 6 months.

6.Security Deposit

On acceptance of the order, you shall submit an interest free amount equivalent to 10% of the total contract/order value towards security deposit. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee/Demand Draft/PDR receipts duly endorsed in the name of the centre. The Security Deposit

will be returned to you on successful completion of the Contractual obligations; failing which it shall be forfeited/adjusted.

7.Offer Validity

Your offer shall be valid for 120 days from the date of tender opening. In case you offer validity is less than 120 days, the said offer is liable for rejection which may please be noted.

8.Liquidated Damages:

If you fail to deliver the ordered items satisfactorily within the time specified or any extension thereof, Liquidated Damage @ 0.5%(zero point five percent) of the order value or part thereof the un-delivered items for each calendar weeks of delay shall be recovered from your bill. However total Liquidated Damage shall not exceed 10% (ten percent) of the order value.

9.Offers received through fax or email will not be considered.

10. JURISDICTION

The court of Bangalore only shall have jurisdiction to deal with and decide any legal matter or dispute whatsoever arising out of this in case PO/contract.

11. Bank Details

You shall provide your bank details such as IFSC code, IBAN No. , SWIFT etc along with your offer which shall be not be changed till completion of supply/service. 12. FORCE MAJEURE

Neither LPSC, Bangalore nor Supplier/ Contractor, shall be considered in default of the performance of their obligations under this Purchase Order if such performance is prevented or delayed for any causes beyond the reasonable control of the parties to the Order getting affected, such as Acts of God, war, riots, civil, commotion, illegal strikes, legal lock-outs, epidemics, fire accidents, floods, earthquakes, proclamation or regulation or ordinance of any Government thereof, provided notice in writing of any such cause with necessary proof that the obligation under the Purchase Order is hereby affected or prevented or delayed is given within 14 days from the happening of the event. As soon as the cause of force majeure has ceased to exist, the party of the actual delay that has occurred due to such force majeure condition.

13. APPLICABLE LAW

The Contract shall be governed by Indian Law for the time being in force and jurisdiction shall lie in the Courts of India.

14. Please refer Sl No: 1 of Government of India, Ministry of Finance, Notification Number 47/2017 integrated Tax (rate) Dated: 14/11/2017, the applicable percentage of GST is 5% only for the supply of Goods and Services. Necessary Certificate will be issued Later.

15. Please refer Sl No: 1 of Government of Karnataka, Finance Secretariat, Notification Number 45/2017 FD 48 CSL 2017, BENGALURU, Dated: 14/11/2017, the applicable percentage of GST is 2.5% only for the supply of Goods and Services. Necessary Certificate will be issued Later.

LPSC is providing concession certificate towards the of payment of Customs Duty vide As per the Customs Notification No. 50/2017, Sl. No. 539(b)-CUSTOMS Dated 30.06.2017 & Amendment No: 5/2018, Sl No.539(A) - CUSTOMS Dated: 25/01/2018.

**LPSC , BANGALORE**

## Bid Templates

**Introduction, Scope of Work, General Requirements of PDS**

**Item Specifications**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
|---|---|---|---|---|
| 1 | 1.) Introduction:<br><br>1.0.1) Plasma diagnostics help in analyzing plasma plume. It is used for characterizing Hall Effect thrusters. LPSC having high vacuum thruster testing facility requires a diagnostic system for analyzing plasma plume of Hall Effect thrusters (HET) operating at powers up to 5kW. The Plasma Diagnostics System (PDS) shall be able to measure plasma properties such as plasma potential, plasma density and electron temperature using Langmuir Probe (LP), ion energy distribution using Retarding Potential Analyzer (RPA) and ion current density using Faraday Cup (FC). The diagnostics system will also be used for finding the divergence angle of plasma plume, an important parameter for | | | |

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| | placing different components on satellite by the satellite team. The system shall have a standard single rack for data acquisition (DAQ) unit, all electronics control unit and a computer having Graphic User Interface (GUI) based control software. The specification will list complete mechanical, electrical & electronics and software requirements for PDS. The mechanical requirements list the technicalities involved with realizing the probe rake for PDS suiting the vacuum chamber present at LPSC and electronics requirements lists the technical specifications of probe and DAQ for PDS. A schematic consisting of elevation and top view of desired probe rake in the vacuum chamber (Annexure 1 & 2) showing necessary dimensions and an overall PDS block diagram (Annexure 3) showing system requirements of the complete system is also detailed in the specification. | | | |

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| 2 | 2.) Scope of Work:<br><br>2.0.1.) To perform spatial scan of plasma plume using a movable rack system mounting all the diagnostic probes. | | | |
| 3 | 2.) Scope of Work:<br><br>2.0.2.) To measure plume ion current density using Faraday Cups (FC). | | | |
| 4 | 2.) Scope of Work:<br><br>2.0.3.) To measure plasma plume properties in terms of electric potential, plasma density and electron temperature using Langmuir Probe (LP). | | | |
| 5 | 2.) Scope of Work:<br><br>2.0.4.) To measure ion energy distribution using Retarding Potential Analyzer (RPA). | | | |
| 6 | 2.) Scope of Work:<br><br>2.0.5.) To rebuild a 3D profile of the plasma plume in terms of the above relevant parameters. | | | |

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| 7 | 2.) Scope of Work:<br><br>2.0.6.) To measure the divergence angle of plasma plume. | | | |
| 8 | 2.) Scope of Work:<br><br>2.0.7.) To acquire, store and processing of data for visualization. | | | |
| 9 | 2.) Scope of Work:<br><br>2.0.8.) Automated calibration of diagnostic probes. | | | |
| 10 | 3.) General Requirements of PDS:<br><br>3.0.1.) The Plasma Diagnostics System (PDS) should have Faraday Cups, Retarding Potential Analyzers and Langmuir Probe mounted inside the vacuum chamber on probe rake with necessary control electronics and DAQ mounted outside the vacuum chamber on a standard 19 inch rack cabinet. | | | |

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| 11 | 3.) General Requirements of PDS:<br><br>3.0.2.) The components present inside the vacuum chamber shall be able to withstand high vacuum of the order of 10^-8 mbar. | | | |
| 12 | 3.) General Requirements of PDS:<br><br>3.0.3.) The choice of materials shall withstand high temperature during thruster operation and must have low outgassing level. | | | |
| 13 | 3.) General Requirements of PDS:<br><br>3.0.4.) The material shall undergo very less erosion and shall also have low sputtering coefficient to minimize surface contamination. | | | |
| 14 | 3.) General Requirements of PDS:<br><br>3.0.5.) Preferably, the metallic materials can be of stainless steel (AISI 300 series), Molybdenum or its alloy such as Titanium Zirconium Molybdenum (TZM), oxygen free copper | | | |

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| | and aluminum alloy. | | | |
| 15 | 3.) General Requirements of PDS:<br><br>3.0.6.) The electrical insulating materials can be of PolyTetraFluoroEthylene (PTFE), PerFluoroAlkoxy (PFA), PolyEther Ether Ketone (PEEK) and Macor. | | | |
| 16 | 3.) General Requirements of PDS:<br><br>3.0.7.) Any cavities inside the vacuum chamber should not be present or should be avoided if possible. | | | |
| 17 | 3.) General Requirements of PDS:<br><br>3.0.8.) The lubricant of any moving part inside the vacuum chamber should be high vacuum compatible. Fomblin Y-VAC 3, Braycote 602EF, Rocol OXYLUBE and dry film coat of molybdenum disulphide can be preferred as lubricants. | | | |

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| 18 | 3.) General Requirements of PDS:<br><br>3.0.9.) Equipments using lubricant shall be completely enclosed and maintenance free. | | | |
| 19 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.1.) The probe rake shall mount Faraday Cups, Retarding Potential Analyzer and Langmuir probe. | | | |
| 20 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.2.) It shall have the provision to mount 19 FCs along the circumference of rake & a RPA and a LP in the horizontal plane containing thruster axis. | | | |

**General Requirements of PDS**

**Item Specifications -I**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 3.1.) Specifications of Plasma Diagnostics Probes | | | |

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| | 3.1.3.) The operating pressure for probes shall be of the order of 10^-5 mbar and 10^-8 mbar with and without thruster firing respectively. | | | |
| 2 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.4.) Cable material of probe shall be able to withstand high temperature and wear due to heat. Preferably, it shall have multiple layers of fibre glass and mica insulation. It shall be shielded to eliminate EMI/EMC interference from and to plasma plume | | | |
| 3 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.5.) Faraday Cups (FCs) shall be used for measuring ion current density by collecting ions on negatively polarized collector electrode with respect to average plasma potential. The FCs shall fulfill following criterions: | | | |
| 4 | 3.1.) Specifications of Plasma Diagnostics Probes | | | |

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| | 3.1.6.) Aperture area: Not more than 1 cm^2 | | | |
| 5 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.7.) Ion current range: 0 to 20 mA/cm^2 | | | |
| 6 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.8.) Current measurement accuracy: Better than 1% FSO | | | |
| 7 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.9.) Collector bias voltage range: -20 to -30 V (Nominal) | | | |
| 8 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.10) Collector material of the cup shall have low electron emission coefficient with respect to impinging ion for reducing spurious current which can affect ion current measurement. | | | |

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| 9 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.11.) Metal exposed to plasma shall have Molybdenum alloy or equivalent material to minimize erosion. | | | |
| 10 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.12.) External electrostatic shield of the probe shall be able to eliminate electric disturbances to the plasma plume. | | | |
| 11 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.13.) Collector current drain range shall be in 10 micro ampere to 10 milli ampere for minimizing electromagnetic effect on plasma. | | | |
| 12 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.14.) Retarding Potential Analyzer (RPA) shall be used to determine ion energy density of plasma plume. It shall use 4 grids to filter primary and secondary electrons. | | | |

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| | The ions having energy greater than a threshold value (set using positive polarization of ion retarding electrode present in RPA) shall be collected on collector to determine the ion energy density of plasma plume.The RPA shall fulfill following criterions: | | | |
| 13 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.15.) Configuration: Multiple grids (4 grids) | | | |
| 14 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.16.) Ion energy range: Up to 3000eV | | | |
| 15 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.17.) Compatible plasma density: Up to 10^15 ions/m^3 | | | |
| 16 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.18.) Ion flux: Up to 30 mA/cm^2 | | | |

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| 17 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.19.) Ion current range: Up to 500 micro ampere | | | |
| 18 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.20.) Current measurement accuracy: Better than 1% FSO | | | |
| 19 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.21.) External shielding electrode voltage range: 0 to (-40 V) | | | |
| 20 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.22.) Primary and secondary electron retarding electrode voltage range: 0 to (-80 V) | | | |

**General Requirements of PDS**

**Item Specifications -II**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
|---|---|---|---|---|
| 1 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.23.) Ion repelling electrode voltage range: 0 to 3000 V | | | |
| 2 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.24.) Collector voltage range: 0 to 40 V | | | |
| 3 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.25.) Collector electrode material shall have high conductivity, high temperature resistance and low secondary electron emission coefficient with respect to impinging ions. Preferably, graphite shall be used as collector material. | | | |
| 4 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.26.) Langmuir probe shall be used to measure plasma parameters such as plasma potential, plasma density and electron temperature. | | | |

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| | Three electrodes Langmuir probe shall be present in the plasma bulk and the voltage drops and current measured across the probes determine the plasma properties. Langmuir probes shall fulfil following criterions: | | | |
| 5 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.27.) Configuration: 3 electrodes | | | |
| 6 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.28.) Plasma source: Continuous | | | |
| 7 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.29.) Plasma potential range (probes electronics acquisition range capabilities): 0 to 150 V | | | |
| 8 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.30.) Plasma density (probes electronics acquisition range capabilities): 5x10^13 to | | | |

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| | 5x10^18 numbers/m^3 | | | |
| 9 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.31.) Electron temperature (probes electronics acquisition range capabilities): 0.1 to 30 eV | | | |
| 10 | 3.1.) Specifications of Plasma Diagnostics Probes<br><br>3.1.32.) Probe material: Molybdenum alloy or equivalent | | | |
| 11 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.1) The schematic, Annexure 1 and Annexure 2, shows the desired probe rake along with thruster present inside the vacuum chamber. The necessary dimensions of vacuum chamber and probes distance from thruster are also shown. | | | |
| 12 | 3.2.) Mechanical Requirements of PDS Probe Rake | | | |

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| | 3.2.2.) PDS should have a rake on which all the diagnostics probes shall be mounted. | | | |
| 13 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.3.) It shall be custom made to fit inside the vacuum chamber present at LPSC and shall not hinder in movement or any process related to the chamber and thruster operation. | | | |
| 14 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.4.) The rake shall be semicircular with its axis of symmetry coinciding with thruster axis. | | | |
| 15 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.5.) It should perform a complete scan of plasma plume by moving ±90° with respect to thruster axis. | | | |

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| 16 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.6.) In vertical plane, front view (refer Annexure 1), 19 faraday cups shall be mounted. | | | |
| 17 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.7.) In the horizontal plane, top view (refer Annexure 2), it shall have provision to mount RPA and LP on either side of FC with a separation of 5°. | | | |
| 18 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.8.) The central position of rake, consisting of 5° separations, shall have extra provision to install two RPA in place of Faraday Cups located at ±30°, ±25°, ±20°, ±15°, ±10° or ±5° respectively. | | | |
| 19 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.9.) The maximum uncertainty in the angular | | | |

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| | positions of all the probes shall be ±0.1°. Suitable means and method shall be provided to measure/verify/calibrate the angular positions/alignment of the probe. | | | |
| 20 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.10.) Following are the spatial location of probes on the probe rake. Horizontal and vertical angular positions of probe on the probe rake along with tolerance in angular position are also indicated. | | | |

**General Requirements of PDS Probe Rake**

**Item Specifications -III**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.12.) Probe Type: Faraday Cups:: Vertical angular position: ±75°, ±60°, ±45°, ±30°, ±25°, ±20°, ±15°, ±10°, ±5°, 0°:: | | | |

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| | Horizontal angular position: 0°:: Tolerance in angular position: ±0.1° | | | |
| 2 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.13.) Probe Type: Langmuir Probe:: Vertical angular position: 0°:: Horizontal angular position: +5°:: Tolerance in angular position: ±0.1° | | | |
| 3 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.14.) Probe Type: RPA:: Vertical angular position: 0°:: Horizontal angular position: -5°:: Tolerance in angular position: ±0.1° | | | |
| 4 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.15.) Probe Type: RPA (extra provision):: Vertical angular position: ±30°, ±25°, ±20°, ±15°, ±10° or ±5°:: Horizontal angular position: 0°:: Tolerance in angular position: ±0.1° | | | |

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| 5 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.16.) The rotary rake shall use a brushless servo motor with an inductive absolute encoder of resolution 0.02° or better. | | | |
| 6 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.17.) Rake shall use a reduction gear box to impart rotary motion ensuring slow movement of rake during plume scan. | | | |
| 7 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.18.) The precision associated with rake position shall be 0.5° or better. | | | |
| 8 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.19.) Limit switches shall ensure that the probe rake remains in its field of operation and does not exceed maximum motion range of ±90° from | | | |

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| | axis of vacuum chamber. | | | |
| 9 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.20.) All the components such as brushless servo motor, inductive absolute encoder, limit switches and gear box shall be mounted at the bottom of probe rake. | | | |
| 10 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.21.) The rake shall protect the wiring of probe and other equipments in vacuum from plasma plume. | | | |
| 11 | 3.2.) Mechanical Requirements of PDS Probe Rake<br><br>3.2.22.) Laser based pointing device shall be used for probe alignment to the intersection of thruster axis and the exhaust plane on the thruster. | | | |

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| 12 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.) A brushless servomotor shall be used for moving the probe rake. | | | |
| 13 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.1.) Motor type: Brushless and maintenance free | | | |
| 14 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.2.) Operation environment: High Vacuum, ~10^-8 mbar | | | |
| 15 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.3.) Frame size standard: NEMA or equivalent | | | |
| 16 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.4.) Protection level: IP65 or equivalent | | | |
| 17 | 3.3.) Electrical specifications of PDS | | | |

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| | 3.3.1.5.) Stall torque, continuous: Minimum 1 Nm | | | |
| 18 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.6.) Power output, continuous: Minimum 330 W | | | |
| 19 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.7.) Motor should be capable of withstanding radial and axial load up to 90N. | | | |
| 20 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.8.) The servomotor shall be augmented with inductive absolute encoder having a resolution of 0.02 degrees with repeatability over 200 degree measurement angle. | | | |

**General Requirements of PDS, Data Acquistion System**

**Item Specifications -IV**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 3.3.) Electrical specifications of PDS<br><br>3.3.1.9.) The servomotor shall use necessary gearbox for reducing the probe rake speed during scan. | | | |
| 2 | 3.3.) Electrical specifications of PDS<br><br>3.3.2.) Electric Feedthrough shall be used for transmitting electrical power from outside to inside of the vacuum chamber. Necessary feedthrough shall be used as per probe voltage ratings and it shall also satisfy following properties: | | | |
| 3 | 3.3.) Electrical specifications of PDS<br><br>3.3.2.1.) Environmental protection level: IP68 or equivalent | | | |
| 4 | 3.3.) Electrical specifications of PDS<br><br>3.3.2.2.) Leak rate: Less than 10^-6 mbarl/s | | | |

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| 5 | 3.3.) Electrical specifications of PDS<br><br>3.3.2.3.) Endurance: Minimum 5000 cycles | | | |
| 6 | 3.3.) Electrical specifications of PDS<br><br>3.3.2.4.) Operating temperature: 0 to 60 degree Celsius | | | |
| 7 | 4.) Data Acquisition System (DAQ)<br><br>4.0.1) The data acquisition system shall consist of control electronics, data acquisition unit and control software for controlling probe rake and visualization of obtained data. The block diagram of required Data Acquisition (DAQ) System is shown in Annexure 3. | | | |
| 8 | 4.) Data Acquisition System (DAQ)<br><br>4.0.2) Insulation of the order of 3000V is required between the electronic system and the probes. | | | |

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| 9 | 4.) Data Acquisition System (DAQ)<br><br>4.0.3) All the current measuring channels shall be based on feedback emitter scheme allowing low current measurement accuracy. 16 bit or better ADC shall be used for data acquisition. | | | |
| 10 | 4.) Data Acquisition System (DAQ)<br><br>4.0.4) Complementary Metal Oxide Semiconductor (CMOS) based digital isolators using RF signal as carrier shall be used for isolation which is more robust and reliable. Opto coupler isolators shall not be used. | | | |
| 11 | 4.) Data Acquisition System (DAQ)<br><br>4.0.5) Field Programmable Gate Array (FPGA) based system shall be used. | | | |
| 12 | 4.) Data Acquisition System (DAQ)<br><br>4.0.6.) Complete data acquisition system shall be mountable in a 19 inch rack cabinet. The rack | | | |

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| | should contain electronic units for servomotor, power supplies for probes polarization, pico/micro ampere instrumentation chain calibrator for probe calibration, UPS for safe and reliable power supply and a control PC with redundant CPU. | | | |
| 13 | 4.) Data Acquisition System (DAQ)<br><br>4.0.7.) The PC shall support control software which should manage rake motion (programmable by user), data acquisition from probes, automated calibration of probe input channels and post-processing with visualization of obtained data. | | | |
| 14 | 4.) Data Acquisition System (DAQ)<br><br>4.0.8.) The control software should provide divergence angle of plasma plume and plasma properties after completion of scan. | | | |
| 15 | 4.) Data Acquisition | | | |

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| | System (DAQ)<br><br>4.0.9.) The software shall have instructions and help tab present for easy operation of software. | | | |
| 16 | 4.) Data Acquisition System (DAQ)<br><br>4.0.10.) The control software shall be installed in a personal computer running with a primary CPU. The control PC shall have following configuration: | | | |
| 17 | 4.) Data Acquisition System (DAQ)<br><br>4.0.11.) Processor: Intel core i5 or better | | | |
| 18 | 4.) Data Acquisition System (DAQ)<br><br>4.0.12.) Clock frequency: 3.5GHz or better | | | |
| 19 | 4.) Data Acquisition System (DAQ)<br><br>4.0.13.) RAM: 8 GB 16MHz DDR3 or better | | | |

**Data Acquistion System, Inspection and Acceptance**

**Item Specifications -V**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 4.) Data Acquisition System (DAQ)<br><br>4.0.14.) Hard disk: 2 TB SATA 600-64 MB or better | | | |
| 2 | 4.) Data Acquisition System (DAQ)<br><br>4.0.15.) An additional redundant CPU, having same configurations to primary CPU, shall be provided. | | | |
| 3 | 5.) Inspection and Acceptance of PDS<br><br>5.0.1.) The design of the Plasma Diagnostics System shall be approved by LPSC before system realization. | | | |
| 4 | 5.) INSPECTION & ACCEPTANCE<br><br>5.0.2.) All the makes/brands of equipments and standards shall be provided in the offer itself. | | | |

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| 6 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.1.) System shall be integrated at vendor's site and conduct the following tests (5.1.2. to 5.1.11.). | | | |
| 7 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.2.) The probe rake's movement and control shall be tested using control software. | | | |
| 8 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.3.) The probe's position alignment shall be calibrated using laser pointing device and control software. | | | |
| 9 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.4.) The inductive absolute encoder shall be tested and verified. | | | |

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| 10 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.5.) Control and DAQ software has to be tested and shall run without any glitches or bugs. Also, it shall generate 3D visualization of plasma plume with simulated source data instead of actual plasma plume and shall indicate divergence angle, plasma density, electron temperature, plasma potential and ion energy. | | | |
| 11 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.6.) Demonstration of Graphic User Interface (GUI), report generation, data logging rates, data retrieval system shall be demonstrated. | | | |
| 12 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.7.) The probes DAQ channel calibration using automated instrumentation chain calibrator shall be | | | |

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| | demonstrated. | | | |
| 13 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.8.) All the computer based tests shall also be demonstrated with redundant CPU having installed softwares. | | | |
| 14 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.9.) Galvanic isolation between measuring probes/polarizing circuits and control/DAQ electronics shall be demonstrated. | | | |
| 15 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.10.) Vendor shall concur for participation of LPSC team (if required) in factory acceptance test. | | | |
| 16 | 5.1.) Pre dispatch inspection. ( Factory Acceptance Test – FAT )<br><br>5.1.11.) However detailed | | | |

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| | mutually agreed test plan shall be derived to conduct the Factory Acceptance Test. | | | |
| 17 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.1.) System shall be transported, installed and commissioned at the premises of LPSC, Bangalore and the following tests (5.2.2 to 5.2.9.) shall be carried out in LPSC | | | |
| 18 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.2.) Axis alignment and positioning of probe rake at the LPSC premises shall be accurately carried out and demonstrated. | | | |
| 19 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.3.) Movement of probe rake using the control software shall be matched physically inside the vacuum chamber and correctness in values shall | | | |

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| | be shown. | | | |
| 20 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.4.) Control of all the equipments from PC based control software shall be demonstrated. | | | |

**Inspection and Acceptance, Responsibilties of Vendor, Responsibilities of LPSC, Condition of Acceptance of Offer, Criteria for Cost Comparison, Warranty and After Sales Service**

**Item Specifications -VI**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
|---|---|---|---|---|
| 1 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.5.) The redundant CPU shall be tested (by simulating failure of primary CPU) and used for running Plasma Diagnostics System. | | | |
| 2 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.6.) Voltage isolation between probes/polarizing circuit and control/DAQ | | | |

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| | electronics including 19 inch rake shall be ensured and verified. | | | |
| 3 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.7.) Successful demonstration of complete diagnostics system on Hall Effect Thruster shall be shown for a minimum 50 sweeps. | | | |
| 4 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.8.) The software shall show 3D visualization of plasma plume and shall indicate divergence angle, plasma density, electron temperature, plasma potential and ion energy. | | | |
| 5 | 5.2.) Final acceptance testing (Site Acceptance testing – SAT)<br><br>5.2.9.) The hard copies and soft copies of user manual describing system configuration, hardware management and probes alignment, operating procedures for acquisition, | | | |

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| | calibration and post-processing, system maintenance, troubleshooting and electric schemes shall be provided. | | | |
| 6 | 6.) Responsibilities of Vendor<br><br>6.0.1.) The vendor shall design, supply, integrate, install and commission the Plasma Diagnostics System in the LPSC, Bangalore/ ISRO campus as per the above specification. | | | |
| 7 | 6.) Responsibilities of Vendor<br><br>6.0.2.) To Conduct Factory Acceptance Test (FAT) and Site Acceptance Test (SAT) as per clause 5.1 and 5.2 of the tender document respectively. | | | |
| 8 | 6.) Responsibilities of Vendor<br><br>6.0.3.) Any suggestions or modifications in control software of Plasma Diagnostics System, suggested after Factory Acceptance Test by LPSC Bangalore shall be made. | | | |

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| 9 | 7.) Responsibilities of LPSC<br><br>7.0.1.) To review and approve the design of the system. | | | |
| 10 | 7.) Responsibilities of LPSC<br><br>7.0.2.) To provide pre dispatch clearance after reviewing all the relevant documents of Factory Acceptance Test of Plasma Diagnostic System. | | | |
| 11 | 7.) Responsibilities of LPSC<br><br>7.0.3.) To provide single phase electric power supply (240 V AC, 50 Hz) at LPSC installation site. | | | |
| 12 | 7.) Responsibilities of LPSC<br><br>7.0.4.) To fire the hall effect thruster for testing of diagnostics system at LPSC | | | |
| 13 | 7.) Responsibilities of LPSC<br><br>7.0.5.) To provide final acceptance of the system after reviewing Site Acceptance Test. | | | |

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| 14 | 8.) Conditions For Acceptance Of Offer<br><br>8.0.1.) HERITAGE OF PLASMA DIAGNOSTICS SYSTEM FOR AEROSPACE USERS:<br><br>The party shall have supplied similar diagnostics system working satisfactorily for reputed Electric propulsion development agency. They shall furnish the details of the company (address, year of supply, commissioning date & customer feedback) with this offer. | | | |
| 15 | 8.) Conditions For Acceptance Of Offer<br><br>8.0.2.) The vendor shall select the reputed make or brand of all the equipments (power supplies, DAQ unit etc.) during offer period itself. The complete list of the commercial off the shelf (COTS) parts shall be provided in the offer itself. Offers without datasheets will be rejected. | | | |

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| 16 | 8.) Conditions For Acceptance Of Offer<br><br>8.0.3.) NON-COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (AMC):<br><br>The suppliers shall compulsorily undertake AMC of 3 years for the 'Plasma Diagnostic System' after completion of warranty period. The scope of work under AMC is given in Clause 13.0 of tender document. | | | |
| 17 | 8.) Conditions For Acceptance Of Offer<br><br>8.0.4.) Vendor shall provide complete block diagram of the system DAQ architecture and explain in detail the probe alignment process. | | | |
| 18 | 9.) Criteria for Cost Comparison:<br><br>9.0.1) Suppliers shall note that the criteria for cost comparison shall be for:• Cost of the Plasma Diagnostics System as per specification scope of the tender document. • Cost for Non-comprehensive | | | |

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| | AMC for 3 years. | | | |
| 19 | 10.) Warranty and After Sales Service<br><br>10.0.1) The plasma diagnostics systems shall be warranted for a minimum period of 12 months from the date of final acceptance of the system at LPSC. | | | |
| 20 | 10.) Warranty and After Sales Service<br><br>10.0.2) Post warranty period, the vendor shall concur to provide/sell custom made spare parts and software updates for a minimum period of ten years. | | | |

**Delivery schedule, Deliverables**

**Item Specifications -VII**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 10.) Warranty and After Sales Service<br><br>10.0.3) Vendor shall provide comprehensive list of recommended spares & | | | |

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| | consumables required for Plasma Diagnostic System. | | | |
| 2 | 11.) Delivery Schedule<br><br>11.0.1.) The design, procuring, manufacturing and factory acceptance test (as per clause 5.1.) shall be completed within 12 months from the release of purchase order. | | | |
| 3 | 11.) Delivery Schedule<br><br>11.0.2.) Installation and commissioning of the system and site acceptance test (as per clause 5.2.) at LPSC, Bangalore shall be carried out within 2 months after arrival of the items at LPSC. | | | |
| 4 | 12.) Deliverables :: Quantity<br><br>12.0.1.) Faraday Cup probes + spares: 19+2 | | | |
| 5 | 12.) Deliverables :: Quantity<br><br>12.0.2.) 4 grid Retarding Potential Analyzer probes (one central and two | | | |

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| | optional probes, that can be mounted on the rack by substituting two of the Faraday Cups) + spares: 3+1 | | | |
| 6 | 12.) Deliverables :: Quantity<br><br>12.0.3.) Triple electrode Langmuir probes + spares: 1+1 | | | |
| 7 | 12.) Deliverables :: Quantity<br><br>12.0.4.) Rotary rake with brushless servomotor, gearbox and inductive absolute encoder for scanning plasma plume: 1 | | | |
| 8 | 12.) Deliverables :: Quantity<br><br>12.0.5.) 19 inch rack cabinet: 1 | | | |
| 9 | 12.) Deliverables :: Quantity<br><br>12.0.6.) Personal computer with software for analysis and visualization: 1 | | | |

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| 10 | 12.) Deliverables :: Quantity<br><br>12.0.7.) Redundant CPU for PC having same configuration as primary CPU: 1 | | | |
| 11 | 12.) Deliverables :: Quantity<br><br>12.0.8.) UPS: 1 | | | |
| 12 | 12.) Deliverables :: Quantity<br><br>12.0.9.) Automated instrumentation chain calibrator: 1 | | | |
| 13 | 12.) Deliverables :: Quantity<br><br>12.0.10.) Data acquisition unit and its electronics: 1 | | | |
| 14 | 12.) Deliverables<br><br>12.0.11.) Necessary mechanical interfaces with LPSC vacuum facility, feedthrough and cables used in the system. | | | |
| 15 | 12.) Deliverables<br><br>12.0.12.) Necessary power | | | |

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| | supplies for biasing Faraday Cups, Retarding Potential Analyzer, Langmuir Probe, signal conditioning and controlling rake motion. | | | |
| 16 | 12.) Deliverables<br><br>12.0.13.) Control software for probe rake control, data acquisition & logging, channel calibration and for measuring divergence angle, plasma density, electron temperature, plasma potential, plasma energy and generating 3D profile of plasma plume. | | | |

**Annual Maintenace Contract**

**Item Specifications -VIII**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 13.) Annual Maintenance Contract<br><br>13.0.1.) The contract shall be of non-comprehensive type and it includes both preventive maintenance and breakdown maintenance. | | | |

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| 2 | 13.) Annual Maintenance Contract<br><br>13.0.2.) The period of annual maintenance contract shall be of three years. | | | |
| 3 | 13.) Annual Maintenance Contract<br><br>13.0.3.) Preventive maintenance of three days shall be carried out once in a year. | | | |
| 4 | 13.) Annual Maintenance Contract<br><br>13.0.4.) Any number of breakdown calls shall be attended on need basis by the vendor on payment basis. | | | |
| 5 | 13.) Annual Maintenance Contract<br><br>13.0.5.) Vendor shall quote price on per man day basis towards breakdown maintenance charge. The price shall be inclusive of conveyance, hotel charges, service charges and other miscellaneous charges. | | | |

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| 6 | 13.) Annual Maintenance Contract<br><br>13.0.6.) Spares required for AMC will be provided or procured by LPSC, Bangalore. | | | |
| 7 | 13.) Annual Maintenance Contract<br><br>13.0.7.) Vendor shall provide mechanical, electrical & electronics and software maintenance support for Plasma Diagnostics System. The scope of work under annual maintenance contract involves following clauses. | | | |
| 8 | 13.1.) Probe rake system<br><br>13.1.1.) Visually inspect all the diagnostic probes (Faraday Cups, Retarding Potential Analyzer and Langmuir Probe) for any deviations. | | | |
| 9 | 13.1.) Probe rake system<br><br>13.1.2.) Check the wire integrity, insulation loss or any electrical damage of all the system wires | | | |

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| | present inside the vacuum chamber. | | | |
| 10 | 13.1.) Probe rake system<br><br>13.1.3.) Verify the angular deflection of probe rake compared to the command from control software. | | | |
| 11 | 13.1.) Probe rake system<br><br>13.1.4.) Functional check of the absolute encoder, servo motor and its drive system. | | | |
| 12 | 13.2.) Control software and Data Acquisition System<br><br>13.2.1.) Ensure communication between power supplies and servomotor drive with PC. | | | |
| 13 | 13.2.Control software and Data Acquisition System<br><br>13.2.2.) Ensure communication between data acquisition unit and PC. | | | |

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| 14 | 13.2.) Control software and Data Acquisition System<br><br>13.2.3.) Control software feature enhancements, latest updates and bug fixes. | | | |
| 15 | 13.2.) Control software and Data Acquisition System<br><br>13.2.4.) Check the redundant CPU and its configuration with respect to primary CPU. | | | |
| 16 | 13.2.) Control software and Data Acquisition System<br><br>12.2.5.) Check for operating system security updates. | | | |
| 17 | 13.2.) Control software and Data Acquisition System<br><br>12.2.6.) Check input output signals of data acquisition unit cards. | | | |
| 18 | 13.2.) Control software and Data Acquisition System | | | |

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| | 13.2.7.) Cleanup and backup of hard disk. | | | |
| 19 | 13.2.) Control software and Data Acquisition System<br><br>13.2.8.) Create system recovery image. | | | |
| 20 | 13.3.) Electronics and Insulation checks<br><br>13.3.1.) Check the insulation between probe rake and high voltage probe biasing power supplies. | | | |

**Annual Maintenance Contract**

**Item Specifications -IX**

| Sl. No | Specifications | Compliance (Yes /No) | Offered Specifications | Re |
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| 1 | 13.3.) Electronics and Insulation checks<br><br>13.3.2.) Visually inspect the electric wire feedthrough and the wires running outside the chamber for any insulation losses or any electrical damage. | | | |

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| 2 | 13.3.) Electronics and Insulation checks<br><br>13.3.3.) Ensure communication between signal conditioning unit and data acquisition unit. | | | |
| 3 | 13.3.) Electronics and Insulation checks<br><br>13.3.4.) Functional check of the probe biasing power supplies and its calibration. | | | |
| 4 | 13.3.) Electronics and Insulation checks<br><br>13.3.5.) Functional check of instrumentation chain calibrator and its calibration. | | | |
| 5 | 13.3.) Electronics and Insulation checks<br><br>13.3.6.) Functional check of probe signal conditioning system. | | | |
| 6 | 13.3.) Electronics and Insulation checks<br><br>13.3.7.) Functional check | | | |

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| | of the UPS. | | | |

**Supporting Documents from Vendor**

**Attachment - I:**

**Attachment - II:**

**Vendor Specificied Terms**

| Description | Vendor Terms |
|---|---|
| This is a Two Part Tender. Do not mention price element in Technical Bid. If any price element mentioned in Technical bid, your offer will not be considered.<br><br>[breakup cost shall be upload in supporting documents from vendor ( price bid/breakup)]<br><br>(1)Packing and Forwarding (P&F):P & F charges, if any, (If mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Vendor Terms). | |
| (2)GST for Indigenous Supply:Please mention applicable GST percentage in the offer<br><br>a)Please refer Sl. No: 1 of Government Of India, Ministry Of Finance, Notification Number 47/2017 integrated Tax (rate) dated: 14/11/2017, the applicable percentage of GST is 5% only for the supply of Goods. Necessary Certificate will be issued later.<br><br>b)Please refer Sl. No: 1 of Government Of Karnataka, Finance Secretariat, Notification Number 45/2017 FD 48 CSL 2017, BENGALURU, dated: 14/11/2017, the applicable percentage of GST is 5% only for the supply of Goods. Necessary Certificate will be issued | |

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| later.<br><br>c)In case of services (i.e., Installation, commissioning & testing and AMC, etc.,) GST @18% extra. | |
| (3)Duties & Levies for Foreign supply:<br><br>a) LPSC is providing concession certificate towards the of payment of Customs Duty vide as per the Customs Notification No. 50/2017, Sl. No. 539(b)-CUSTOMS Dated 30.06.2017 & Amendment No: 5/2018, Sl. No. 539(a) - CUSTOMS Dated: 25/01/2018.<br><br>b) GST is not applicable for imported items. | |
| (4) Installation Charges:<br><br>If any, mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Vendor Terms. | |
| (5) Delivery Terms:<br><br>In case of Indigenous Supplier : FOR LPSC, BANGALORE | |
| (6) Delivery Terms:<br><br>In case of Foreign Suppliers: EX-WORKS / FOB /FCA | |
| (7) Freight charges:<br><br>If any, mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Vendor Terms. | |
| (8) Delivery Period:<br><br>I. The design, procuring, manufacturing and factory acceptance test (as per clause 5.1.) shall be completed within 12 months from the release | |

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| of purchase order.<br><br>II. Installation and commissioning of the system and site acceptance test (as per clause 5.2.) at LPSC, Bangalore shall be carried out within 2 months after arrival of the items at LPSC.<br><br>Refer Clause No. 11 | |
| (9) Payment Terms for Indigenous Orders:<br><br>100% payment shall be made through RTGS within 30 days after receipt (including installation & commissioning) and acceptance of the item at our site. | |
| (10) Payment Terms for Foreign Orders:<br><br>Payment term shall be Sight Draft OR 90% by Irrevocable Letter of Credit and balance 10% by wire transfer after receipt (including installation & commissioning) and acceptance of the ordered item. | |
| (11) Liquidated Damages (LD):<br><br>If the ordered items are not supplied within the delivery schedule, LD shall be levied from your bill @ 0.5% of the order value per week or 0.5% of the value of the stores for which the delivery is delayed for each week of delay subject to a maximum of 10% of the order value. (NOTE : This is a mandatory clause) | |
| (12) Warranty :<br><br>I. The plasma diagnostics systems shall be warranted for a minimum period of 12 months from the date of final acceptance of the system at LPSC.<br><br>II. Post warranty period, the vendor shall concur to provide/sell custom made spare parts and software updates for a minimum period of ten years.<br><br>III. Vendor shall provide comprehensive list of recommended spares & | |

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| consumables required for Plasma Diagnostic System.<br><br>Refer Clause No. 10 | |
| (13) Security Deposit (SD) : You have to furnish a Bank Guarantee for 10% of the order value within 10 days of receipt of order towards the faithful execution of the order valid till the completion of the scope of work as per order plus sixty days. (This will be returned to you immediately on execution of the order satisfactorily as per order terms. In case of non-performance / poor performance, the amount will be forfeited). | |
| (14) Performance Bank Guarantee (PBG) :<br><br>You have to submit a PBG from a Nationalised / Scheduled Bank for 10% of the order value towards the performance of the system at the time of supply valid till the completion of warranty period plus 60 days as per the format provided by the Department. OR 10% of the order value shall be with held till the completion of Warranty Period plus 60 days. | |
| (15) Security Deposit cum Performance Bank Guarantee (SD cum PBG):<br><br>In case, if parties are unable to provide two separate BGs, i.e., one for SD and one for PBG, they can submit a combined BG for SD cum PBG within 10 days of receipt of order for 10% of order value valid till the completion of total contractual obligation (i.e., supply period + warranty period + 60 days) as per the format provided by the Department. | |
| (16) Details of Principal:<br><br>Address, contact details like Telephone Number, Fax, e-mail etc., (if applicable) | |
| (17) Details of Indian Agent:<br><br>Address, contact details like Telephone Number, Fax, e-mail etc., (if | |

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| applicable) | |
| (18) ARBITRATION:<br><br>In the event of dispute or difference arising out of or in connection with this purchase order/contract, which cannot be resolved through amicable settlement by mutual consultation, the same shall be settled under the Rules of Arbitration & Conciliation act 1996 under the Indian statue only, whose decision shall be final and binding on both the parties. | |
| (19) JURISDICTION:<br><br>The Courts in and around the City of Bangalore alone shall have jurisdiction to deal with and decide any matter or dispute whatsoever arising out of this agreement including those arising under the Arbitration Act. | |
| (20) Any other terms: | |

**Vendor Specificied Terms I**

| Description | Vendor Terms |
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| (21) In case two or more tenders are received from an Indian agent on behalf of more than one foreign Principal/OEM, in the same tender for the same item/product will not be considered. | |
| (22) Purchase/Preference to MSEs: Purchase/Price Preference shall be extended to the MSEs under the Public Procurement Policy for MSEs formulated under the Micro, Small & Medium Enterprises Development Act 2006. Necessary authenticated documentary evidences shall be submitted along with your offer. NOTE: This is not applicable for foreign Suppliers. | |
| (23) Insurance :<br><br>Being a Government of India Department, Insurance is not required at | |

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| our cost. Please ensure the safe delivery of the ordered item with proper AIR / SEA / ROAD worthy packing. | |
| (24) Validity of Offer :<br><br>(a) The validity of the offers should be 90 days (in case of single part tender) from the date of opening of the tenders.<br><br>(b) The validity of the offers should be 120 days (in case two part tender) from the date of opening of the tenders.<br><br>NOTE : Tenders validity period shorter than offer validity mentioned above will not be considered for evaluation. | |
| (25) In case of foreign orders:<br><br>(a) Please specify whether any Export clearance is required. If it is required please provide End User Certificate format along with offer.<br><br>(b) Please specify whether any Agency Commission is involved or not. If YES mention the percentage of Agency Commission. [Agency Commission shall be claimed by the Indian Agent through an Invoice. The Agency Commission shall be paid to the Indian Agent in Indian Rupees worked out on the basis of Telegraphic Transfer buying rate of exchange prevailing on the date of placement of the Purchase order/Contract and shall be paid within 30 days from the date of satisfactory acceptance of the item at our site. Distributers are not eligible for Agency Commission] | |
| (26) Special conditions against Indian Agents submitting quotations in Foreign Currency:<br><br>(a) Foreign Principals proforma invoice indicating the commission payable to the Indian Agent and nature of after sales service to be rendered by the Indian Agent.<br><br>(b) Copy of Agency agreement with the Foreign Principal and Indian agent, precise relationship between them and their mutual interest in the business. | |

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| (c) Copy of registration and item empanelment of the Indian agent. | |
| (27) Address, contact details like Telephone Number, Fax, e-mail etc., on which order to be placed. | |
| (28) Offers received through fax or email or unsigned will not be considered. | |
| (29) You shall provide suppliers bank details such as name of the bank, IFSC code, IBAN Number, SWIFT etc., along with your offer which shall be not be changed till completion of payment. | |
| (30) The tenders received from Indian agents on behalf of their foreign Principals/OEMs (in cases where the Principals/OEMs also submit their tenders simultaneously for the same item/product in the same tender) the same will be not be considered. | |
| (31) Criteria for Cost Comparison:<br><br>Suppliers shall note that the criteria for cost comparison shall be for:<br><br>a. Cost of the Plasma Diagnostics System as per specification scope of the tenderdocument.<br><br>b. Cost for Non-comprehensive AMC for 3 years.<br><br>Refer Clause No. 9 | |
| (32) This is a Two Part Tender. Do not mention price element in Technical Bid. If any price element mentioned in Technical bid, your offer will not be considered.<br><br>[breakup cost shall be upload in supporting documents from vendor ( price bid/breakup)] | |
| (33) Kindly mention the quoted currency. | |
| (34) Approximate weight of the consignment. | |

**Vendor Specificied Terms for AMC**

| Description | Vendor Terms |
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| (1) Vendor shall offer Non- Comprehensive (AMC) after expiry of the warranty period for a period of Three years. The scope of the non comprehensive AMC shall be as under.<br><br>Refer Clause No. 8.0.3. | |
| (2) Preventive Maintenance: Preventive maintenance of three days shall be carried out once in a year.<br><br>Refer Clause No. 13.0.3. | |
| (3) Break down maintenance:Vendor shall quote price on per man day basis towards breakdown maintenance charge. Theprice shall be inclusive of conveyance, hotel charges, service charges and other miscellaneouscharges.<br><br>Refer Clause No. 13.0.5. | |
| (4) Other terms and conditions: For the AMC, lump sum cost may be quoted. However, for breakdown maintenance call, cost may be quoted on per day basis so that the breakdown maintenance charges can be paid at actual depending on the number of days for which work has been carried out. | |
| (5)PAYMENT TERMS : Maintenance charges shall be paid after every yearly proportionately on completion of each satisfactory service. However, at the end of each service, a Service Report duly signed by contractor, Indentor and duly approved by Indentors Divisional Head shall be obtained from the user division to the effect that the system have been serviced and is working satisfactorily and the certified service report shall be submitted to the Sr. Accounts Officer, LPSC, along with your bill/invoice in duplicate with a copy to Purchase Officer. | |

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| (6)SECURITY DEPOSIT : The party shall submit the security deposit equivalent to 10% of the AMC value till the completion of contract in the form of bank guarantee or either form of negotiable instrument valid for the total AMC period, issued by a nationalized or scheduled bank in the form of Rs. 200 non-judicial stamp paper before commencement of the work in favour of Senior Accounts Officer, LPSC, Bangalore. This security deposit will be returned (interest free) after the successful completion of Annual maintenance Contract. The security deposit shall have a further claim period of 6 months. | |
| (7)Maintenance shall be carried out at our premises only. In case any item has to be taken to your premises for repairs, necessary Bank Guarantee for the value of the item shall be furnished, and valid till returning of the item. | |
| (8) During AMC, in the event of damages to our property or injury to our personnel due to the negligence of your employees, the responsibility shall solely rests with you. | |
| (9) ARBITRATION:In the event of dispute or difference arising out of or in connection with this purchase order/contract, which cannot be resolved through amicable settlement by mutual consultation, the same shall be settled under the Rules of Arbitration & Conciliation act 1996 under the Indian statue only, whose decision shall be final and binding on both the parties. | |
| (10) JURISDICTION:The Courts in and around the City of Bangalore alone shall have jurisdiction to deal with and decide any matter or dispute whatsoever arising out of this agreement including those arising under the Arbitration Act. | |
| (11) Income Tax:As applicable shall be deducted from your Bill, at source.NOTE: Applicable for Indian Service Providers. | |
| (12) You shall provide suppliers bank details such as name of the bank, IFSC code, IBAN Number, SWIFT etc., along with your offer which shall be not be changed till completion of payment. | |
| (13) NOTE: If the service provider is from INDIA, then the quotation shall be in Indian Rupees only. | |
| (14) Spares required for AMC will be provided or procured by LPSC, Bangalore. | |

**Price Bid Form**

| Item Description | Slab Range | Qty | UOM | Currency | Unit Price |
|---|---|---|---|---|---|
| DAQ SYSTEM Annual Maintenance Contract of 2nd year | - | 1 | Years | - | - |
| DAQ SYSTEM Annual Maintenance Contract of 3rd year | - | 1 | Years | - | - |
| DAQ SYSTEM Plasma Diagnostics System for three dimensional spherical scan of plasma plume of Hall effect thruster (Any Break up cost shall be uploaded in supporting documents from vendor in Price bid only) | - | 1 | No. | - | - |
| DAQ SYSTEM Annual Maintenance Contract of 1st year | - | 1 | Years | - | - |

Break-up of other taxes and other costs should be specified in respective narration columns.

Sum of these Break-up values should be specified in respective value columns.

**Supporting Documents from Vendor(price bid/breakup)**

**Attachment - I:**

**Attachment - II:**

**Attachment - III:**

**Attachment - IV:**

**Please attach break up cost, if any.**