

PART 2

REQUIREMENT SPECIFICATIONS

1. SCOPE OF TENDER

The scope of this tender is for the Supply, Delivery, Installation and Commissioning of Liquid Chromatography High Resolution Mass Spectrometer (LC-HRMS) to the Department of Chemistry, Faculty of Science, National University of Singapore.

2. TECHNICAL SPECIFICATIONS

2.1 Liquid Chromatograph Specifications

- a. Binary pump with degasser
 - i. High pressure gradient
 - ii. Gradient channel: at least 2 channels
 - iii. Gradient composition precision: $< 0.15\%$ or 0.02 min
 - iv. Operating pressure limit: 700 bar @ 2 mL/min and above
 - v. Flow precision: $< 0.075\%$ (RSD) or ≤ 0.02 min (SD)
 - vi. Flow rate accuracy: 1% or 10 $\mu\text{L}/\text{min}$
 - vii. pH range: 1 to 10
 - viii. Maximal operating flow rate: at least 5 mL/min
- b. Autosampler
 - i. Injection range: 0.1 to 100 μL and above
 - ii. Carryover: $< 0.001\%$
- c. Column oven
 - i. Temperature range: $+10^{\circ}\text{C}$ to 90°C and above, with 1°C increments
 - ii. Temperature accuracy: 0.5°C or better

2.2 High Resolution Mass Spectrometer Specifications

- a. Include Electrospray Ion Source
- b. Must have collision-induced dissociation (CID) MS/MS capability
- c. Mass resolution power (FWHM): $> 30,000$ for small molecule ($m/z < 300$), $> 60,000$ for bigger molecule ($m/z > 1000$)
- d. Mass range: 50 to 10,000 and above
- e. Full scan mass accuracy: mass error < 2 ppm (internal calibration), mass error < 5 ppm (external calibration)
- f. Full scan sensitivity: 1 pg reserpine S/N $> 50:1$ RMS
- g. MS/MS sensitivity: 1 pg reserpine S/N $> 1000:1$ or 2.5 fmol Glu-Fibrinopeptide B S/N $> 50:1$
- h. Full scan acquisition rate: ≥ 50 Hz
- i. MS/MS acquisition rate: ≥ 30 Hz

2.3 PC and Software for Data Acquisition and Processing

- a. Data acquisition/processing computer with monitor
- b. Data-dependent MS/MS scan function
- c. Data processing software provide macros feature or provide dynamic-link library to access raw data or equivalent direct raw data access solution

2.4 Options

Tenderers shall quote for the following options in the Schedule to Form of Tender. These options shall be exercisable by NUS upon award of tender.

- a) Diode Array Detector

- i. Number of diode: 1024
 - ii. Diode width: < 1 nm
 - iii. Wavelength range: 190 nm to 950 nm and above
 - iv. Wavelength accuracy: +/- 1nm
 - v. Data acquisition rate: 100 Hz and above
- b) Extended warranty or comprehensive service contract for variable years: This option shall include all cost of repairs, including but not limited to spare parts, consumables, labour, transport and accommodation. The option is commencing from the end of the warranty period of the year addressed.
- c) Additional data processing software license

3. OTHER REQUIREMENTS

3.1 Utilities Requirement

Utilities requirement for the system should be specified in detail in the tender submission. The tenderer is required to be accurate and specific in specifying all the equipment consumption and emission ratings (for example, electrical input current rating, water supply, compressed air supply, exhaust ratings, etc., where applicable).

3.2 Safety Requirements

At all times in its performance of the works described above, the Contractor shall comply with all safety rules and regulations stipulated by the relevant authorities as well as and in accordance with industry best practices. At all times in its performance of the works described above, the Contractor shall possess and maintain (and shall ensure all its employees or contractors performing the works shall possess) all relevant certificates and permits required under law for its performance of the works described in above, including any certificates or legal documents required by NUS. Tenderers are to submit all relevant certificates and permits required under law as part of tender submission, and during the period of the Contract, shall provide copies of such certificates at NUS' request from time to time.

3.3 Factory Acceptance Test (FAT)

- a) The Tenderer should provide as part of its tender submission the factory acceptance test protocol as recommended by the manufacturer so as to demonstrate full compliance to the Specifications. NUS reserves the right to amend the protocol as it deems necessary. The Tenderer agrees to perform the acceptance test as agreed, to the satisfaction of NUS.
- b) Factory Test Acceptance Test Criteria. The factory acceptance test shall include, but not limited to:
 - i. Mass resolution test
 - ii. Mass accuracy test
 - iii. Sensitivity test

3.4 Delivery

DDP (Delivery Duty Paid; Incoterms 2010) to National University of Singapore. The Contractor shall be fully responsible for all transport required for the delivery of the Goods to NUS designated site. The Contractor shall also arrange for all insurance required including coverage for loss of or damage to the Goods during conveyance or transportation to NUS designated site, at no additional cost and expense to NUS.

3.5 Price

- a) Pricing shall include freight and insurance to the delivery location.
- b) All software to enable the proper functioning and use of the system to meet the requirements of NUS will be supplied together with the equipment. The license fees for all software shall be included within the Contract price. Contractor and/or its software licensor shall grant and NUS shall have the perpetual right and licence to use the software and such right and license shall be transferable upon the transfer or sale of the system.

3.6 Export and Import licenses

Export / Import licenses if required, should be clearly indicated.

The Tenderer shall provide any export/import licenses to NUS as may be required. The Tenderer shall make its own arrangements regarding import and export licenses, custom and import duties and all related matters from their manufacturing/production origination to the NUS designated site.

3.7 Site Preparation

The Tenderer shall provide in its tender submission the information with regard to the dimensions and weights of the various component parts of the system as well as any specific site or environmental requirements. Within one month of the award of tender, the Contractor shall supply to NUS such information and assistance as may be necessary to enable NUS to conduct site preparation for the installation of the system.

3.8 Installation, Commissioning and Training

- a) **Installation**
Equipment should be installed without disruption to normal operations. The Contractor shall warrant that upon its delivery and installation, each item of the system shall be in good working order and will conform to the Requirement Specifications and the Contractor's official published specifications. The Contractor shall provide all tools and equipment necessary for the installation of the system at no additional charge.
- b) **Commissioning**
Equipment commissioning should be carried out for full functionality of hardware, software and process.

c) **Training**

Training should be carried out after the commissioning of the equipment for at least 5 personnel. The training should cover software and hardware operation, as well as the standard maintenance requirements.

3.9 Site Acceptance Test (SAT)

- a) The Site Acceptance Test is to be inspected by mass spectrometry laboratory personnel from NUS.
- b) The Tenderer should provide as part of its tender submission the Site Acceptance Test protocol as recommended by the manufacturer so as to demonstrate full compliance to Specifications. NUS reserves the right to amend the protocol as it deems necessary. The Tenderer agrees to perform the acceptance test as agreed, to the satisfaction of NUS.
- c) Site Acceptance Test Criteria. The site acceptance test shall include, but not limited to:
 - i. Mass resolution test
 - ii. Mass accuracy test
 - iii. Sensitivity test

3.10 Documentation

- a) Three (3) sets of operation and maintenance service manuals in English should be provided.
- b) One (1) set of Factory Acceptance Test report in English (softcopy) shall be submitted within 14 working days upon satisfactory completion of factory acceptance test.
- c) One (1) set of Site Acceptance Test report in English (hardcopy and softcopy) shall be submitted within 14 working days upon satisfactory completion of site acceptance test.

3.11 Support and Maintenance

- a) On completion of training, further application advice, if required, shall be made free of charge via telephone, email, fax or modem.
- b) The Tenderer should provide on-time support for system maintenance, software and hardware troubleshooting. "On-time support" refers to response/help within 48 hours after NUS calls or email; or, if actual physical support at NUS's site is required, it is attendance within 14 business days if system fails to be back into operation with remote support.
- c) Tenderers shall ensure availability of critical spare parts and consumables for at least 10 years. A list of recommended preventive maintenance guidelines shall be provided as part of the tender documentation.

3.12 Warranty

The system should have a minimum 12 months on-site comprehensive warranty. The warranty shall include all cost of repairs, including but not limited to spare parts,

consumables, labour, transport and accommodation. The warranty period shall commence upon satisfactory completion of the Site Acceptance Tests.

3.13 Track Record

Tenderers shall provide track records and references of past projects for similar system installations in the past 5 years.

3.14 Delivery Timeline

Tenderers shall provide the delivery timeline.

For clarifications on technical specifications listed herein, tenderers may contact:

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Email : chmyuch@nus.edu.sg

EVALUATION CRITERIA

The following criteria will be used in the evaluation of this tender.

1. Critical Criteria:

Tenderers must satisfy the following critical criteria before their tender proposal will be further evaluated:

- a) Tenderers shall not be debarred from participating in NUS tenders.
- b) Compliance with the Technical Specifications listed in Sections 2.1 to 2.3.

2. Other Criteria:

Tenders shall be evaluated based on a Price versus Quality matrix of 30% to 70%.

- a) Competitive Pricing (30%)
- b) Compliance with Requirement Specifications, excluding the Technical Specifications listed in Critical Criteria 1 (b) (25%)
- c) Quality of Proposal - Ability to exceed requirement requirements in accordance with NUS' needs (30%)
- d) Possess a valid registration certificate with the appropriate Government Registration Authority (5%)
Supply Head Reference: EPPU S4
Financial Grade: up to S\$500,000 and above
EPU/LAB/30 - Laboratory equipment and accessories and/or
EPU/LTE/10 – Laboratory Testing and Survey Equipment
- e) Track record in section 3.13 (5%)
- f) Ability to meet delivery schedule (5%)