

Should your offer be accepted, the Requirement Specifications as set out in this Part and shall govern the Contract between the Authority and your company.

Equipment: Fast Liquid Chromatograph	Compliance (Yes/ No) <i>*If No, please indicate reason of non-compliances.</i>
Location: IDL	
(1) Critical Specifications	
a) The proposed system must be a Fast Liquid Chromatograph	☒ Yes/ ☐ No
b) The entire system must be a unified platform to be supplied by a single Contractor to ensure seamless operation	☒ Yes/ ☐ No
c) The Tenderer must demonstrate that it has a proven appropriate set-up and capability to provide after-sales service efficiently and effectively in Singapore for the proposed system in the tender or other fast LC system by the same manufacturer. The service engineers must be qualified to provide the after-sales services for the proposed system. A copy of certification shall be submitted for evaluation upon request. Please provide at least 3 track records for the proposed model or other fast LC system for the sales/ provision of maintenance support of fast LC system in Singapore from 2018 to 2020 in Annex C to Part 3 – Price and Submission Information .	☒ Yes/ ☐ No
(2) Binary/Quaternary pump	
a) Allow gradient formation	☒ Yes/ ☐ No
b) Should have at least one dual pistons with servo-controlled variable stroke drive, floating piston design and active inlet valve (or equivalent)	☒ Yes/ ☐ No
c) Should be capable of standalone operation when software is not in use	☒ Yes/ ☐ No
d) Flow range: minimum 0.050 to 2.200 mL/min with 0.01 mL/min increments (or better)	☒ Yes/ ☐ No
e) Flow precision: $\leq 0.075\%$ RSD	☒ Yes/ ☐ No
f) Flow rate accuracy: within $\pm 1\%$ of set value or 10 mL/min, whichever greater	☒ Yes/ ☐ No
g) Operating pressure range should be able to reach up to at least 800 bars	☒ Yes/ ☐ No
h) Pressure pulsation: $\leq 2\%$ amplitude or ≤ 3 bar or whichever better, at 1 mL/min isopropanol for all pressures above 10 bars	☒ Yes/ ☐ No
i) Compressibility: Pre-defined, based on mobile phase compressibility	☒ Yes/ ☐ No
j) Working pH range for all components: minimum 2 to 12 to be available as standard	☒ Yes/ ☐ No
k) Compatible with phosphate buffers.	☒ Yes/ ☐ No
l) Pump delay volume: ≤ 900 μ L	☒ Yes/ ☐ No

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m) Composition range: Settable from 0 – 100% per channel	☒ Yes/ ☐ No
n) Composition precision: $\leq 0.5\%$ RSD	☒ Yes/ ☐ No
o) Composition accuracy: $\leq 0.5\%$ absolute	☒ Yes/ ☐ No
p) Should have solvent selection valve in order to combine 2 out of 4 solvents for binary gradient or to select different solvent for flushing column	☒ Yes/ ☐ No
q) Pump must be able to run with existing columns sizes as follow: - ID 2.1 mm, 3 mm and 4.6 mm; 5 μm, 3.5 μm and sub-2-μm particle columns; and - Superficially porous columns.	☒ Yes/ ☐ No
r) Inclusive of solvent cabinet; complete with minimum five sets of filters and caps (with 4 holes) and automatic rinsing kit	☒ Yes/ ☐ No
s) The Contractor is required to provide solvent cabinet(s) that able to hold at least one 5-litre round bottle (with circumference of approx. 60cm) together with three 1-litre round bottles (with circumference of approx. 33cm)	☒ Yes/ ☐ No
(3) Solvent degasser	
a) No. of independent channels: at least 4	☒ Yes/ ☐ No
b) Internal volume: At least 400 μL per channel to allow for fast and easy flushing, purging, priming, and solvent exchange	☒ Yes/ ☐ No
c) Working pH range for all components: at least 2 – 12 as standard	☒ Yes/ ☐ No
(4) Auto-sampler	
a) Operating pressure range shall be able to reach up to at least 800 bars	☒ Yes/ ☐ No
b) Able to accommodate minimum 96 samples of 2 mL vials	☒ Yes/ ☐ No
c) Able to use vials with rubber, silicone and PTFE septa as well as insert	☒ Yes/ ☐ No
d) Minimum Injection volume: 0.1 - 10 μL without loop change in $\leq 0.1 \mu\text{L}$ increments	☒ Yes/ ☐ No
e) Precision: $<0.3\%$ RSD	☒ Yes/ ☐ No
f) Accuracy: $\leq 2\%$	☒ Yes/ ☐ No
g) Automated or programmed needle wash function which can be turned on or off to minimise carryover. Needle wash function should preferably not impact sample loop and injection volume. Contractor should provide	☒ Yes/ ☐ No

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clear information from existing published material on how the needle wash is carried out	
h) Additional needle flush station with a peristaltic pump or equivalent function to wash the exterior of the needle	☒ Yes/ No
i) Carryover must be $\leq 0.1\%$ without needle wash (if applicable); and $< 0.05\%$ with external needle wash. No carryover should be observed using 12 mg/mL of caffeine at UV wavelength of 280 nm with needle wash.	☒ Yes/ No
j) Injection cycle time: Not more than 50 sec per sample	☒ Yes/ No
k) Equipped with high pressure valve that allows use of 1.8- μ m fully porous particle column or superficially porous column	☒ Yes/ No
l) Pre-treatment function that minimally includes reagent addition, dilution and mixing must be available.	☒ Yes/ No
m) Overlapped injection ability to increase productivity that can be used with both full and partial sequence run	☒ Yes/ No
n) System must have a transport mechanism that uses an X-Z-Theta robot (or equivalent) to optimise vial positioning by the gripper arm of the autosampler.	☒ Yes/ No
o) Autosampler should be able to perform injection from the correct vial position consistently for all samples on sample tray. There should be no instances for wrong vial injected or skipping of vials.	☒ Yes/ No
p) Needle material or needle coating should be compatible with vials using rubber, silicone and PTFE septa and be able to withstand high throughput injections without significant wear off or carryover. Published information about the needle material and ruggedness shall be submitted upon request.	☒ Yes/ No
q) The price quoted shall include at least: (1) 1 x minimum 96-vial (2-ml) thermostatted tray (4°C to 40°C); and (2) 1 x 40-vial (2-ml) tray (if applicable)	☒ Yes/ No
(5) Column compartment	
a) Temperature range: 10 °C below ambient to at least 80 °C	☒ Yes/ No
b) Temperature accuracy: $\pm 1^\circ\text{C}$ or less	☒ Yes/ No
c) Column capacity: at least 2 columns of 300 mm length	☒ Yes/ No
d) One column switcher to switch minimally between two columns (at least 300 mm length).	☒ Yes/ No
(6) Diode Array Detector	

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a) Detection type: At least 512-element photodiode array	☒ Yes/ No
b) Lamp type: Deuterium lamp	☒ Yes/ No
c) Able to monitor at least 4 compound specific wavelengths simultaneously during a single analysis without loss in sensitivity	☒ Yes/ No
d) Signal and spectra sampling rate: ≥ 80 Hz	☒ Yes/ No
e) Short-term noise: $<\pm 8 \mu\text{AU}/\text{cm}$ with 10 mm path length cartridge cell	☒ Yes/ No
f) Signal drift: $\leq 1 \times 10^{-3}$ AU/hr at 230 nm or equivalent	☒ Yes/ No
g) Upper linearity limit: ≥ 2.0 AU (Based on ASTM method)	☒ Yes/ No
h) Wavelength range: At least 190 – 500 nm	☒ Yes/ No
i) Wavelength accuracy: Better than ± 1.0 nm, self-calibration with deuterium lines, verification with holmium oxide filter	☒ Yes/ No
j) At least two programmable slit width between 1 nm-8 nm	☒ Yes/ No
k) Include flow cell with equivalent or better features: 10 mm pathlength max, $<2 \mu\text{L}$ volume, withstand at least up to 80 bar pressure	☒ Yes/ No
l) Include data analysis software for spectra evaluation with purity and spectra matching functions. Contractor shall provide sufficient information and training to help users understand the peak purity function as well as the basis of spectra matching on the System.	☒ Yes/ No
m) Able to create and register UV spectra to the UV library in the system. Please provide screenshot for the UV library	☒ Yes/ No
n) Radio frequency identification (RFID) tags for flow cells and UV lamp that record parameters such as cell dimensions, lamp usage, serial number, etc.	☒ Yes/ No
o) Able to select reference wavelength for elimination of background interference	☒ Yes/ No
p) The system must have a built-in data recovery feature which help prevent data losses in the event of communication breakdown between system and PC	☒ Yes/ No
(7) Chromatographic software	
a) The software should have an user interface that allows the complete control of the liquid chromatographic system including access to all method parameters, data acquisition, data analysis, method automation, reporting, generation of customised reports, and system management utilities	☒ Yes/ No

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b) Operating software should have multi-tasking capability – capable of control, data acquisition, data evaluation, automation and reporting.	☒ Yes/ No
c) Software should minimally have functions for wavelength optimisation, generation of peak purity reports, spectral libraries search for compound identification, and mathematical operations such as normalisation, subtraction and smoothening.	☒ Yes/ No
d) Must be able to run at the same time with other programs on the computer such as word processors and also export information to other programs through industry standard protocols and file formats	☒ Yes/ No
e) Software should preferably have functions for updating of volumes for all four solvents attached to the pump(s) independently.	☒ Yes/ No
f) Software should allow shutdown after a sequence is completed. Software should preferably also allow shutdown when calculated remaining solvent volume in any of the solvent bottles reaches below a certain threshold.	☒ Yes/ No
g) Must have built-in or integration path to OpenLab ECM for central secure long-term data storage	☒ Yes/ No
h) Configurable access control to different functions of software	☒ Yes/ No
i) Software must be able to provide log/ trails for method and results changes.	☒ Yes/ No
j) Reports are customisable according to the laboratory's needs. Assistance is to be provided by the Contractor to ensure the seamless integration and interface with LISA for the system report printing and extraction	☒ Yes/ No
k) System should be able to import and run a sequence file (usually in csv or txt file format) generated by LISA	☒ Yes/ No
l) Software should preferably be able to read UV library in “.uvl” format. If the software to be provided is unable to read “.uvl” format, Contractor is required to provide assistance to ensure the library can be accessed and used on the new software.	☒ Yes/ No
m) Include software with intuitive diagnostic and monitor capabilities and alert functions for problem notifications	☒ Yes/ No
n) Software should preferably be able to include both chromatogram and purity results for each analysis in a single report template which can be printed out directly from the software	☒ Yes/ No
(8) Computer and Printer	
a) PC (Specifications of the following should be equivalent or better) Intel® Core™ 8th Gen i7 Processor (3.6 GHz, 8 MB Cache, Quad core) or better	☒ Yes/ No

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• Monitor: 20" IPS LED Monitor • Hard Disk: 1 TB 7200 rpm SATA 6Gb/s HDD • Memory: 16 GB DDR4 RAM • Optical Mouse • Keyboard • Operating System: Microsoft Windows 10 Professional SP1 or newer version • 2 network cards	
b) Printer: Laserjet network printer with at least 1200x1200dpi resolution and prints at least 32 pages per minute. The printer must be capable of automatic duplex printing.	☒ Yes/ No
c) The Contractor shall ensure that the system PC/notebook provided with the system is network ready and able to connect to HSA's network for interfacing with LISA (Laboratory Information & Scientific Administration) system. If required, additional network cards shall be included to ensure the connectivity to LISA	☒ Yes/ No
(9) Other Features	
a) System should be compatible with existing LC methods that allow direct method transfer from current Shimadzu Nexera Series UHPLC systems	☒ Yes/ No
b) Modular design that has flexible configuration options and true front accessibility for all components	☒ Yes/ No
c) Able to run in 2 modes: HPLC and fast LC without the need for modification of hardware	☒ Yes/ No
d) The proposed system must be incorporated with GLP features that includes: I) Early maintenance feedback with display for a) Pump: litres of mobile phase pumped, mobile phases and seal wear b) Autosampler: number of injections, user-settable limits messages c) Detector: lamp time, lamp energy, date of last lamp replacement II) User-set limits for feedback messages for timely replacement of parts III) Electronic records of maintenance and errors for all modules in a log book	☒ Yes/ No
e) The system shall come with safety and maintenance requirements that includes extensive diagnostics, error detection and display, leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas	☒ Yes/ No

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f) There shall have storage of all details of analytical method including system set points, data acquisition, data evaluation and reporting parameters as one analytical specification.	Yes/ No
(10) Integration with HSA's LISA (Laboratory Information & Scientific Administration) System	
a) The Contractor shall ensure the system PC/notebook provided is able to run i. OpenLAB – Cerity Enterprise Content Manager (ECM) Version 3.3.2 ii. OpenLAB – Cyberprinter iii. Must have built-in or integration path to OpenLAB ECM for central secure long-term data storage	Yes/ No
(11) Middle-Tier Software for integration with LISA	
a) The Contractor shall ensure the system software will be able to have direct interface to LISA for the following: • Raw Data Files archival & retrieval • System test result report output to PDF for archival System test result report for result uploading.	Yes/ No
b) Tenderer shall specify the format of the system software and outputs, please complete below: a) Software: _____ b) Output format: _____	Yes/ No
c) Tenderer shall propose a complete and comprehensive solution to ensure the seamless interface between the system software and LISA, and to meet the requirements as specified above. The proposal may include required hardware, system software, application software and professional services. Please submit your proposed solution in Annex C to Part 3 – Price and Submission Information .	Yes/ No
(12) Configuration and setting of System PC/Notebook for integration with LISA	
a) Contractor shall work with HSA assigned personnel for the setting up and configuration of System PCs / notebook to ensure the connection to the HSA network as well as integration to LISA	Yes/ No
b) Contractor shall work with HSA personnel for the following: • To define and assign a Hostname and/or PC name given by HSA to facilitate the System management on HSA network	Yes/ No

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- To define the Raw Data file structure & directory assigned by HSA to facilitate the automation of electronic archival and retrieval of files - To work with LISA vendor, if required, to ensure the system report print out to be in PDF file format - To perform UAT to ensure the integration to LISA is running fine	
(13) System Reports Requirement	
a) Contractor shall work with Laboratory to ensure the seamless integration and interface with the Laboratory's Information Management System for the system report printing and extraction	☒ Yes/ ☐ No
b) Tenderer shall provide HSA the following output format for the System Test Result output and they are: - Raw Data File: _____ - Electronic output file: _____ - Hardcopy print out: _____ Please state if there are other output files can be generated by System: _____	☒ Yes/ ☐ No
c) The following information must be able to be captured and printed on the above mentioned System Test Result output format to facilitate the integration and interface for result extraction and they are: - Data file name - Method used - Operator - Date Acquired - System - Sample Name - Misc Info - Vial Number	☒ Yes/ ☐ No
d) The sequence and sequence printout should include the following information: - Sequence line - Type of sample - Vial number - Data file name - Name of Method - Sample Information (with at least 2 lines of information) - Amount of sample	☒ Yes/ ☐ No

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• Volume of sample • Dilution factor • Internal Standard Amount	
e) The library and library matching printout should include the following information: • Sequence line • Type of sample • Vial number • Data file name • Name of Method • Display of UV spectrum of target • Results of the UV library match	☒ Yes ☐ No
f) Contractor shall assist user to configure the required information should additional information/ parameters need to be included.	☒ Yes ☐ No
(14) Installation, Commissioning, Training and Warranty	
a) All systems proposed must be GLP compliant	☒ Yes ☐ No
b) Prices quoted must include installation and commissioning, warranty, operator training and LC starter kit. i. Operational training on theory for approximately 55 staff on HSA premises ii. Hands-on training for operating the system model submitted in this tender must be provided for 3-10 persons.	☒ Yes ☐ No
c) An endorsed copy of 5x5 risk assessment form for the installation of the system must be submitted to the laboratory 2 weeks before the delivery. A template of this form can be found on MOM website.	☒ Yes ☐ No
d) The system should come with at least three (3) years warranty that covers the system hardware, software and computer. The warranty shall minimally include the following: i. Unlimited breakdown calls and on-site support services during Office Hours from 8:00 am to 5:30 pm Monday to Friday excluding Saturday, Sunday and Public Holidays; ii. Provision of software upgrade or revisions iii. Semi-annual preventive maintenance (PM) (2PM/year); iv. Replacement of consumable parts based on the frequency as stated in Appendix 1 (or equivalent) that is in accordance to IDL's requirement; v. Include all replacement parts; and	☒ Yes ☐ No

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vi. Include all repair consumables for PM, repair and other maintenance services that are performed by the Contractor Contractor should accommodate observation by laboratory staff during the maintenance process. Any software revisions should also be provided free-of-charge.	
e) Contractor to provide softcopies of service reports and preventive maintenance reports that fulfil the requirements of the Laboratory.	☒ Yes/ ☐ No
(15) Technical support	
a) Contractor shall provide full assistance in terms of hardware, software and application support. This is to ensure that the system is fully validated with relevant methods for casework within 3 months after commissioning	☒ Yes/ ☐ No
(16) Delivery	
a) The delivery of the system is to be coordinated with the Laboratory.	☒ Yes/ ☐ No
(17) Option to purchase: 4-year post warranty comprehensive maintenance services on biennial renewal basis	
Tenderer shall quote for the option to purchase 4-year comprehensive maintenance contract on biennial renewal basis. The contract shall minimally include the following: a) Unlimited breakdown calls and on-site support services during Office Hours from 8:00 am to 5:30 pm Monday to Friday excluding Saturday, Sunday and Public Holidays; b) Provision of software upgrade or revisions c) Semi-annual preventive maintenance (PM) (2PM/year); d) Replacement of consumable parts based on the frequency as stated in Appendix 1 (or equivalent) that is in accordance to IDL's requirement; e) Include all replacement parts; and f) Include all repair consumables for PM, repair and other maintenance services that are performed by the Contractor The coverage for post warranty comprehensive maintenance contract must be extended to system hardware, software and computer.	☒ Yes/ ☐ No

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Replacement and Purchase of Components 1. The Contractor shall inform the Authority of any part or component of the System that needs to be replaced. Prior written approval must be issued by the Authority before the replacement may be effected unless the replacement required is deemed urgent by the Authority in which case a verbal approval (which shall subsequently be confirmed in writing) obtained from an authorised officer of the Authority shall suffice. 2. The Contractor shall use all reasonable endeavours to supply only original or genuine replacement components, which are required to maintain the system in good working order.	☒ Yes ☐ No
Guarantee 3. The Contractor hereby warrants that all the System and every part or unit thereof serviced by the Contractor shall conform to the requirements of this Contract and be free from any defect or deficiency in their performance or workmanship for a period of three (3 months) from the date of acceptance of the Services by the Authority (hereinafter referred to as "the System Guarantee Period"). The Contractor hereby also warrants that all materials and every part or unit thereof, used for the Services shall be free from any defect in manufacture or any defect arising out of design, workmanship or materials used or any failure or malfunction due to quality of material, workmanship, design, assembly, installation or integration for a period of three (3) months from the date of acceptance of the materials by the Authority (hereinafter referred to as "the Materials Guarantee Period"). The System Guarantee Period and the Materials Guarantee Period shall collectively be known as the "Guarantee Period". 4. Where during the Guarantee Period, any part or unit of the System serviced by the Contractor or materials used for the Services or supplied therefor are found to be defective of any of the reasons specific in Clause 3 above, the Contractor shall at the written request of the Authority replace the same at the expense (including freight charges, transportation costs or other incidental charges) of the Contractor or if the Authority so agrees make good or repair the same at the expense (including freight charges, transportation costs and other incidental charges) within a Guarantee Turn-Around-Time of 7 days. The System or materials or part or unit thereof so replaced or repaired shall be subject to the Guarantee under this Clause for the Authority or three (3) months whichever is later and such balance of the Guarantee Period shall begin to run only from the date of receipt of the part or unit so replaced or repaired by the Authority.	☒ Yes ☐ No

Please indicate any non-compliance to requirement specifications here should there be any.

Reference To	Remarks