

Equipment 5: High Performance Liquid Chromatography – Mass Spectrometer/ Diode Array Detector with Fraction Collector (HPLC-MS-DAD with Faction Collector)		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
Location: CML	Quantity: 1	
<u>Technical Specifications</u>		
- The system must be a high performance liquid chromatography (HPLC) coupled to an ultrafast single quadrupole mass spectrometer (MS), a diode array detector (DAD) and a fraction collector. The modules must be capable of standalone operation and have internal diagnostics to monitor the instrument's performance. The system must have a single software to control all individual modules.		☒ Yes/ ☐ No
(A) High Performance Liquid Chromatograph		Yes/ No
(A.1) Solvent delivery system with high pressure and binary gradient features.		Yes/ No
- Minimum flow rate must be no higher than 0.001 mL/min.		☒ Yes/ ☐ No
- Maximum flow rate must be no less than 10 mL/min.		☒ Yes/ ☐ No
- Allow 0.01 mL/min flow rate step change from micro to semi-preparative flow rates without any hardware changes.		☒ Yes/ ☐ No
- Flow rate accuracy must be no more than ± 1 %.		☒ Yes/ ☐ No
- Flow rate precision must be no more than ± 1 % relative standard deviation (RSD). Pressure setting range must be no less than 60 MPa.		☒ Yes/ ☐ No
- Gradient formation must be produced through low pressure binary mixing.		☒ Yes/ ☐ No
- Precision of composition must be less than 0.2% RSD.		☒ Yes/ ☐ No
- Allow stable delivery of even non-polar organic solvents.		☒ Yes/ ☐ No
- Automatic rinsing of plunger must be available.		☒ Yes/ ☐ No
- Must be capable of standalone operation for maintenance		☒ Yes/ ☐ No
- Reservoir tray (with at least four solvent bottles complete with fittings) and automatic rinsing kit must be supplied.		☒ Yes/ ☐ No
- Must have a leak sensor as safety feature.		☒ Yes/ ☐ No
- Must have internal degassing unit.		☒ Yes/ ☐ No
- Must allow control from external software and local control on the instrument.		☒ Yes/ ☐ No
(A2) Auto-Sample Injector		Yes/ ☒ No
- Sample injection volume must be variable between 0.1 μL to 100 μL inclusive with zero sample loss during injection.		Yes/ ☒ No

Equipment 5: High Performance Liquid Chromatography – Mass Spectrometer/ Diode Array Detector with Fraction Collector (HPLC-MS-DAD with Faction Collector)		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
Location: CML Quantity: 1		
- Number of samples to be processed automatically, random access for a minimum of 100 positions for 2 ml vial volume.		☒ Yes/ ☐ No
- Must be able to perform customised continuous analyses according to the conditions specified for each sample, including pre-treatment, injection and analysis conditions. Priority samples must be allowed to be inserted in the queue during automated run.		☒ Yes/ ☐ No
- Flow line rinse capability both before and after sampling must be possible.		☒ Yes/ ☐ No
- Carry over must be $\leq 0.1\%$.		☒ Yes/ ☐ No
- Injection precision must be $\leq 0.25\%$ of RSD value.		☒ Yes/ ☐ No
- Must have a leak sensor, automatic rack and vial recognition as safety feature.		☒ Yes/ ☐ No
- Sample holder must have capability to control temperature, range covering minimally from 4 °C to 40 °C		☒ Yes/ ☐ No
(A.3) Column Compartment		
- Must have uniform temperature distribution that can maintain constant temperature level even when power source voltage fluctuates.		☒ Yes/ ☐ No
- Allow a temperature range of 10 °C to 80 °C		☒ Yes/ ☐ No
- Temperature control precision should be ± 0.2 °C or less.		☒ Yes/ ☐ No
- Must have temperature limit device and temperature fuse.		☒ Yes/ ☐ No
- Capable of temperature programming in linear and step programmes.		☒ Yes/ ☐ No
- Must be able to accommodate at least two columns with a minimum length of 25 cm.		☒ Yes/ ☐ No
- Must have a leak sensor as safety feature.		☒ Yes/ ☐ No
(B) Mass Spectrometer		
- The instrument must be a bench top model with a maximum scan speed of 10,400 Da/sec.		☒ Yes/ ☐ No
- The mass analyser must be a single quadrupole MS system.		☒ Yes/ ☐ No
- Mass range must be cover m/z 2 to 2000.		☒ Yes/ ☐ No
- Mass stability of detection ion must be less than 0.1 amu over a period of 12 hours.		☒ Yes/ ☐ No

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Equipment 5: High Performance Liquid Chromatography – Mass Spectrometer/ Diode Array Detector with Fraction Collector (HPLC-MS-DAD with Faction Collector)		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
Location: CML Quantity: 1		
- Dynamic range of quantification must be more than or equal to 6 x 10 ⁶ ppm.		☒ Yes/ No
- Detection of positive/negative ions must be user-selectable and the switching time between positive and negative polarity must be no more than 30 msec.		☒ Yes/ No
- Resolution: The full width at half mass for the target peaks must be between 0.45 and 0.74 inclusive during auto-tuning.		☒ Yes/ No
- Mass measurement accuracy must be less than ± 0.13 Da during tuning.		☒ Yes/ No
- Auto-tuning must be standard with a syringe pump that delivers accurate calibrant injection under full workstation control in both positive and negative modes. Manual tuning must also be allowed.		☒ Yes/ No
- Sensitivity requirement (positive ESI): The measured signal-to-noise ratio obtained from the chromatogram monitoring the quantification of m/z 609 ion on injection of 1 pg of reserpine must be more than 75:1, based on a 1-μL injection of a 1 pg/μL reserpine solution.		☒ Yes/ No
- Sensitivity requirement (positive APCI): The measured signal-to-noise ratio obtained from the chromatogram monitoring the quantification of m/z 609 ion on injection of 1 pg of reserpine must be more than 10:1, based on a 10-μL injection of a 1 pg/μL reserpine solution.		☒ Yes/ No
- A LC-MS start-up kit must be supplied.		☒ Yes/ No
- Software controlled flow switching valve for diverting the flow to waste must be available.		☒ Yes/ No
(C) Diode Array Detector		
- Must be a 1024-element diode array		Yes ☒ No
- Must have a leak sensor as safety feature.		☒ Yes/ No
- Must allow control using external software.		☒ Yes/ No
- Maximum sampling rate of detector must be no less than 20 Hz.		☒ Yes/ No
- Wavelength range of detector must cover the range of 190 nm to 950 nm with accuracy of no greater than ±1 nm.		Yes ☒ No
- Must allow programmable slit width of 1 to 16 nm and diode width of less than 1 nm.		☒ Yes/ No
- Flow cell must have path length of 10 mm and ability to modify to switch or upgrade to different flow cells when required.		☒ Yes/ No

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Equipment 5: High Performance Liquid Chromatography – Mass Spectrometer/ Diode Array Detector with Fraction Collector (HPLC-MS-DAD with Faction Collector) Location: CML Quantity: 1	Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
- The software must be able to perform manual integration of single and group peaks capability for better peak identification.	☒ Yes/ ☐ No
- The software must be able to perform automatic integration of single and group peaks with both standard perimeters and user settable perimeters.	☒ Yes/ ☐ No
- The software must be able to generate numeric data compatible with Microsoft Excel for plotting chromatogram.	☒ Yes/ ☐ No
- Free software upgrade must be provided throughout the warranty period. If the upgraded software is not compatible with the existing computer and/or existing operation system, free computer and/or operation system must be provided.	☒ Yes/ ☐ No
<u>Miscellaneous</u>	
- The system shall consist, but not be limited to, the above listed major components, complete with all the accessories and interfacing necessary to make a fully functional and operable system.	☒ Yes/ ☐ No
- The power supply must be 230 ± 6%, 50/60 Hz, suitable for use in Singapore.	☒ Yes/ ☐ No
- Prices quoted must include installation, commissioning, initial calibration and operator training at Chemical Metrology Laboratory. The system with PC must come with a minimum 1 year warranty. The warranty must include unlimited breakdown calls and on-site services, replacement of parts and at least 1 comprehensive preventive maintenance (includes both labour and consumables/replacement parts) per year, and cover the overall system (both hardware and software). Any software revisions should also be provided free-of-charge. The Contractor is required to oversee overall systems integration, site preparation, installation and necessary configuration of the system.	☒ Yes/ ☐ No
- <u>Option to Purchase:</u> Tenderer is required to quote for the option to exercise 3-year post warranty comprehensive preventive maintenance contract in <u>Annex C Price Summary</u>. - The post warranty comprehensive maintenance contract shall minimally include the following: a) Unlimited breakdown calls and on-site support b) All replacement parts and consumables c) 1 PM per year with PM kit provided where necessary d) Update of software revision	☒ Yes/ ☐ No
Standard consumables that are required for the set up and commissioning of the system must be provided. In addition to the standard consumables, tenderer is	☒ Yes/ ☐ No

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Equipment 5: High Performance Liquid Chromatography – Mass Spectrometer/ Diode Array Detector with Fraction Collector (HPLC-MS-DAD with Faction Collector)		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
Location: CML Quantity: 1		
(c) on-site service within 2 working days when requested; and (d) replacement of parts (within 2 working days when parts are available in Singapore, within 5 working days when parts are not available in Singapore and are needed to be ordered from overseas) when necessary.		
- The system must have a minimum 8-year value guarantee such that vendor shall have a minimum of 8 years' guaranteed parts and comprehensive service available or give residual value credit for replacement.		☒ Yes/ No
- Tenderer must be able to provide on-site instrument operation and user maintenance training by qualified engineer(s)		☒ Yes/ No
- Tenderer is required to quote trade-in price for Waters 2996/2769/3100 High Performance Liquid Chromatography – Mass Spectrometer with Fraction Collector. The price shall include removal, transportation and other required services. Price "0" shall be indicated in Price Summary if one of the following conditions is fulfilled. a) there is no trade-in value but removal of existing system is provided; or b) trade-in option and removal of existing system is not provided		☒ Yes/ No

COMPLIANCE OF REQUIREMENT SPECIFICATIONS

I hereby confirm that I can meet all the specifications and requirements as stated in Section 3: Requirement Specifications, Equipment 5: HPLC-MS-DAD with Fraction Collector.

Tenderer's (as *Principal/Agent)
Company or Business Registration No:

200512450H

Tenderer's official
Stamp:

Authorized Signature




Name: Joanna Ang

Designation: Account Manager

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

Reference To	Remarks
Section A2	0.1 to 50.0 µL as standard, Up to 1000.0 µL with optional extension loops
Section C	190 to 800 nm
Section C	512-element diode array
Section A.1	Maximum flow rate must be no less than 10 mL/min.

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Equipment 6: High Performance Liquid Chromatography –Diode Array Detector (HPLC-DAD)		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
Location: CML	Quantity: 1	
- Number of samples to be processed automatically, random access for a minimum of 100 positions for 2 ml vial volume.		☒ Yes/ No
- Must be able to perform customised continuous analyses according to the conditions specified for each sample, including pre-treatment, injection and analysis conditions. Priority samples must be allowed to be inserted in the queue during automated run.		☒ Yes/ No
- Flow line rinse capability both before and after sampling must be possible.		☒ Yes/ No
- Carry over must be $\leq 0.1\%$.		☒ Yes/ No
- Injection precision must be $\leq 0.25\%$ of RSD value.		☒ Yes/ No
- Must have a leak sensor, automatic rack and vial recognition as safety feature.		☒ Yes/ No
- Sample holder must have capability to control temperature, range covering minimally from 4 °C to 40 °C.		☒ Yes/ No
(A.3) Column Compartment		
- Must have uniform temperature distribution that can maintain constant temperature level even when power source voltage fluctuates.		☒ Yes/ No
- Allow a temperature range of 10 °C to 80 °C		☒ Yes/ No
- Temperature control precision should be ± 0.2 °C or less.		☒ Yes/ No
- Must have temperature limit device and temperature fuse.		☒ Yes/ No
- Capable of temperature programming in linear and step programmes.		☒ Yes/ No
- Must be able to accommodate at least two columns with a minimum length of 25 cm.		☒ Yes/ No
- Must have a leak sensor as safety feature.		☒ Yes/ No
(B) Diode Array Detector		
- Must be a 1024-element diode array		Yes/ ☒ No
- Must have a leak sensor as safety feature.		☒ Yes/ No
- Must allow control using external software.		☒ Yes/ No
- Maximum sampling rate of detector must be no less than 20 Hz.		☒ Yes/ No
- Wavelength range of detector must cover the range of 190 nm to 950 nm with accuracy of no greater than ± 1 nm.		Yes/ ☒ No
- Must allow programmable slit width of 1 to 16 nm and diode width of less than 1 nm.		☒ Yes/ No

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Equipment 6: High Performance Liquid Chromatography –Diode Array Detector (HPLC-DAD) Location: CML Quantity: 1		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
- Flow cell must have path length of 10 mm and ability to modify to switch or upgrade to different flow cells when required.		☐ Yes/ No
- Must have programmable instrument's attributes including wavelength, polarity, peak width, wavelength range.		☒ Yes/ No
(E) Software and computer - Minimum configuration: Intel i5-2400 processor or equivalent, 4GB RAM, 500 GB hard drives, wireless modem 802.11a/b/g/n/ac , USB 3.0, DVD RW (CD RW capable), mouse and keyboard, high resolution 19 inch flat screen color monitor.		☒ Yes/ No
- Must provide Window 7 Prof. Operating System and Microsoft Office.		☒ Yes/ No
- Single software platform must be provided for a seamless control of all the modules of LC and MS.		☒ Yes/ No
- The software must be able to generate both standard and customisable reports to suit different needs.		☒ Yes/ No
- The software must be able to perform manual integration of single and group peaks capability for better peak identification.		☒ Yes/ No
- The software must be able to perform automatic integration of single and group peaks with both standard perimeters and user settable perimeters.		☒ Yes/ No
- The software must be able to generate numeric data compatible with Microsoft Excel for plotting chromatogram.		☒ Yes/ No
- Free software upgrade must be provided throughout the warranty period. If the upgraded software is not compatible with the existing computer and/or existing operation system, free computer and/or operation system must be provided.		☒ Yes/ No
Miscellaneous		
- The system shall consist, but not be limited to, the above listed major components, complete with all the accessories and interfacing necessary to make a fully functional and operable system.		☒ Yes/ No
- The power supply must be 230 ± 6%, 50/60 Hz, suitable for use in Singapore.		☒ Yes/ No
- Prices quoted must include installation, commissioning, initial calibration and operator training at Chemical Metrology Laboratory. The system with PC must come with a minimum 1 year warranty. The warranty must include unlimited breakdown calls and on-site services, replacement of parts and at least 1 comprehensive preventive maintenance (includes both labour and consumables/replacement parts) per year, and cover the overall system (both hardware and software). Any software revisions should also be provided free-of-charge. The Contractor is required to oversee overall systems integration, site preparation, installation and necessary configuration of the system.		☒ Yes/ No

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Equipment 6: High Performance Liquid Chromatography –Diode Array Detector (HPLC-DAD)		Compliances (Yes/ No) <i>**If No, please indicate reason of non-compliances.</i>
Location: CML	Quantity: 1	
in Singapore, that is, the company must provide: (a) contacts (handphone number and email) of at least two engineers experienced with the system; (b) immediate instruction for trouble shooting by telephone when requested; (c) on-site service within 2 working days when requested; and (d) replacement of parts (within 2 working days when parts are available in Singapore, within 5 working days when parts are not available in Singapore and are needed to be ordered from overseas) when necessary.		
- The system must have a minimum 8-year value guarantee such that vendor shall have a minimum of 8 years' guaranteed parts and comprehensive service available or give residual value credit for replacement.		☒ Yes/ No
- Tenderer must be able to provide on-site instrument operation and user maintenance training by qualified engineer(s)		☒ Yes/ No

COMPLIANCE OF REQUIREMENT SPECIFICATIONS

I hereby confirm that I can meet all the specifications and requirements as stated in Section 3: Requirement Specifications, Equipment 6: HPLC-DAD

Tenderer's (as *Principal/Agent)
Company or Business Registration No:

Tenderer's official
Stamp:

200512450H

Authorized Signature

Joanna

Name: Joanna Ang



Designation: Account Manager

(*Delete whichever is not applicable)

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

Reference To	Remarks
Section A.2	0.1 to 50.0 μ L as standard, Up to 1000.0 μ L with optional extension loops
Section A.1	Maximum flow rate must be no less than 10 mL/min.
Section B	512 element
Section B	190-800nm