TECHNICAL SPECIFICATIONS

1.1 SAMPLE TYPES TO BE ANALYSED

Parameter	Technical Specification
Liquid samples	
	Essential oils Vegetable oils Volatile fatty acids
Gas samples	
	Hydrogen (0-80%), Methane (0-80%), Carbon dioxide (0-80%), Dihydrogen sulphide, H_2S (ppm) Ammonia, NH_3 (ppm)

1.2. GC TECHNICAL SPECIFICATIONS

1.2.1		**GC OVEN**	
Item	**Parameter**	**Specifications**	**BIDDER'S RESPONSE** Indicate" Complied or "Non Complied". Technical Literature/Published document should be submitted to prove compliance

A. Chromatographic performance	Retention time performance	Area repeatability must be <0.5% RSD or better for example C16 in heptane from data obtained on ten subsequent splitless analyses from 1 µL injected volume.	
	Retention time repeatability	GC must have a specification published for retention time repeatability of <0.008 % or <0.0008 minutes	
	Linearity	Linearity must be <4% RSD on response factor between 10% and 50% volume	
B. System capabilities	GC Configuration	(i) GC must be capable of being upgraded in the future to install a single quadrupole mass selective detector (MSD) The system must thus be capable of supporting simultaneous installation and operation with a single quadrupole mass selective detector (MSD) and 3 detectors, without impact on GC or detector performance or need for auxiliary oven or 2nd GC. (ii) The GC must have complete integrated control of all parameters (no external control module) for the configured detectors.	
C. Heating system/ Column oven	Operating temperature rate	Ambient +4 to 450 °C.	
	Heating rate	Minimum of 120 °C/min.	
	Oven ramps/ plateaus	Oven must support 20 oven ramps with 21 plateaus. Negative ramps are allowed.	
	Temperature control	Oven temperature maintained within 0.01 °C of the set-point value, per 1°C ambient temperature.	
	Oven cooling	450 °C to 50 °C in less than 4 minutes or better.	
	Temperature set point resolution	Must be 0.1 °C.	
D. Injector	Injector type	Split/ splitless (SSL) injector for sample introduction (i) It must be possible to set the split ratio BETWEEN 0 AND 12 500.	

		(ii) The split flow must be adjustable from OFF or 0 to 1250.0 mL/min.	
	Injector compatibility	Injector must be able to operate with the following column (i) Capillary columns. (ii) Capillary column connection must use standard vessel-graphite ferrules.	
	Inlet and septum	(i) The inlet liner and septum must be easily accessible, and connection require less effort. (ii) Inlet must be compatible with Merlin microseal septum. (iii)The septum purge flow must be adjustable from 0.5 to 50.0 mL/min.	
	Injection of large volume	The injectors must permit large volume splitless injection (up to 50 microliters).	
	Injector operating temperature	The maximum operating temperature of injectors must be at least 400°C.	
E. Controllers	Carrier gas controller included	(i) To allow operation in constant and programmed flow & pressure modes. (ii) To allow constant linear velocity. (iii) Support surged pressure split/splitless injection.	
	Pneumatic controller included	(i) Must support up to 18 channels of integrated electronic gas control. (ii) Must allow for setting of gas pressures in the range of 0 – 1050 kPa (0 – 152 psi). (iii) Pressure set point adjustable in increments of 0.01 kPa or 0.001 psi.	

1.2.2	**DETECTORS**		
	Parameter	**Technical Specification**	**BIDDER'S RESPONSE** Indicate" Complied or "Non Complied". Technical Literature/Published document should be submitted to prove compliance
A. Flame Ionization Detector (FID)	Column types	The FID must be optimised for use with capillary columns	
	Flameout detection	The FID must offer flameout detection and automatic re-ignition.	
	Detection limit	Minimum detection limit (MDL) of <1.5 pg C/s or better and minimum sensitivity of 0.0**5** Coulombs/gC or better	
	Operating temperature	Maximum operating of 450 °C	
	Integrated Electronic Controls	The FID must use Integrated Electronic Controls for the following gases as an integral part of the module: (i) Air: 0-500 mL/min. (ii) H2: 0 – 100 mL/min. (iii) Makeup gas (N2 or He) 0 – 50 mL/min.	
	Data Acquisition Rate	The FID module must provide a Data Acquisition Rate of at least 600 Hz.	
B. Thermal Conductivity Detector (TCD)	Column types	The TCD must be optimised for use with capillary columns.	
	Operating temperature	Maximum operating of 400 °C	
	Detection limit	Minimum Detection limit (MDL) of 400pg tridecane/mL with helium carrier or < 20pg tridecane/s with total flow of helium through the cell of 3mL/min.	
	Linear dynamic range	Linear dynamic range: $10^5 \pm 5\%$.	

1.2.3	**AUTOSAMPLER**		
	Parameter	**Technical Specification**	**BIDDER'S RESPONSE** Indicate" Complied or" Non Complied". Technical Literature/Published document should be submitted to prove compliance
A Autosampler	Compatibility	(i)An autosampler must be included and be capable of injecting liquids. The sampler must be compatible with liquid syringes. The gas samples will be manually injected. (ii) GC must provide power and communications for one ALS (Automated Liquid Sampler) injector and one autosampler tray (with at least 50 vial capacity) without need for separate control board or power box. (iii) GC system must be provided for Syn gas analysis solution on the TCD, with manual gas injection.	