फ़ाइल संख्या: QA-11013/1/2025-QA-FSSAI

भारतीय खाद्य सुरक्षा एवं मानक प्राधि5करण

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(गुणवत्ता आश्वासन प्रभार्ग)

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दिनांक: 17th July, 2026

सूचना/ Notice

Subject: Technical specifications of High End Equipment (HEE) –LC-HRMS– reg.

FSSAI has finalized the technical specifications of High End Equipment (HEE) –LC - HRMS. The suggestive technical specifications of LC-HRMS, are placed at ***Annexure-I.***

2. The specifications are **purely indicative** and shall **not be construed as standard tender specifications** or mandatory procurement conditions. The procuring agencies shall independently assess their operational requirements and suitably modify any specification thereof, as deemed necessary. Further, nothing contained in the enclosed specifications shall be interpreted as favouring or restricting any particular manufacturer, technology, supplier or country of origin. Wherever required, procuring agencies may constitute their own Technical Committee (TEC) or consult subject matter experts for finalization of tender specifications. FSSAI shall not be liable for any procurement/ contractual issues arising out of procurement undertaken by other agencies.

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Annexure-I

Technical Specifications of LC-HRMS	
Sl. No.	**Requirement**
	Application Requirement
1	A high resolution accurate mass LC-QToF/LC-Q-Orbitrap system with all software and accessories for its successful operation is required. The solution provided as a whole must perform following workflow:
	a. Workflow for simultaneous untargeted screening and quantitation of chemical contaminants (Antibiotics, Vet Drugs, PPCPs, Water contaminants) in food, feed and water by simultaneous full scan and MS/MS data acquisition with variable/fixed mass window isolation in the Quadrupole. The solution provided must have necessary database for accurate mass matching and MS/MS spectra matching.
	b. Workflow for targeted quantification of contaminants/small molecules using high resolution MRM or equivalent data acquisition mode
	c. Untargeted and targeted metabolomics and lipidomics workflow with software support for peak alignment, adduct grouping, peak picking, metabolite ID, lipid annotation, user expandable databases, pathway mapping, statistical tools for multivariate analysis and biomarker selection.
	d. Workflow for honey authentication, oligosaccharide profile for adulteration detection, floral origin authentication etc.
	UHPLC System
2	(i) The system should be operated seamlessly with the MS system using the provided operating software
	(ii) Binary high pressure pump with built-in degasser.
	(iii) Operating Flow Rate Range to be 0.1 to 2.000 mL/min or better.
	(iv) Operating Pressure should be 15000 psi or better at 1 ml/min or better.
	(v) Flow rate Accuracy ±1%
	(vi) 4 channels vacuum degasser
	(vii) Flow precision ≤0.07 % RSD or better
	(viii) The autosampler should be refrigerated, have a minimum sample capacity of 96 x1.5-2 ml vials or more and also 96/384 well plates.
	(ix) Injection volume range of 0.1 – 100 µl with injection volume accuracy of +/-1.0%.
	(x) Carry over should be <0.004% for caffeine/ chlorhexidine or better.
	(xi) Column Oven with capacity to hold at least 2 columns at a time, with software controlled column switching function and temp range from ambient to 85°C or better.
	(xii) 5 number C18 columns of 2.1x100mm sub-2u particle size or equivalent for multiresidue pesticides, multiresidue antibiotics, polar pesticides, untargeted metabolomics, untargeted lipidomics
	Mass spectrometer
3	**(i) Ion source**: The system should include dedicated ESI and APCI Source to cover all areas of applications, with a facility of interchanging easily by the user and auto detection of installed probe by the instrument and software.
	(ii) User should be able to do cleaning of ion source without disturbing vacuum.
	(iii) Flow rates compatibility from 1-1000 µL/min or better for both ESI and APCI Ionization sources without splitting.
	(iv) Both ESI and APCI ion source should have desolvation temperature\ ≥400°C or better.
4	**Mass analyzer**: QToF/Q-Orbitrap
5	**Mass range**: Quadrupole mass range should be at least from 50-2200 amu or better.
6	**Resolution**: Should have 70,000 or higher/ should have 60000 or higher with ion-mobility
7	**Data acquisition rate**: High Speed is expected with very high response time and efficient fragmentation and ability to acquire ≥40 MS/MS spectra per second or better in the case of Q-TOF technology. In case of Orbital Trap, the scan speed should be at least 22 Hz or better.
8	**(i) Mass Accuracy**: Minimum 1 PPM in MS and MS/MS Modes.
	(ii) Mass accuracy documents for 24 h or more duration for consecutive on column injections must be provided for the quoted instrument to show the stability of mass accuracy in longer metabolomics cohort analysis.
9	**(i) Sensitivity**: The Instrument must be sensitive enough for detecting sub ppb/femtomole levels of contaminants as per regulatory screening detection limit (SDL) i.e. less than 5ppb or better. The Sensitivity achieved in data independent acquisition (DIA) & MS/MS modes must be stated. Application Notes showing pesticide/ antibiotic residue analysis at less than 5 ppb method LOQ, should be provided and demonstrated.
	(ii) In this regard document showing calibration curves for relevant contaminants (pesticides/antibiotics) in DIA and high-res MRM mode must be provided.

10	**(i) Acquisition modes:**
	(a) The system must have variable window acquisition mode in Q1 for Data Independent Acquisition (DIA)
	(b) Must acquire and display Full Scan mass spectra
	(c) Must acquire and display Selected Ion Monitoring (SIM) scan data for monitoring selected ions for target compound analysis
	(d) Must acquire and Multiple Reaction Monitoring (MRM/PRM) like Selected Reaction Monitoring/Multiple Reaction Monitoring (SRM/MRM) like data sets
	(e) Timed SIM for scheduled data acquisition of target compounds
	(f) Timed MS/MS for scheduled data acquisition of target compound fragment spectra
	(g) Must have Dynamic Exclusion capability on fly to temporarily exclude an ion, while allowing MS/MS spectra acquisition of minor abundant precursors
11	**Dynamic range**: The system should have linear dynamic range of 5 orders or better for Qualitative and relative Quantitative analysis with the highest sensitivity, claimed mass accuracy, precision and reproducibility.
Workstation and Software	
12	Original and Licensed Universal perpetual software (**Including free upgrades up to 5years**)
13	Computers and workstations and all interfacing hardware and software for instrument control, data acquisition and data processing must be supplied and should be compatible to the system.
14	**(i) Acquisition Computer-1 nos.** with the following / equivalent or higher configuration:
	(ii) High-performance PC with factory recommended processor and OS, **MS office professional**, minimum **32 GB RAM, minimum 2 TB HDD or better,** High-resolution 24" LED monitor, wireless keyboard & mouse
15	**(i) Processing computer- 1 no.** with the following/equivalent or higher configuration:
	(ii) High-performance PC with Intel i7 microprocessor, Windows 10 professional OS, **64 GB RAM, MS office professional, 10 TB HDD, High-resolution 28" LED monitor, wireless keyboard & mouse and Laser printer Duplex printing /copy (print, copy, scan).**
16	**Operating Software**: The software should be user friendly, capable of controlling the entire functions of UHPLC and HRMS/MS, with required licenses for systems suitability calculations; all accessories required for its operation should be provided. Full-fledged reporting facility with capability of customized user-designed report format should be available.
17	**(i) Application Software**: Application software for complete workflows like targeted and untargeted screening, library search, elemental composition algorithm, component differential analysis, back ground subtraction etc. Dedicated software for small molecules and non-targeted compound analysis with suitable data library must be provided.:
	(ii) Empirical formula: from the m/z value from spectra with algorithm for better matching.
	(iii) Fragment prediction: For metabolite identification - Ability to store data dependent information as trees and search (navigation) Component detection & Predict fragmentation with mechanisms. Software with HRMS database should be provided .
	(iv) Compound database: should have up to date compound HRMS libraries and fragments with different energies of collision dissociation. All library and software should be included for the above-mentioned applications (Pesticides, Antibiotics, Small Molecules)
	(v) Quoted Application software should come with In-built MS acquisition workflows for Metabolomics applications (Targeted & Non- Targeted workflows), including lipidomics, either in the same software or dedicated lipidomics software.
	(a) Ready to-use acquisition and data processing methods (with supply of Pre-defined columns, QC samples and settings) for targeted screening and quantitation of at least 300 contaminants, which should be pre-configured and work at customer site directly after installation
	(b) Automatic library searching against Free and commercially available libraries
	(c) Automatic library searching against user defined libraries
	(d) Qualitative, quantitative and characterization with suitable library system.
	(e) Standard Operating Procedures for multi-target screening and quantitation included in the package for food safety applications
	(f) Indicators and scoring in the software based on annotation quality of mass and retention data for identified compounds in targeted analysis
	(g) Data acquisition and data processing that ensures that even trace amounts can be detected from complex matrices in screening experiments at a sub ppb level for certain compounds
	(h) Availability and software support for both library search and database searches
	(i) Database contains accurate mass information for both parent and MS/MS fragment ions, to be used for verification and reduction of false positives
	(j) Possibility for metabolic pathway driven workflows for automatic generation of relevant target list for screening and subsequent quantitation
	(k) Possibility in the software to choose which MS or MS/MS ion should be used for quantitation

	(l) Possibility to easily adapt the target database; merge databases, reduce the number of entries, add new entries
	(m) Software for non-targeted workflows and exploration of unknown compounds, metabolic pathways and statistical comparisons:
	- Ions belonging to the same compound can be combined into one feature, i.e. isotopes, charge states, adducts or fragments.
	- Rapid known-compound recognition, also called de-replication: The annotation quality symbol (AQ) gives at-a-glance indication if an identified compound is of high, medium or low quality. This allows a rapid assessment to confirm an assignment or to explore further characterization.
	- Advanced statistical tools included in the software; e.g. PCA, ANOVA, T-Test, HCA
	- Compound identification via spectral libraries and/or web search for possible structures based on unique elemental compositions automatically generated followed by in-silico fragmentation routines
	(n) Client/server-based processing software solutions to ensure fast processing and remote access to data.
	(o) Dedicated export options of results to enable a seamless data evaluation in 3rd party tools, e.g. for advanced statistics, pathway mapping or network analysis
	(p) Single Software package should be able to compile data from all the mass analyzers and group the overlapping results to present a comprehensive report of all identified analytes without need to change the file format
	(q) Software should allow discrimination of false discovery and allow grouping of environmental pollutants to reduce complexity in results.
	(r) Metabolomics integrated software to understand the biological context of identified metabolites with statistical analysis capability: Ex: PCA plots and related statistical outputs.
Other mandatory general requirement	
18	**Vendor should attend service call within 48 h free of cost during the 5 year warranty period. An affirmation in suitable stamp paper is required in this regard. Minimum one user reference letter certifying satisfactory instrument performance and service experience must be provided.**
Vacuum System	
19	(i) A robust high efficiency oil less vacuum system with minimum maintenance and utility with low noise level and automatic vacuum lock system.
	(ii) The system should have vacuum safety features to prevent damage to the instrument
	(iii) All accessories required for the proper functioning of the vacuum should be supplied
Gases, cylinders and connections	
20	(i) Must be supplied with branded nitrogen gas generator of minimum 99.9% purity and flow rate as required for the HRMS instrument should be provided.
	(ii) It should be complete with all necessary accessories such as arrangement for gas supply through the gas generator, compressor, gas regulators and filters.
	(iii) Connector between gas generator and the system that are essential for the running of the instrument should be provided.
	(iv) If any other gas is required for example collision gas should be mentioned and provided **with minimum two gas cylinders**, regulator, connectors etc.
	(v) The gas supply system should not occupy excessive space, should have minimum tubing and maintain the aesthetics and functionality of the laboratory. An affirmation in this regard is required.
	(vi) The following documents should be supplied along with the cylinder:
	(a) Manufacturer Certificate;
	(b) Hydrostatic test certificate;
	(c) The Chief Controller of Explosives, Nagpur (CCOE-NAGPUR) gas filling approval certificate and
	(d) Purity certificate.
UPS	
21	Online 20 KVA (or better) UPS with a minimum of 2 hour power back up for the entire system including the vacuum pump, nitrogen generator should be quoted. The battery must be placed in a suitable rack and the necessary accessories for power point connections should be provided.
Warranty and CMC	
22	(i) Minimum 5 years including supporting accessories, from the date of completion of IQ, OQ and PQ of system for honey authenticity and pesticide and antibiotic residues.
	(ii) The heated ion source (ESI/ APCI) & Detector should be covered with 10 years warranty.
	(iii) The date of warranty period for LC-HRMS, Nitrogen generator-compressor, vacuum system, UPS with batteries, PC, Printer, Gas cylinders with its accessories and all associated supply will start from the date of completion of IQ, OQ and PQ of LC-HRMS.
	(iv) It should cover hardware, software as well as wear and tear consumables (except column and sample preparation), Up-gradation of software to the latest version (if applicable), prompt service (within 24-48 hours on-call), training and application support during the period.

	(v) In case of breakdown of the system, the servicing to be done immediately by the supplier during the warranty period and maximum down time period is 24-48 hrs, if it's not attended the warranty will extend accordingly.
	(vi) At least two minimum preventive maintenance visit shall be carried out annually. PM Kit as and when required should be provided during PM Visit.
After sales service/ Post warranty	
23	(i) The supplier shall have application laboratory in India/abroad to support the application requirement and training needs.
	(ii) The supplier shall have service facility and trained engineers located in nearby metros to provide breakdown services within 24-48hrs of complaint registration.
	(iii) Should have a good after sales service/technical support capable of reaching at short notice within 24-48 hours to the places where LC-HRMS is proposed to be installed. Visits and unlimited breakdown calls by service/application support engineers.
	(iv) Troubleshooting training (Instrumentation/Application) as and when required free of cost.
	(v) The application and method development support must be rendered, as and when required.
	(vi) The vendor should also assure supply of spares, accessories, consumables and service for at least 10 years.
	(vii) Both AMC & CMC Price for LC-HRMS to be quoted separately, for 3 years after warranty. Terms and conditions for the AMC & CMC after the warranty period has to be specified.
	(viii) AMC price for 3 years after warranty quoted by the vendor will be considered for finalizing the L1. However it needs to be submitted separately as a price breakup document.
Demonstration and Training of personnel	
24	(i) Demonstration and Training on system to our Lab personal at site to be incorporated, responsibility of the supplier for training of the lab personnel at supplier site/installation site.
	(ii) Basic training for a period of not less than10 working days after installation of the equipment to technical personnel and further for method development whenever required during warranty and AMC period should be provided free of cost.
	(iii) One general entry-level training-cum-workshop and one advanced-level training-cum-workshop must be arranged at the user's site by the vendor on experimental and data analysis part, with no extra cost involved.
	(iv) Trouble shooting training along with Application support for developing validating at least one priority parameter or selected by the lab.
	(v) Supplier has to demonstrate on site validation as per the laboratory /regulatory requirements / protocols.
Accessories	
25	The following accessories, but not limited to should be supplied along with instrument:
	(i) PM kit for HPLC and MS sufficient for trouble free operation during warranty period should be provided along with instrument.
	(ii) Branded Single Channel micro pipettes with two decimel that are perfect companion for daily, repetitive liquid handling in laboratories, of capacity 50-1000 µl- 04 nos. 10-100 µl- 04 nos., 1000-5000 µl- 02 nos to be supplied along with the instrument.
	(iii) Capillary Tube/Cone/Desolvation line/ other similar accessories (as applicable) – 10 Nos,
	(iv) All required standards for Mass calibration and tuning, HPLC calibration should be provided
	(v) Vials (1.5/2.0 mL) with cap and septa 1000 Nos should be provided.
	(vi) Amber colour vials (1.5/2.0 mL) with cap and septa 2000 Nos should be provided.
	(vii) Syringe PTFE Filter, 13mm, 022µ – 1000 No. s
	(viii) Standard Tool kit should be provided for Instrument maintenance (ix) Reputed highly branded solvent filtration unit with pump and required accessories to be provided
	(x) Branded Mobile phase bottles 500 ml-12 no's and 1000 ml -12 no's with caps fixing solvent lines
	(xi) 12 nos. of one-litre mobile phase branded bottles should be supplied. (xii) Low volume 500 µl sintered/recovery vials with suitable caps/septa – 1000 nos. to be supplied
	(xiii) QUECHERS Kit for pesticides extractions-1000 no's
	(xiv) One no. of Portable Bench top heavy duty Multi tube vortex mixer to be supplied along with instrument which is designed to facilitate hands-free mixing in tubes, flasks, vials with digital display.
	- Speed range: 500-2500rpm or better
	- Timer: 1 min to 99 hr 59 min or better
	- Orbit: 3.0 mm or better
	- Electrical: 100-240 V, 50-60 Hz
	- Operating temperature range: +5 deg C to +50 deg C or better
	- Capable of vortexing broad range of vessels, racks and applications(horizontal and vertical)
	(xv) Accessories tube racks required for variety of tubes :
	(a) 50 x 1.5/2 ml (2 no.s) or more

	(b) 50 x 15 ml (2 no.s) or more
	(c) 15 x 50 ml (6 no.s) or more
	(d) 9 x 50ml, Horizontal Quechers method (2 nos.) or more
Others	
26	(i) Proof of Performance documents must be provided with the Compliance sheet. The vendors must submit/upload all the Technical Data Sheets as per their claim in original & authenticated.
	(ii) Data pertaining to Honey Authentication must be submitted.
	(iii) Standards/reagents required for successful installation must be supplied.
	(iv) Users lists of equipment supplied in India should be provided (Enclose full list of the users in India).
	(v) Minimum two performance testimonials from reputed user are must for the quoted instrument