	INDIAN INSTITUTE OF TECHNOLOGY BOMBAY **MATERIALS MANAGEMENT DIVISION** **Powai, Mumbai 400076.**

PR No. 1000045814 Rfx No. 6100002246:

Specification for Gel Permeation Chromatography

Chromatography (SEC) is the technique of choice for the characterization of polymers. In conventional GPC/SEC, average molecular weights are calculated relative to the standards used to calibrate the column set. GPC/SEC System is a high-end multiple detector platform that provides not only accurate molecular weight data independent of the chemistry of the standards but also insight into the behavior of the polymer in the solution.

Molecular weight and polymer chain length: The equipment should be able to determine the distribution of polymer chain lengths and molecular weight.

Absolute molecular weight, radius of hydration, and determination of branching chain: The equipment should be able to determine directly absolute molecular weight and hydrodynamic radius (Rh).

Detailed specifications

Sr. No	System	Specifications	Compliance (Yes/No)	Additional information
1	**Pump – Quaternary**	1. Quaternary gradient pump capable of mixing up to 4-solvents 2. Flow rates 0.001-10 ml/min. 3. Flow rate accuracy + 1% 4. Flow rate precision: ≤0.07 % RSD 5. Max. Operating pressure: 8500 psi or more 6. Delay Volume: 900uL or less 7. Composition precision: ≤0.5% RSD		

		8. Software initiated purge function. 9. Capable of working in both isocratic and gradient operations. 10. Number of solvent channels should be minimum four with integrated channel degassing unit. 11. Safe leak handling.		
2	**Injection system: Autosampler (Detachable, if needed)**	1. Injection Volume Range: up to 100 uL. 2. Max. operating pressure: 8500 psi or more 3. Auto sampler carryover: < 0.005 % RSD or better 4. Sample Delivery Precision: 0.3% RSD or better 5. Sample capacity: 100 or more 6. Should have advanced features like auto dilution, derivatization, and auto addition.		
3	**Thermostat Column compartment**	1. Should accommodate minimum four Columns of 30 cm. 2. Compatible with auto sampler and software controlled. 3. Temperature controlled range: 10 ° below ambient to 80 °C 4. Temperature control precision: ± 0.05 °C or better 5. Should have a Solvent heating facility.		

4	**Software and hardware**	1. Software should be latest, genuine, and original with Part Number 2. Single Point Control for complete system including all modules, acquire, process, and reproduce the data 3. Real time triggers to react the condition i.e., to act on Fault, Leakage, Stop, Start, wavelength switching, injection etc.		
5	**Photo-diode array detector**	1. Detection type: 1024 photo diodes or more 2. Wavelength range 190-950 nm or more 3. Light source: Deuterium lamp & Tungsten Lamp 4. Wavelength accuracy: ± 1 nm 5. Linearity range: ≤5% at 2AU 6. Noise: <1.0x10-5 AU at 7. Drift: <1.0x10-3 AU/Hr or better 8. Peak purity software 9. Diode width/Resolution: < 1.2 nm. 10. Flow cell: 10mm path length, 10 to 15 ul volume (Analytical standard) 11. Temperature control for complete optical unit. 12. Data rate up to 120 Hz or better.		
6	**Additional Feature**	1. The system should have the provision for		

		complete upgradation (module and system wise) capability in future.		
7	**RI Detector**	1. Must be temperature control. 2. Flow cell volume 10 ul or lower, 3. Temperature stability +/- 0.2 °C 4. Measurement range: $\pm 600 \cdot 10^{-6}$ RIU.		
8	**Viscometer Detector:**	1. Temperature control should be there. 2. capillary bridge design for intrinsic viscosity measurement. 3. Shear rate (typical) 3000 s-1 4. Temperature stability +/- 0.2 °C		
9	**Light Scattering Detector:**	1. Lowest cell volume is preferred, < 18ul or lower. 2. Temperature control should be there, which user can set as per method 3. Both RI and LS must have same wavelength range. 4. All detectors, columns and standards in the system must be supplied by a single vendor.		

10	**Columns:**	1. Vendor needs to supply multiple GPC columns along with Guard column and standards to cover a wide range of applications. 2. Molecular weight range 4000 to 6 lakh kDa should be covered by all the columns provided.		
11	**Software:**	1. One software support: software should be capable of controlling system and data processing and, if required, capable of advanced GPC calculations like branching, etc. 2. All detectors (RI, Viscometer and LS Detector) should be in one housing. The whole system and column standards must be supplied by OEM directly.		
12	**Warranty**	5-year comprehensive warranty		
13	**Computer Requirements**	1. CPU: i5 Core processor 64bit, 3 GHz or higher 2. Monitor: 21-inch Monitor, which supports 1920 x 1080 or higher resolution 3. HDD: 1 TB		

		4. RAM: 16 GB 5. Operating system: Microsoft Windows 10 enterprise/ professional (64 Bit) 6. Power backup: 7 KVA UPS should be supplied. 7. Ethernet: 2 LAN ports.		

Other Terms and Conditions:

1. The quoted model should have all the spares and components available for at least 10 years after installation, and service support should be available for this duration minimum.
2. System performance should be demonstrated with necessary standards and calibration kits which the vendor will provide as part of standard delivery.
3. The warranty should include a preventive maintenance kit, and calibration kit.
4. No conditional warranty will be accepted.
5. Basic training for a period of one week after installation & commissioning of the equipment is to be provided at our site to technical personnel.
6. On-site training of staff and students (at least twice in a year for 7 days each) during the first 3 years.
7. Service support should be available for 6 days a week.
8. Training on troubleshooting the issues associated with instrumentation or applications should be provided free of cost whenever required by the user.
9. Manufacturers should provide the service support details in Mumbai, India.
10. Details of at least 2 service engineers and application specialists should be provided along with their experience.
11. Details of the users (name, phone number and email ID) in India for the quoted instrument in the bid should be provided.
12. Instrument performance, quality of service and application support certificates from at least three existing users should be provided, preferably CFTI or IIT or equivalent.
13. Evaluation will be done based on technical specifications as per our tender

notice.

14. Maximum educational discounts should be applied.
15. The delivery period should be specifically stated. Earlier delivery may be preferred.
16. We may provide unknown samples to the vendors for analysis on the quoted models to verify their claims on technical specifications and reserve the right to reject any or all quotations based on the results (at technical stage).