

SPECIFICATIONS OF GAS CHROMATOGRAPH WITH TCD & FID**1. CONFIGURATION:**

Micro processor based unit with two capillary injectors, Thermal Conductivity Detector (TCD) and Flame Ionization Detector (FID) along with Hydrogen Gas generator, Zero Air generator and Nitrogen Gas generator.

2. SCOPE:

- a) Determination of purity and impurities in Mono Methyl Hydrazine (MMH), UH-25 and Hydrazine propellants used for launch vehicles and satellites in ISRO.
- b) To analyze purity and impurities of organic solvents.

3. COLUMN OVEN:

- Oven size : 280 x 280 x 200 mm HxWxD (app.)
- Temperature range : Ambient to 450 deg C
- Temperature accuracy : ± 1 % of the set temp.
- Cooling speed : 450 deg C to 50 deg C within 4 minutes
- Heating rate : 150 deg C per minute
- No. of Ramps / plateaus : 24 Ramps / 25 Plateaus
- Oven should have provisions for automatic cooling without opening the door.
- Should have selected initial and final temperature programmable for multi cycle operation.

4. INJECTORS:

- Complete electronic flow control for injector (including Split flow) and detectors.
- Range of injectors include : Split/splitless, cold-on-column, flash, packed-on-column, and programmable temperature vapourizing injector.
- Other inlet systems : Liquid Sampling Valves (LSV) for sample introduction.
- Back flush and quick switch valve capability (optional).
- Detector includes : Flame Ionisation Detector (FID) and Thermal Conductivity Detector (TCD)
- Necessary adaptors to operate with capillary Wide Bore column and packed columns.
- Temperature Range : Ambient to 450 deg C in step of 1°C.
- Suitable interchangeable accessories for capillary column to packed column.

5. SPLIT - SPLITLESS CAPILLARY INJECTOR:

- To operate with capillary and wide bore.
- Suitable for all capillary columns (50 micrometer to 530 micrometer)
- Large volume split less injection (4 micro litres) without requiring pressure pulse to quantitatively recover the whole sample.
- Temperature Range : Ambient to 400 deg C in step of 1°C
- Constant pressure & flow mode

6. PNEUMATICS:

(Electronic Flow control for Split/Split less inlet)

- Electronic carrier gas control is performed through an integrated pressure and mass flow controller which must be able to control column pressure or flow rate.
- Programmable head pressure control (0.1 to 150 psi) or constant electronic flow control (0.1 to 100 ml/min.), programmable split ratio control (1 to 10000), adjustable septum purge, pressure pulse injector mode (0.1 to 150 psi) and gas saver mode. For 100 to 1000 μ m diameter fused silica columns, 1 to 250 meter length. Maximum temperature limit : 450°C.
- Provision for automatic column leak test.
- All the pressure and flow controls should be electronically controlled. Corresponding values should be digitally displayed.
- Should have flow adjustments variable from 0 to 1500 ml / min.

7. GC CONTROL:

- Digital display of oven, injector and detector temperatures.
- Pressure and flow parameters of carrier gases and type of carrier gas.
- Graphic array of temperature programming and the sample run.
- Key board control for oven, injector and detector base body temperature settings.
- Carrier gas pressure and flow rate settings, automatic system leak check and automatic column evolution to prevent RT variation.
- Real time clock programming with auto start, real time system diagnostics, instrument start diagnostics, sampling valve actuation and stop watch.
- Multiple safety features are provided with few controls like maximum column temperature settable by the user using password protection.

8. DETECTORS:

a) THERMAL CONDUCTIVITY DETECTOR:

- Dual filament
- High performance in terms of sensitivity and linearity for wide bore & capillary columns
- Control board for digital as well as analog acquisition
- Cell volume: 200 micro liters or less
- Gas flow up to 100 ml per minute
- Temperature Range : Ambient to 400 deg C
- Linear dynamic range : 1000000
- Filament temperature safety cut off
- 10 times amplification for trace level Analysis
- Start up kit (SS tubings 2mm x1mm x 3 meter long-3 Nos., Male plug brass-10 nos., Union Tee connect Brass – 5 Nos., Locking nut SS – 10 Nos., Septum – 50 Nos, Ferrules- 50 Nos., Bubble flow meter-1No. etc)

b) FLAME IONIZATION DETECTOR:

- Type : Flame ionization
- High performance in terms of sensitivity and linearity
- Temperature Range : Ambient to 400 deg C in steps of 0.1 deg C.
- Sensitivity : More than 0.03 Coulombs per gram of Carbon
- Linear dynamic range : 10000000
- Control board for digital as well as analog acquisition
- Flame out Detection and automatic re-ignition.
- Ceramic and stainless steel jet and jet replacement tool

9. COLUMNS

- A set of capillary columns & packed columns suitable to carry out analysis as per specification mentioned in the scope.
- One more set of capillary columns as a standby suitable to carry out analysis as per specification mentioned in the scope.
- HETP of column should be mentioned along with certification.

10. ACCESSORIES

10.1 Hydrogen Gas Generator

10.2 Zero Air Generator

10.3 Nitrogen Gas Generator

11. POWER REQUIREMENT:

- 230 V AC 50 Hz

12. OPERATING SYSTEM:

➤ Computer:

It should be supplied with suitable PC (Intel Core i7 processor, 32 GB RAM or higher, RAM expandability up to 128 GB) having an interface cord and standard configurations with LED monitor, with two serial and one parallel ports and standard key board for warranty period of three years.

➤ Printer:

Laser Jet color printer which is windows compatible.

➤ Auto Diagnostics:

Exhaustive checks should correct operations and status of GC control, CPU, ROM, RAM, key board.

13. SPARE PARTS :

Spare parts required for 2 years trouble free operation & maintenance of GC shall be quoted separately along with break-up cost. IPRC will decide the required spare parts for maintenance.

14. SOFTWARE:

Window based software with interface card with PC and printer for dual channel operation.

The soft ware should have minimum factors such as:

- Control and acquisition / data handling
- Full digital control of methods
- To store unlimited method files.
- Scheduled files.

- report formats.
- Chromatograph for comparison.
- Manual base corrections.
- Multi level calibrations.
- System suitability parameters etc.
- On screen time display of incoming chromatogram with adjustable expansion. Multipoint, linear quadratic or geometric calibration curves with regression statistics, on screen display and editing options.
- Grouping of non consecutive peaks, chromatogram addition, subtraction, rationing, differentiation, stacking, offsetting & comparing.
- External standard, internal standard, area normalization and area % calibration methods.
- Automatic base line correction.

15. INSTALLATION / COMMISSIONING:

All infra structural facilities required for installing and commissioning of the system should be furnished. All accessories required for installation and commissioning of the equipment are to be supplied along with the equipment. A responsible service personnel / local agent should be entrusted with the task of Installation / Commissioning of the system.

16. DEMONSTRATION:

The vendor should demonstrate the full capability of the system with respect to its claimed capabilities such as repeatability of analysis

17. TECHNICAL COMPLIANCE STATEMENT:

The vendor should enclose the technical compliance statements against our technical specifications clearly mentioning Yes or No for various points. The statement should be supported by relevant literature/data.

18. MANUALS:

Operating and Maintenance manual with all necessary information required to run the instrument smoothly should be given in both soft and hard forms along with the system.

19. TRAINING:

Training related to operation, maintenance and troubleshooting etc is to be imparted to the lab personnel for sufficient period at our Laboratory without any extra charge.

20. WARRANTY:

Vendor should provide comprehensive warranty for minimum one year after successful commissioning and installation or 18 months from the date of supply.

21. AFTER SALES SERVICES & MAINTENANCE CONTRACT

Vendor has to give assurance of providing efficient after sales services and undertaking maintenance contract with IPRC after the expiry of warranty period on mutually agreeable terms & conditions

22. ANNUAL MAINTENANCE CONTRACT:

The vendor has to quote firm & fixed AMC charges for three years after completion of warranty period on following terms. Cost for each Preventive Maintenance visit (Two Nos.) and cost for one breakdown visit per annum.

23. PREVENTIVE MAINTENANCE:

Vendor's representative shall visit once in six months for preventive inspection and maintenance.

24. BREAK DOWN MAINTENANCE (ON CALL BASIS):

In case of AMC Parties representative will visit within 48 hours of notice of breakdown and make the system operative within next 48 hours. Vendor has to give a list of spares with cost, which may be required for three years of trouble free service under optional spares.

25. GENERAL TERMS AND CONDITIONS:

- The item shall be supplied at IPRC, Mahendragiri, Tirunelveli district, Tamil Nadu.
- Item should be packed in good condition to avoid any transit damage.
- Payment shall be made after installation and commissioning of the equipment at IPRC, Mahendragiri