

GC for General Samples:**2-Channel Gas Chromatograph**

Channel 1: S/SI injector & GSV for liquid and gas samples injection, configured so that be able to separate and analyze below components:

Piperazine, AMP & H₂O

Channel 2: S/SI injector, GSV & LSV for liquid and gas samples injection, configured so that be able to separate and analyze below components:

Trace Permanent Gas Impurities in Ethylene or Propylene including H₂, O₂, N₂, Ar, CO, CO₂, CH₄ as ppb to low-ppm

Item no	Technical Features	Requirements
1	OVEN	<ul style="list-style-type: none"> • Operating temperature range suitable for all columns and chromatographic separations. Ambient temperature +4 °C to 450 °C. • Temperature set point resolution: 0.1 °C. • Supports 20 oven ramps with 21 plateaus. Negative ramps allowed. • Maximum achievable temperature ramp rate: 120 °C/min • Maximum run time: 999.99 min (16.7 h). • Oven cool down (22 °C ambient) 450 to 50 °C in 4.0 min (3.5 min with oven insert accessory). • Ambient rejection: < 0.01 °C per 1 °C.
2	PENOMATI CS	<ul style="list-style-type: none"> • Compensation for barometric pressure and ambient temperature changes be standard. • Pressure must have typical control of ±0.001 psi for the range of 0 to 150 psi. Pressure set points may be adjusted in increments of 0.001 for the range 0.000 to 99.999 psi; 0.01 psi for the range 100.00 to 150.00 psi. • User could select pressure units as psi, kPa, or bar. • Pressure/flow ramps: Three minimum. • Carrier and makeup gas settings be selectable for He, H₂, N₂, and argon/methane. • Flow or pressure set points for each inlet or detector parameter could be adjusted with instrument and Software. • Constant flow mode be available when capillary column dimensions are entered into the instrument. • Split/splitless, Multimode, and PTV inlets must have flow sensors for the control of split ratio. • Inlet modules

		<ul style="list-style-type: none"> • Pressure sensors: Accuracy: $< \pm 2\%$ full scale, Repeatability: $< \pm 0.05$ psi, Temperature coefficient: $< \pm 0.01$ psi/°C, Drift: $< \pm 0.1$ psi/6 months. • Flow sensors: Accuracy: $< \pm 5\%$ depending on carrier gas, Repeatability: $< \pm 0.35\%$ of set point, Temperature Coefficient $< \pm 0.20$ mL/min (NTP)* per °C for He or H₂; $< \pm 0.05$ mL/min NTP per °C for N₂ or Ar/CH₄. • Detector modules: Accuracy: $< \pm 3$ mL/min NTP or 7% of set point, Repeatability: $< \pm 0.35\%$ of set point <p>*NTP = 25 °C and 1 atmosphere</p>
3	S/SL INJECTOR	<ul style="list-style-type: none"> • Suitable for all capillary columns (50 μm to 530 μm id). • Split ratios up to 7,500:1 to avoid column overload. Setting split ratios (particularly low split ratios) is limited by column parameters and control of system flows (particularly low system flows). • Splitless mode for trace analysis. • Pressure-pulsed splitless be easily accessible for best performance. • Maximum temperature: 400 °C. • EPC be available in two pressure ranges: 0 to 100 psig (0 to 680 kPa) for best control for columns > 0.200 mm diameter; 0 to 150 psig for columns < 0.200 mm diameter. • Gas saver mode to reduce gas consumption without compromising performance. • Electronic septum purge flow control to eliminate “ghost” peaks. • Total flow setting range: 0 to 200 mL/min N₂ 0 to 1,250 mL/min H₂ or He • Turn top inlet sealing system i with each S/SL inlet for quick, easy, injector liner changes.
4	PTV INJECTOR	<ul style="list-style-type: none"> • Support hot/cold split and splitless modes as well as large volume injections. • Temperature control: either LN₂ (to -160 °C) or LCO₂ (to -65 °C) cooling. • Temperature programming of up to 3 ramps at up to 720 °C/min. • Maximum temperature: 450 °C. • EPC pressure range 0 to 100 psig. • Split ratio up to 7,500:1. • Electronic septum purge flow control. • Choice of Gerstel septumless head or Merlin Microseal® septum head. • Total flow setting range: 0 to 200 mL/min N₂ , 0 to 1,250 mL/min H₂ or He
5	FID DETECTOR	<ul style="list-style-type: none"> • Electronic pneumatics control and electronic on/off for all detector gases. • EPC compensated for atmospheric pressure and temperature variation. • Minimum detectable level (for tridecane): < 1.4 pg C/s • Linear dynamic range: $> 10^7$ ($\pm 10\%$). • Full-range digital data path enables peaks to be quantified over the entire 10^7 concentration range in a single run. • Data rates up to 500 Hz accommodate peaks as narrow as 10 msec at half height. • Standard electronic pneumatic control for three gases: <ul style="list-style-type: none"> - Air: 0 to 800 mL/min

		<ul style="list-style-type: none"> - H2: 0 to 100 mL/min - Makeup gas (N2 or He): 0 to 100 mL/min •adaptable for either packed or capillary columns. •Flameout detection and automatic reignition •450 °C maximum operating temperature
6	TCD DETECTOR	<ul style="list-style-type: none"> •Electronic pneumatics control and electronic on/off for all detector gases. •EPC compensated for atmospheric pressure and temperature variation. •Minimum detectable level: 400 pg tridecane/mL with He carrier. •Linear dynamic range: $> 10^5 \pm 5\%$ •Unique fluidic switching design provide rapid stabilization from turn-on, low-drift performance. •Signal polarity could be run-programmed for components having higher thermal conductivity than the carrier gas. •Maximum temperature: 400 °C •Standard EPC for 2 gases (He, H2, or N2 matched to carrier gas type) •Make-up gas: 0 to 12 mL/min •Reference gas: 0 to 100 mL/min •The instrument must accommodate a third detector as TCD located on the left-hand side of the GC.

A Special GC Instrument as Below:

**GC for CO2 Capture Project
Special Gas Chromatography System**

Common Requirements for instrument:

- *Voltage: 220 volt (universal)
- *PC system with latest version of original MS operating system with color laser printer
- *latest version of Original Software in Order to control GC and analyze results
- *Installation kit
- * Five years spare parts
- * 1 year guaranty & 10 years warranty
- * Training course for 2 people for each instrument

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It is the responsibility of the supplier to provide suitable standards (at least 10 liters) for the calibration of second channel.

- *sample temperature: ambient
- *sample pressure: ambient to 20 barg
- *Factory acceptance test (FAT) in the presence of the customer before delivery at the expense of the supplier for two people.
- *The supplier is responsible for the preparation of the device and the CRMs according to the requested data sheet, transportation, installation, start-up and training at Mahshahr Center Research & Technology company.

- A) Application done before by the customer?
 B) Application according
 1. Standard method, like ASTM? Method: no Standard Method
 2. Application or article? Methanol Production Analysis (gas and liquid in one sample in high temperature)
 C) Sample information

Sample type: 01

Sample Type	Real	(Calibration, Validation, Real sample)
Sample Description	CO2 Capture- Amine- Trace Impurities	(for example Naphtha)
Sample state	Gas liquid mixture	(Gas or Liquid)
Sample Temperature at site	70 °C	
Sample Pressure at site	1-20 Bar	
Max Runtime	60 Min	
Max cycle Time	30 Min	

Fill in details in case of specific component analysis

#	Component or group	Critical comp.	Concentration		LOD	Unit of measurement (wt %, vol%, ppm, ppb, etc.)	Quantitation (yes or no)
			Min.	Max.			
01	CH4		1ppb	Low-ppm		ppm	Y
02	O2		1ppb	Low-ppm		ppm	Y
03	N2		1ppb	Low-ppm		ppm	Y
04	CO		1ppb	Low-ppm		ppm	Y
05	CO2		1ppb	Low-ppm		ppm	Y
06	H2		1ppb	Low-ppm		ppm	Y
07	Ar		1ppb	Low-ppm		ppm	Y
08	Piperazine		0.01	15		Wt%	Y
09	2-Amino-2-Methyl-1-Propanol (AMP)		0.05	25		Wt%	Y
10	H2O		60	90		Wt%	Y

Additional Information:

All component with higher concentration than 0.001 ppm should be Analyzed
 All component with less concentration than 0.001 ppm not need to be Analyzed
 O2 and Ar have to be separated

Notes:

- In case "0" is specified as the minimum concentration it is assumed 0.5
- If any components in the stream(s) polymerize or decompose, indicate temperature at which the change(s) occur.
- All samples are considered free of particulates. Indicate if sample contains particulates.

Does this sample contain:

	No	Yes	Describe
Corrosives	*		
Moisture/Water		*	
Particulates	*		
Oils/Heavies	*		
Precipitates	*		
Oligomers, Polymers	*		

توجه:

تطابق کلی مشخصات فنی پیشنهادی با مشخصات فنی مورد نظر

- عدم تطابق کلی مشخصات کالای پیشنهادی با حداقل مشخصات فنی پیش‌بینی شده در اسناد مناقصه که موجب تأثیر در عملکرد دستگاه شود، باعث حذف کامل پیشنهاد فنی می‌شود. که اهم آن در زیر آمده است:
 - تمام قطعات و اتصالات دستگاه بر مبنای سیستم اینچی (inch) باشد.
 - کلیه کنترل گرهای فشار و جریان گاز در دستگاه بطور داخلی کالیبره شوند و نیاز به کالیبراسیون توسط تجهیزات خارجی نداشته باشند.
 - آون دستگاه توانائی تنظیم و تحمل دما تا حداقل 400 درجه سانتیگراد را داشته باشد.
 - بطور پیش طراحی شده آون دستگاه قابلیت خنک کردن سریع از 450 تا 50 درجه سانتیگراد را در کمتر از 5 دقیقه داشته باشد.
 - دکتور FID دستگاه قابلیت رنج خودکار داشته و Over load نشود.
 - دستگاه توانایی ارتباط از طریق شبکه به سیستم کامپیوتری کنترل کننده را داشته باشد.
 - نرم افزار کامپیوتری کنترل کننده دستگاه اصالت داشته و اختصاصی همان برند باشد.
- شرکت پیشنهاد دهنده باید قبول کند که تمامی اسناد فنی دستگاه اعم از Operating Manual و Service Manual را در به همراه دستگاه ارائه دهد.