



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

Std. / Doc. Number

PY 56488Rev. No. **00**

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Specification for Gas Chromatograph

1. SCOPE

This technical specification covers the Design, Engineering, Manufacturing, Assembly, testing at vendor works, inspection by purchaser, packing and transportation to site with necessary documentation like data sheets, statutory approvals, O&M manuals etc., and supervision of erection & complete commissioning assistance as required for Gas chromatograph.

2. SCOPE of SUPPLY – As per enquiry**3. Proven Track Record**

The items being offered as per specification should be operating satisfactorily in captive power plant applications / hydrocarbon industries like Refinery, Petrochemical, Fertilizer, steel plants and gas processing plants for at least 4000 Hours. The above criteria shall be applicable to main equipment, sub- components as well as bought out items if any.

Vendor shall submit necessary supporting documents / past users confirmation supporting to above PTR requirements along with technical offer.

If offered instruments / equipments are supplied to BHEL PE&SD within last 5 years, above PTR clause is not applicable.

4. INSTRUCTIONS TO BIDDERS

4.1 Bidders **are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry**. In the event of any conflict between these specifications, data sheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for clarifications before bid submission **and the decision of Purchaser shall be final & binding on Bidder, without any cost & delivery implications. However in the event of conflict, most stringent requirements shall be followed.**

4.2 Offers with incomplete information will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder.

4.3 Any technical features [over & above BHEL enquiry specification requirements] proposed by Bidder will not be given preference for the purpose of evaluation.

4.4 Bidder shall submit the "Duly filled & Signed copy of Check list" compulsorily along with technical offer without which offer is liable for rejection without any further interaction with the Bidder

5. List of Annexures (To followed along with this specification)

Document No.	Document Name
Annexure – [1]	Price Bid format
Annexure – [2]	Gas composition
Annexure – [3]	Gas chromatograph Block diagram

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Revisions:

Refer to record of
revisions

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Anand Babu**Date :****15.10.20**



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6. CHECK LIST (To be filled by BIDDER and submitted along with Technical offer is compulsorily)

Vendor shall submit the following documents mandatorily as part of COMPLETE technical offer.

Enquiry No. / Date :

Name of the Bidder :

Project Name :

Item Description :

S. No	Document	Bidder confirmation (Yes/No)	Remarks
1	Technical offer complies with the specifications and its associated annexures, pre-bid clarifications in Toto and there are no technical deviations. Signed and stamped copy of this specification along with annexures enclosed along with technical offer.		
2	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are submitted in BHEL format . In case technically feasible deviations are proposed by the bidder and subsequently withdrawn, <u>no commercial implications can be claimed by the bidder</u>		
3	All items are manufactured conforming to latest version of material grade standard and manufacturing standard mentioned in this specifications		
4	Bidder to quote as per BHEL price format only. No other format is acceptable. Bidder to attach un-priced price bid format by indicating "QUOTED" against each item and submit with technical offer duly signed & stamped.		
5	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent of + 10% and -30% of order Value.		
6	Bidder to agree that Bill of materials / list of equipment furnished in the offer is only for information; Vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.		
7	Confirm that the quote includes training, commissioning spares, special tool & tackles, mounting hardware/ accessories, terminations, networking components etc. as required for commissioning activities.		
8	All the equipments / items / etc., supplied by bidder are having valid statutory approval certificates and same will be produced at any stage of contract execution to BHEL. The same were eligible to take local statutory regulatory body approval during commissioning of the system (if applicable)		
9	All documents and literatures are to be supplied in English Language.		

 (Bidder's Signature and stamp with date)



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DEVIATION FORMAT

Enquiry No.:Item:Name of Bidder:Offer Ref. No.:

Sl. N o.	Clause no. & Spec. no.	Description as per Specification	Deviation taken	Nature of Deviation	Remarks

NOTES:

1. Technical offer of the bidder will be evaluated only on the basis of Deviation Schedule. Deviation Schedule constitutes this sheet (with these Notes) duly signed and stamped.
2. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
3. Additional sheets in the same format can be attached by the vendor, if necessary.
4. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
5. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
6. Reasons for the deviations shall be specified in the Remarks column.
7. If there are no deviations from the specifications, bidder still has to submit the signed copy of this format by writing "NO Deviations" on this format.
8. If the "Deviation Schedule" is not submitted along with the offer, the bidder's offer is likely to be rejected without any further interaction with the bidder. Only the accepted deviations in conjunction with the original tender shall constitute the contract document for the award of job to the bidder

SIGNATURE OF THE BIDDER_____

NAME_____

DESIGNATION_____

DATE_____

COMPANY SEAL

7. TECHNICAL STANDARDS

Latest edition of the following standards shall be followed for design, manufacturing and testing of the Gas chromatograph covered under this specification.

IEC 79	Electrical Apparatus for Explosive Gas Atmosphere.
IEC 529	Degree of Protection provided by Enclosures.
ANSI/ASME	American National Standards Institute/ American Society of Mechanical Engr.
B. 1.20.1	Pipe Thread
B 16.5	Steel Pipe Flanges and Flanged Fitting
B 16.20	Ring joint Gaskets and Groove for Steel Pipe Flanges
API	American Petroleum Institute MPMS (Relevant Portions)
CENELEC EN 50020	Electrical Apparatus for Potentially Explosive Atmospheres
DIN 50049	Document on Material Testing
IS- 2147	Degree of Protection Provided for Enclosures
IS – 2148	Flame proof Enclosures of Electrical Apparatus
IEC – 801	Electromagnetic compatibility for Industrial Process Measurement and Control Equipment

8. TECHNICAL INFORMATION

- 8.1 Bidder shall offer the detailed BOQ along with Sub-components makes, model numbers and quantities as required for complete Gas chromatograph. FAT shall be carried-out from a place, which meets the requirement of PTR as well as authorized by OEM. Bidder shall provide a complete system to BHEL as a package.
- 8.2 Gas Chromatograph shall be provided with international standard painting shades before painting the standard procedure for painting like epoxy quoting, primer coating etc as per international standard to be followed.
- 8.3 Bidder to ensure that the moisture content of the process gas, calibration gas or carrier gas shall not be entered into the Gas Chromatograph.
- 8.4 Purchaser's data sheets indicate type, minimum sampling system requirements and material construction for Gas Chromatograph and its sampling system. However, this does not absolve the vendor of the responsibility for proper selection with respect to the following :
 - i. Proper design of the sampling system and gas chromatograph to measure the component of interest to the stated accuracy.
 - ii. Selection of materials for all the parts of the gas chromatograph system so as to be compatible with the process stream and surrounding atmosphere as per purchaser's data sheets.
- 8.5 Vendor shall be responsible for selection of the correct model no. of instruments to meet the specifications contained in this spec. In case of model no. required to be changed at later date, the same shall be done by the vendor without any price or delivery implications
- 8.6 Offer shall be clear, unambiguous (with no alternatives) and complete with all data sheets, catalogues etc.
- 8.7 Gas Chromatograph shall be connected to the Flow Computer (not in the scope of this Tender). Hence suitable interface & integration with Flow Computer is under GC Vendor's scope.
- 8.8 Separate Analyser Cabin, necessary Sample Handling System, Tubing from main pipeline to Analyser Cabin, Bottles and Skid for mounting are under Vendor's scope.

8.9 Technical Data Sheet [Tag No: 910-AE/AT/AI-1102]

S. No	Description	Requirement
1	Application	RLNG / Gas
2	Line No / Line Size / Material / rating	4"-P-910-5107-DA1A ; 4" Sch XS / Carbon Steel / 600#
3	Scope of Supply	Complete GC including sample pre-conditioning / sample handling system (if applicable), Interface with return line, calibration gas cylinders, analyzer with signal conditioning unit, power supply unit programmer and other necessary accessories as required.
4	Analyser	
4.1	Mounting	To be mounted in the field adjacent to the pipeline.
4.2	Site / Ambient conditions	The analyzers must function properly in Indian conditions without any defect between 0 to 65°C ambient temperatures, 0 - 100% relative humidity and in high ambient dust levels. If not, suitable arrangement to be provided
4.3	Installation	Outdoor, Suitable for Zone-1, IIC, T3 [40 meters away from Tapping point]



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4.4	Purge backup facility	OEM to decide based point no.4.3 above.
4.5	Power Supply	For Analyzer: 110V, single phase UPS supply; For Lighting & others: 240V, non-UPS supply; Vendor shall supply for explosion proof isolator switches for main power supply in Gas Chromatograph cabinet. Vendor to note that any other voltage level or DC supplies required shall be in vendor's scope.
4.6	Accuracy / response time / repeatability	As per manufacturer's standard.
4.7	Analyser Type / operating principle	Continuous On – line Gas Chromatograph microprocessor controlled. Solid – state electronics protected from industrial EMI/ RFI interference.
4.8	Number of streams	Single
4.9	Column	Micro packed column with high resolution and low carrier gas consumption.
4.10	Column size	By vendor
4.11	Detector	High performance Thermal conductivity type
4.12	Carrier gas	Helium along with pressure regulators for minimum 2 years consumption
4.13	Cycle time	4.0 minutes max.
4.14	Outputs	a) Four Nos. Analog Output (4 – 20 mA, isolated) signals for driving 600 ohms load resistance each for: 1) Gas Calorific Value 2) Specific gravity 3) Compressibility factor & 4) Gas composition
		b) 2 No's RS485 (MODBUS RTU) for interfacing with flow computer [Tags: 910-FQI-1102 & 910-FQI-1201]. Minimum details to be communicated in above links are: Gas composition – Calorific value (Gross & Net) – Specific gravity – Compressibility
		c) Potential free Contact output for malfunction.
4.15	Calibration Gas	If required, Calibration gas cylinders and pressure regulators for min. 1 year consumption to be provided
4.16	Configuration changes	It shall be possible to make configuration changes by an inbuilt keypad or through external configurator (Note-5)
4.17	Manual calibration	Required
4.18	Local Display Unit	Required
4.16	Gas Chromatograph & Gas Chromatograph electronics mounting	Complete Gas Chromatograph and Gas Chromatograph electronics together with fully tubed carrier gas and calibration gas cylinders
4.17	RS-485 cables between GC and flow computers [910-FQI-1102 & 910-FQI-1201].	To be supplied by bidder along with required accessories for termination; Quantity = 1200 meters;
4.18	RS-485 cables (for Purchaser's use)	To be supplied by bidder along with required accessories for termination; Quantity = 3000 meters;
4.19	Cable glands & lugs	To be provided by bidder all incoming & out going cables of bidder supplied items with 20% spare quantities.
4.20	Utilities available	Instrument air @ Minimum 5.5Kg/cm2(g) and Maximum 8.0Kg/cm2(g); Instrument air with 1" header shall be made available near the GC cabinet by the purchaser; All further tubing, dual compression fittings, adapters, Filter Regulators, gauges required for the above shall be in vendor's scope.
4.21	Tube fittings	All the fitting shall be Swagelok make.
5	Sample handling system	
5.1	Items required	The sampling system shall include all necessary equipments and components for sample probe, line isolation valves, sample pre-conditioning / pressure / temperature regulation (if required), sample transfer line, sample conditioning system, sample bypass & interface with return lines, calibration port, vent / drain header with flame arrester, etc.
5.2	Probe	As per Manufacturer's standard; Online retractable type; Material: SS 316; Bidder to provide Sample probe with SS Relief valve and pressure gauge, Thredolet 6000 # material ASTM – A-105 (as per ANSI B 16.5) thread as per ANSI B 1.20.1, necessary assembly consisting of Ball valve, manometer and Relief Valve etc
5.3	Sample Tap off point connection size / Rating / Flange material	1.5" flanged ANSI 600#RF, facing 125 AARH, flange MOC: ASTM A105. Pipeline Flange shall be protruding 200 mm from the surface of the pipeline;



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5.3	Installation	Refer point no.4.3 above
5.4	Interconnection Tubing, Tube fittings and all wetted parts for complete system	SS316 as a minimum with double compression fittings
5.5	Tube length from process tap to analyser	To be decided based point no.4.3 above.
6	Flow (Min - Nor - Max - Design)	2780/3728/4120 Nm3/Hr
7	Pressure (Min-Nor-Max-Design)	25/28/39/52 Kg/cm2(g)
8	Molecular weight	Refer attached gas composition sheet
9	Compressibility	Refer attached gas composition sheet
10	Viscosity [In Cp]	Refer attached gas composition sheet
11	Temp (Min - Nor - Max-Design)	4/35/55/65 Deg C
12	Gas Compositions	Refer attached gas composition sheet

NOTES:-

- Vendor to note that all utilities like power, instrument air etc. shall be provided by owner at one point near the analyser panel. Further distribution with all accessories regulators, adapters etc shall be in vendor's scope of supply.
- Vendor to calculate probe length considering minimum 30% to 50 % insertion in line.
- Sample Return Conditions:
 Pressure (Normal / Design) kg/cm2g: *Same as supply conditions.*
 Temperature (Normal / Design)deg C: *Same as supply conditions.*
 All required accessories like pump, tubing etc to return the sample to sample return line as per above conditions and distance mentioned in attached 'Distance table' shall be in vendors scope of supply.
- Purge shall be as per NFPA 496 Type Z **based on point no.4.3 of data sheet above**. Purge failure alarm shall be provided for Purchasers use.
- In case external configurator is required, the same shall be supplied by vendor along with all suitable hardware such as Laptop with bag / PC (of latest configuration), associated cables, necessary configuration software's (along with Unit wise License), other associated accessories, converters etc. as required.
- Gas Chromatograph field equipments shall be suitable for the ambient conditions and shall guarantee that the performance of the GC shall not deteriorate up to the specific ambient conditions. Documentary proof shall be furnished in support of performance otherwise vendor to provide suitable provision such as shelter/ cabinet with full details with offer.
- The Analyzer Unit shall be fully microprocessor controlled with heated oven, Detectors column flow adjustments Access panel, purge air controls, carrier gas controls etc. and certified for Hazardous area installation in the field.
- The Detector system and electronics shall withstand high and low temperatures.
- The Gas Chromatograph shall have retention time reproducibility character with analyzer programs stored in EEPROM and with battery backed CMOS memory. The GC shall store the data (of 3 shifts per day of 4 minute cycle average up to a month) for minimum one month. Vendor shall furnish the maximum capacity of the GC to store the data in the offer.
- The offer GC should have extensive data storage/retrieval capacity to keep valuable data /results for future use. The GC archive shall store minimum most recent 1200 cycles & last 400 calibration and average result of last 64 days. Details have to be furnished in the offer.
- The Gas Chromatograph shall have auto diagnosis feature and shall display error/ warn messages about the status of every parameter and eventful malfunctioning.
- The Gas Chromatograph shall have method linking feature so that the analyzer shall be programmed to perform automatically and sequentially different determinations on a mixed sampler batch with each sample is analyzed according to its own method
- Bidder to take care Mounting Skid for of Analyser, sampling conditioning cabinet and the bottle stand with vent system of 3mtr. An explosion proof Junction Box with Switches for signal & power supply along with necessary power & signal cables and glands.
- Bidder to provide Bottle (duly filled for Calibration Gas, Carrier Gas) & Bottle Stand with Bottle pressure regulators, Automatic switchover system for Carrier Gas, Heating plate etc suitable for mounting in the field.
- All Cables, Glands, Terminals, Tubing, structural items, Panel accessories required for installation of the system is in vendor's scope.

9. DESIGN AND CONSTRUCTION

- In general Gas Chromatograph and sampling systems shall be designed and constructed in accordance with API – MPMS (Relevant portions).
- Process Stream sampling shall be continuous.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.3 Unless otherwise specified material of all components wetted by sample shall be ANSI – 316 SS. 9.4 Gas Chromatograph enclosures and accessories shall be suitable for the electrical area classification indicated in purchaser's data sheets. Unless otherwise specified, the enclosures shall be to the following standards : Weather proof housing : IP 55 as per IEC – 529 / IS – 2147 Flame proof housing : Flame proof Ex (d) as per IEC – 79/IS-2148 Flameproof equipment shall also be made weatherproof. Intrinsically safe version of Gas Chromatograph shall be suitable for the area classification indicated in purchaser's data sheets. Unless otherwise specified, the intrinsic safety shall be to the following standards : Intrinsically safe BS 5501/CENELEC EN 50020. All such Gas Chromatographs shall also be weatherproof to IP 55 as per IEC- 79 / IS – 2147. The intrinsically safe and explosion proof equipment shall be certified by statutory bodies like BASEEFA, FM, PTB, CMRI etc. In addition to the certificate from statutory body, for instruments supplied for projects in India, vendor irrespective of their place of manufacture shall also furnish approval form CCOE (Chief Controller of Explosives) and the same is mandatory. In case CCOE certificate is not available now, vendor to confirm to supply the same for each item before shipment. 9.5 All interconnecting wiring shall be colour coded / numbered and terminal blocks clearly identified. 9.6 The sampling system, Gas Chromatograph Analyser, Bottles etc. shall be supplied pre – mounted on cabinet of self-standing skid, in general. The foundation of skid shall have holes to anchor it to the ground with anchor bolts. The enclosure to skid shall be weatherproof to IP 55, as a minimum. 9.7 The design of Gas Chromatograph system shall be in compliance with the electromagnetic compatibility requirements as per IEC – 801. 9.8 Process sample return point and utilities as required will be made available near the Gas Chromatograph at pressure and temperature conditions specified in the data sheet for each Gas Chromatograph as single point supply and return. In general, all the offered items are to comply with maximum pressure and temperature data specified in data sheets. In exceptional cases, standard cell or such part of instrument with a rating lower than maximum pressure and temperature can be offered provided suitable conditioning means and hardware are provided and adequate safety devices with proper hook up enabling discharge to a flare header is provided. Multi – point distribution of utilities and process sample, is to be arranged by vendor following good engineering practices. 9.9 Sampling System (General requirements) i. The sampling system shall be furnished with all the necessary equipment and accessories to condition and regulate the sample to acceptable levels. ii. The sampling system shall be engineered, designed, fabricated and furnished completely assembled as an integral part of the Gas Chromatograph Analyser or as a separate Unit. The sampling system shall be designed on the basis of the utilities available as indicated in this specifications. iii. Each sampling system component shall be capable of being removed without dis-assembling the entire system. iv. Sampling system shall be designed for easy integration with the Gas Chromatograph Analyser in the field. v. Sampling system design shall be such that the sample drawn for analysis is truly representative of the process stream. Extra care shall be exercised in the selection of the various components forming the sampling system. vi. The sampling system shall be designed to move the sample from the process to the Gas Chromatograph in the shortest possible time. Due consideration shall be given to the size of the sample tubing to avoid possible plugging. Any requirement of steam tracing of sample tubing shall be indicated in the bid. vii. When details of sample return points are indicated in purchaser's data sheet, sampling system shall be designed to meet the requirement. viii. Sampling system shall consist of one or more of the following components as required by the service conditions shown on the instrument data sheets : filters (coarse and fine), pressure regulators, relief valves, flow indicators, flow controllers, temperature indicators, scrubbers, heaters, coolers, dryers, sample pumps, aspirators etc. Vender in the bid with proper reasoning shall include any additional requirement. ix. Where purchaser's data sheets indicate the possibility of polymer formation or presence of excess polymers, vender shall offer suitable design features to minimize plugging because of polymer residue. x. Filters shall be always dual and it shall be possible to remove and replace one of the filters without upsetting the operation of the Gas Chromatograph	



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10. SPARES & Special Tools / Tackels

10.1 CONSUMABLES for ONE-YEAR Operation shall be considered by bidder part of the offer.

10.1.1 Vendor service engineer shall hand carry (or supply prior to commissioning) the shelf life items.

10.1.2 In addition to above, consumables, shelf life items required for ONE (1) year operation shall be included in scope of supply along with main system.

10.1.3 Post-Commissioning of the System, vendor shall supply these consumables/shelf life items to site without any time and cost implications in ONE / TWO lots (subject to approval during drawing approval).

10.1.4 Vendor shall furnish complete and detailed list with quantity and part number etc., in the technical offer. In case particular consumable item found to be essential for smooth functioning of the analyzer but not included in the vendor offer / BOM, such items shall be supplied by vendor on "as required" basis without any time and cost implications.

10.1.5 Wherever, consumable shelf life is less than 1 year, the vendor shall make partial shipment of such material at appropriate time.

10.2 Bidder as a part of the offer shall consider commissioning spares.

10.3 Special Tools and Tackles required for Operation & Maintenance of GC shall be considered in the offer by bidder. List must be furnished along with the offer.

10.4 MANDATORY SPARES - If applicable, requirement shall be as per [enquiry & Annexure-\[1\] of this specification](#).

11. INSPECTION & TESTING

11.1 Unless otherwise specified, purchaser reserves the right to test and inspect all the items at the vendor's works. Vendor shall provide necessary facilities, utilities, labour and consumables required for carrying out the job.

11.2 Stage /Final Inspection including document verification as per approved QAP shall be carried out by CUSTOMER /CONSULTANT/ CUSTOMER's Third Inspection Agency & BHEL/BHEL's Third Party Inspection Agency at vendor works. Test procedure shall include but not be limited to the following. All the tests being conducted shall clearly bring out in the Quality Assurance Plan (QAP) by Vendor.

11.3 The system should be supplied in a ready to installed condition at site. All the operation, performance and maintenance guideline to be demonstrated during Inspection and documents to be furnished along with dispatch of the Equipments.

11.4 Vendor shall submit the following test certificates and test reports for purchaser's review :

- a. Material test certificate for all wetted parts (MIL certificates).
- b. Twenty-Four hour repeatability test report.
- c. Calibration report for all Gas Chromatographs.
- d. Effect of interfering components present in the process sample.
- e. Certificates from statutory bodies for use in area classification indicated in data sheet.

11.5 Witness Inspection: Gas Chromatographs shall be subjected to pre – despatch inspection by the purchaser. Following tests shall be carried out, as a minimum : -

- a. Physical dimensional verification and workmanship.
- b. Verification of model no, serial no and name plate
- c. Leak checking of complete system using nitrogen or instrument air.
- d. The Gas Chromatographs shall be calibrated using a test sample 50% of scale reading for the component of interest. Deviation of actual calibration from the calibration curve supplied by vendor shall be within + 1% of span.
- e. Repeatability shall be demonstrated for a period of at least 8 hours continuously using a standard sample, unless otherwise specified.
- f. Effect of variation in the power supply, voltage and frequency, to be verified. The Gas Chromatograph must function satisfactorily.

12. SUPERVISION OF ERECTION & COMMISSIONING

12.1 Vendor shall provide supervision of Erection & commissioning services as per "[Enquiry & Annexure-\[1\] of this specification](#)".

12.2 If it is in vendor scope, following shall be the scope of work:

- a) Vendor shall include the supervision of erection & commissioning on lump sum basis (per man day rates are not acceptable).

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		b) E&C charges shall include the travel to & fro travel from vendors work to site, lodging, boarding & local travel. Vendors shall arrange their own lodging, boarding & traveling. c) Vendors shall arrange their own Test equipments, commissioning tools, manpower etc as required. 12.3 Supervision of Erection & Commissioning services shall be ordered by BHEL Site at the time of commissioning. However vendor shall submit the price offer for services as per “Enquiry & Annexure-[1] of this specification” and same shall be considered for L1 evaluation. 13. TRAINING 13.1 Bidder shall arrange training for Owner’s personnel. Different type of courses shall be offered for operation / process engineers and operators, instrument maintenance engineers and technician. 13.2 Vendor’s works Training shall be provided. Travel and living expenses of the Purchaser’s personnel shall be borne by the Purchaser. 13.3 Apart from the above, vendor shall provide the site Operational and maintenance TRAINING as per below – 13.3.1 Duration: - As per enquiry & Annexure-[1] of this specification. 13.3.2 Location: - At manufacturer works / at site (exact location shall be intimated during order execution). 13.3.3 Training materials: - One set for each participant. 13.4 Vendor shall offer operation training basically meant for operating personnel. The various facilities available in the system for operation, actions required during emergencies and identifying the various diagnostic messages shall be the main contents of the operation training. 13.5 Transport, Lodging & Boarding expenses for Purchaser's personnel during training at vendor's works will be borne by the purchaser 14. DOCUMENTATION 14.1 Information to be included with offer Vendor shall make the offer in detail, with respect to every item of the Purchaser’s specifications. Any offer not conforming to this shall be summarily rejected. a) Duly filled & Signed copy of Check list b) Deviation list, if any (as per “No deviation format” given in this specification). If there are no deviations, bidders shall submit “Deviation format” by mentioning deviations “Nil”. c) Unpriced price schedule (To be submitted compulsorily without fail) d) Proven Track record and reference list (To be submitted compulsorily without fail in-line with cl. 3 of this specification) e) Power Consumption Details (To be submitted compulsorily without fail) f) List of Consumables (To be submitted compulsorily without fail) g) List of Special tools & Tackles (To be submitted compulsorily without fail) h) Bill of materials (only for information) i) All the details regarding type, construction, materials, accessories etc. of the On-line Gas Chromatograph along with technical catalogue (only for information) j) Detailed sketch showing various components of sampling and sample conditioning system (only for information) k) Sample flow rates required achieving response time, the recommended length and size of the sampling tube between process tap and sampling system (only for information). l) Any special cabling requirements including shielding and grounding requirements and maximum permissible distances of separation between the field and the control room mounted units etc (only for information). m) Copy of the Certificate of intrinsic safety/ flameproof from statutory body like PESO, BASEEFA, FM, PTB, CMRI etc. as applicable (only for information). n) Consumption figures of electrical power and other utilities for each gas chromatograph system (only for information). o) Overall dimensions of major units, dimension of the skid to be mounted in field (only for information).					

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		14.2 Documentation after P.O. Placment (for approval by BHEL and / or BHEL’s customer in 4 sets) : Vendor shall submit certified drawings and specification sheets for Gas Chromatograph which shall include the following: a) Bill of Material of the complete G.C system. b) G.A Drg. With overall Dimension of both Sampling unit & 19” Rack. c) Sampling interconnection details identifying each component with make and model number. d) Detailed interconnection diagram for process, piping and tubing. (Hook up Diagram) e) Installation drawings. f) Calibration curves as required for each Gas Chromatograph system. g) Cabling details including shielding / grounding requirements. h) Utility consumptions. i) Technical Literatures, Installation & Commissioning Manuals for all supplied items. j) Quality Assurance Plan. k) Software required for the systems. l) Wiring Diagram of 19” Rack. m) Cable Parameters (Capacitance, inductance, L/R ratio) for interconnection cable between field and the control room mounted units for intrinsically safe system. n) The details of the heat load, humidity particulate / chemical filtration etc. of the system. o) Vendor shall provide certificate for all the test indicated in para 11.0 of this specification. In addition, vender shall provide the “manufacturer’s certificate of Conformity” to purchaser’s specifications as per clause 2.2 of DIN 50049. Documentation Schedule: i. Submission of documents as per “Master documents schedule” (which will be finalized after award of the contract) within 2 weeks of placement of LOI / P.O. (for approval by BHEL and / or BHEL’s customer in 4 sets) ii. <i>All vendor documents main system and its sub-items shall be submitted to Customer / Consultant for approval during order execution. Any comment furnished by Customer / Consultant / BHEL shall be taken care by vendor during ordering execution.</i> iii. Further BHEL will provide comments on vendor submitted document within 25 working days for revision & resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals. iv. Revised drawings / Documents shall be submitted by Bidder in 07 days of receipt of comments / observations from BHEL. BHEL shall revert within 25 days on receipt of these revised documents / drawings from vendor for approvals. v. All the approvals required for manufacturing shall be completed with 2 months from P.O to meet the P.O delivery schedule. Accordingly vendor shall ensure the submission of approval category documents (which are required for manufacturing) and obtain their approvals. vi. Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates. vii. It is vendor’s responsibility to obtain approvals from BHEL as earliest as possible to meet PO delivery schedules. Accordingly vendor to plan and execute the supplies in time. 14.3 Documents to be submitted during final shop testing and before equipment dispatch. (Note: submission of these documents are commercially linked) a) Complete O& M manual – all in 16 sets (14 sets to be included with item dispatch and balance to BHEL purchase department). b) Approved Engg documents c) Guarantee and all test certificates for review and acceptance by BHEL and / or BHEL’s Customer 3 sets of CD-ROM – containing O&M manual and Engineering documents (1 set to be included with item dispatch and balance to BHEL purchase department).			

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		15. NAMEPLATE The Gas Chromatograph and its accessories shall have a SS nameplate firmly attached to it at a visible place, furnishing the following information as applicable: a) Tag number as per purchaser’s data sheets. b) Manufacturer’s Serial No. and Model No. c) Manufacturer’s name / trade mark. d) Range e) Area classification in which the equipment can be used.			
		16. SHIPPING 16.1 All threaded and flanged openings shall be suitably covered to prevent entry of foreign material. 16.2 Each major part shall be sealed in thick plastic bags. Suitable moisture absorbent shall be provided for electronic components.			
		17. MARKING, PACKING AND DESPATCH 17.1 All items shall be marked (stamped/etched) in accordance with the applicable code/standard/specification. In addition, the item code, if available, shall also be marked. 17.2 For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard. 17.3 Part number/Dispatch link-up of all the equipment’s/items supplied and also their co-relation with system/drawing/approved BOQ. 17.4 Paint or ink for marking shall not contain any harmful metal or metal salts which can cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features. 17.5 The equipment shall be transported to site by the vendor in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site the vendor. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the vendor’s scope. The vendor shall send each consignment to site with a detailed packing list. 17.6 All the equipment shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by ship/rail or trailer. The equipment shall be wrapped in polythene sheets before being placed in crates/cases to prevent damage to the finish. Crates/cases shall have skid bottom for handling. 17.7 Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order. 17.8 The equipment/items may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed. 17.9 The following minimum packing procedures shall be followed:- a) All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kinds. b) All items shall be protected from rust, corrosion, and mechanical damage during transportation and handling. c) Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications. d) All electrical, instrumentation etc., shall be properly packed to prevent damage during transport, storage, handling at site. e) All the items which the Bidders considered liable to be damaged during shipment or storage, shall be packaged for separate shipment. If instruments are removed from the panel, they and their connection shall be suitably tagged to ensure simple re installation at the job site. Each instrument shall be sealed in plastic bags containing moisture absorbing dessicants. f) It shall be bidder’s sole responsibility to protect all the material during period of dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and including delays in transit.			



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g) Mandatory Spare parts shall be packaged separately and clearly marked as 'Mandatory Spares'.

h) Commissioning spares, Tools & tackles to be packed separately & suitably tagged.

17.10 In case of imported/exported items, seaworthy packing shall be done as per specification no: HY0490573 (latest revision). This specification shall be obtained by vendor on request.

17.11 If mandatory spare items are ordered, same shall be sent in pre-decided lots in containers /secure boxes distinctly marked in GREEN color with boldly written "S" mark on each face of the containers /secure boxes

17.12 Loose vendor items sent by vendor to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items.

17.13 A packing list covering items having shelf life are to be intimated to site. Also, shelf life items shall be packed separately in black color painted box for easy identification at site.

18. WARRANTY

The warranty shall be valid for 24 calendar months commencing from date of supply (or) 12 calendar months commencing from the date of commissioning whichever is earlier.

19. LOGISTIC SUPPORT

17.1 Bidder shall ensure and provide the following information/ details during detail engineering as part of purchase requisition:

- a) Local service facilities in India is available or not from the manufacturer?
- b) If not available, where in the manufacturer's approved service facility presently located nearest to India?
- c) Instruments/ System shall be user serviceable.
- d) User reference list.
- e) When was quoted model introduced in the market?

17.2 Logistic support certificate shall be provided from the supplier for the system

17.3 The logistic support certificate shall be signed by a corporate level person of the Vendor/ Vendor principal.

17.4 Certificate For Logistics Support (by Principal)

(To be signed by Principal's corporate level signatory on company's letterhead)

I, on behalf of M/s _____ confirm that the **GAS CHROMATOGRAPH** quoted by M/s _____ for _____ Project shall continue to be supported by us. The quoted item shall not be withdrawn from Indian market in next five (5) years from the date of placement of order as a matter of our corporate policy.

I further confirm that in case of placement of order by **END USER** on M/s _____ we shall continue to support M/s _____ in providing back-up engineering, maintenance support and spare part to **END USER** for a period of 10 years from the date of supply.

SIGNATURE WITH SEAL
AUTHORIZED, SENIOR MANAGEMENT LEVEL

17.5 Certificate for Logistics Support (by Vendor)

(To be signed by Vendor's corporate level signatory on company's letterhead)

I, on behalf of M/s _____ confirm that the **GAS CHROMATOGRAPH** quoted by M/s _____ for _____ Project shall continue to be supported by us and our principal(s). The quoted item shall not be withdrawn from Indian market in next five (5) years from the date of placement of order as a matter of our corporate policy as supported by attached certificate from our principal(s) M/s _____

I further confirm that in case of placement of order by M/s _____ on us, we shall continue to support **END USER** in providing back-up engineering, maintenance support and spare part to **END USER** for a period of 10 years from the date of supply.

SIGNATURE WITH SEAL
AUTHORIZED, SENIOR MANAGEMENT LEVEL SIGNATORY



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RECORD OF REVISIONS

Rev.
No.

Date

Revision Details

Revised By

Approved By

00

15.10.2020

Original issue

K. Anand Babu

K. M. Babu

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