

ESP-001- 2A Rev . 00 	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number											
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<u>Specification for Calorific Value Analyser System</u> 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 Calorific Value Analyser System. 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 and gas processing plants under similar process conditions for <u>at least 4000 Hours</u>. 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 <u>within one week of issue of Enquiry</u>. 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) <table border="1"> <thead> <tr> <th>Document No.</th> <th>Document Name</th> </tr> </thead> <tbody> <tr> <td>Annexure – [1]</td> <td>Price Bid format</td> </tr> <tr> <td>Annexure – [2]</td> <td>Gas composition & Process Data</td> </tr> <tr> <td>Annexure – [3]</td> <td>Customer Specification</td> </tr> <tr> <td>Annexure – [4]</td> <td>CV analyzer Block diagram</td> </tr> </tbody> </table>					Document No.	Document Name	Annexure – [1]	Price Bid format	Annexure – [2]	Gas composition & Process Data	Annexure – [3]	Customer Specification	Annexure – [4]	CV analyzer Block diagram
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Revisions: Refer to record of revisions														
					Prepared By:	Checked By :	Approved :	Date :						
					Sujatha Sapavat	Kamal Kumar	Anand Babu	25.02.19						

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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 COMPLTE 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)		

 (Bidder's Signature and stamp with date)



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DEVIATION FORMAT

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

Sl. No.	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

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7. TECHNICAL STANDARDS

Latest edition of the following standards shall be followed for design, manufacturing and testing of the Calorific Value (CV) Analyser covered under this specification.

AGA 5	Energy measurement.
AGA-8	Compressibility calculations.
ISO 6976	Natural Gas calculations
GPA 2272-2000	Energy measurement
GPA 2145	Energy content and related calculations.
B 1.20.1	Pipe Threads
B 16.20	Ring Joint Gaskets and Groove for Steel Pipe Flanges
B 16.5	Steel Pipe Flanges and Flanged Fittings
IS-2 148	Flameproof Enclosures of Electrical Apparatus
NFPA-496	National Fire Protection Association.
ASTM D1945	Test method analysis of natural gas by gas chromatography
ASTM D 3588	Practice for calculating heat value, compressibility factor, and Relative density of gaseous fuels.
IEC 60529	Degrees of protection provided by enclosures (IP code)

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 package.
- 8.2 FAT shall be carried out from a place, which meets the requirement of PTR as well as authorized by OEM. Vendor shall provide a complete system to BHEL as a package.
- 8.3 The **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.
- 8.4 Vendor to ensure that the moisture content of the process gas, calibration gas or carrier gas shall not be entered into the Gas chromatograph.
- 8.5 The suitable software to be installed and provided along with laptop for analysis and diagnosis purpose. The loose software CD/DVD along with key shall be provided for future installation if laptop got repaired / maintenance. Laptop has facility to install third party software's also for end user usage.
- 8.6 The offered GC shall be in complete package / assembled together shall meet the enquiry specification requirements.

8.7 Technical Data Sheet

1	Application	COG, BFG+LDG calorific value measurement as per Annexure-[4] of this specification
2	Line Size / Material / Rating	As per Annexure-[4] of this specification
3	Process Connection	As per Annexure-[4] of this specification
4	Probe Type / Material	Online retractable / SS 316
5	GC Installation type	Outdoor, Field mounted cabinet with vortex cooler
6	Hazardous area classification	Suitable for class I, zone 2 / group II B T2
7		
8		
9	Sample handling system	
9a	Tube & Tube fittings	Stainless Steel
9b	Intermediate joints	Double compression fittings, SS
9c	Sample flow meter indication	Local - Rota meter type
9d	Moisture removal	Filters / membranes [Each for sample, carrier]
9e	Isolation valves & NRV's	Required for sample, carrier & calibration lines.
9f	Sample bypass for venting	Required
9g	Pressure measurement	Local for sample, carrier & calibration lines.
9h	Pressure regulators and relief valves	Required for carrier gas line.
	General	
10	No of streams into GC	1 for sample [COG (or) BFG+LDG], 1 for calibration & 1 for carrier.
11	Type of columns	As per Annexure-[3] of this specification



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12	Detectors type / Quantity	OEM standard & Annexure-[3] of this specification
13	Analysis time	As per Annexure-[3] of this specification
14	Accuracy	As per Annexure-[3] of this specification
15	Repeatability	As per Annexure-[3] of this specification
16	Calculations standard	As per Annexure-[3] of this specification
17	Enclosure protection rating	As per Annexure-[3] of this specification
18	Design	CV analyzer shall have separate electronics and oven section with independent doors.
19	Other requirements	As per Annexure-[3] of this specification
	Input / Output signals	
20	Input Power supply	As per Annexure-[4] of this specification
21	Active Output Signals	
21a	Analog Outputs	Calorific value for each sample [1 No's]
21b	Analog Outputs	Specific gravity for each sample [1 No's]
21c	Analog Output-3	Wobbe Index
21d	Digital Output-1	Fault alarm
21e	Digital Output-2	Calibration mode indication
21f	Serial RS-485 Port-1	Fuel Gas Data to DCS via MODBUS
21g	Serial RS-485 Port-2	Fuel Gas Data to Flow Meter via MODBUS
21h	Serial RS-485 Port-3	Fuel Gas Data to LAPTOP via MODBUS
	Accessories	
22	External Terminal Block / JB	For all input and outputs
23	Cable glands	SS, double compression type
24	Cable lugs & dummy plugs	SS, double compression type
25	Mounting stand / Rack / structures etc	CRCA for post mounting in field
26	Conduits for cables	Required between GC to external unit.
27	Cables between GC & external unit	By vendor.
28	Configuration CD with Key	Suitable for offered GC for calibration & Diagnostics.
29	Laptop with Bag	Required.
30	Software's in Laptop	Windows OS, Anti-virus, MS-Office.
31	Carrier Gas cylinders	As per Annexure-[3] of this specification, whichever is higher
32	Calibration Gas cylinders (Suitable for hazardous area design)	As per Annexure-[3] of this specification, whichever is higher.
33	Calibration bend Gas cylinder (Suitable for hazardous area design)	One number with regulator (or) As per Annexure-[3] of this specification, whichever is higher.
34	Tag plate	SS

9. CONSUMABLES for ONE YEAR Operation

- 9.1 Vendor service engineer shall hand carry (or supply prior to commissioning) the calibration gas and carrier gas cylinders as these are shelf life items.
- 9.2 In addition to above, consumables, shelf life items (like calibration gases, carrier gases) required for ONE (1) year operation shall be included in scope of supply along with main system.
- 9.3 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).
- 9.4 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.
- 9.5 Wherever, consumable shelf life is less than 1 year, the vendor shall make partial shipment of such material at appropriate time.



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10. INSPECTION & TESTING

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.

a)	Dimensional and Physical verification of model no, serial no and name plate	:	100 % Review
b)	BOM verification	:	100 % Witness
c)	Functional test for Analyzer transmitter [Power on, display configuration, etc.]	:	100 % Witness
d)	Material test certificates	:	Certificate Review
e)	Ex-proof (PESO) certificates	:	Certificate Review
f)	Radiography test for joints & welds	:	Certificate Review
g)	Hydrostatic/pneumatic test	:	Certificate Review
h)	Calibration test	:	Certificate Review
i)	Manufacturing process in house test reports	:	Certificate Review

Test Methods:

Test property	Method
Heating value	ASTM D 3588 / ISO 6976
Specific gravity	ASTM D 3588 / ISO 6976

11. SUPERVISION OF ERECTION & COMMISSIONING

11.1 Vendor shall provide supervision of Erection & commissioning services as per "Enquiry & Annexure-[1] of this specification".

11.2 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).
- 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.

11.3 **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.

12. TRAINING

12.1 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.

12.2 **Vendor's works Training shall be provided. Travel and living expenses of the Purchaser's personnel shall be borne by the Purchaser.**

12.3 Apart from the above, vendor shall provide the site Operational and maintenance TRAINING as per below –

12.3.1 Duration: - As per enquiry & Annexure-[1] of this specification.

12.3.2 Location: - At manufacturer works / at site (exact location shall be intimated during order execution).

12.3.3 Training materials: - One set for each participant.

12.4 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.

12.5 Transport, Lodging & Boarding expenses for Purchaser's personnel during training at vendor's works will be borne by the purchaser

13. MANDATORY SPARES - Spares requirement shall be as per enquiry & Annexure-[1] of this specifications.

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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. - Duly filled & Signed copy of Check list - 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”. - Unpriced price schedule (To be submitted compulsorily without fail) - Proven Track record and reference list (To be submitted compulsorily without fail in-line with cl. 3 of this specification) - Power Consumption Details (To be submitted compulsorily without fail) - List of Consumables (To be submitted compulsorily without fail) - Bill of materials (only for information) 14.2 Documentation after P.O. Plcement (for approval by BHEL and / or BHEL’s customer in 4 sets) - 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) 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. - 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. - 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. - 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. - Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates. - 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) - Complete O& M manual – all in 16 sets (14 sets to be included with item dispatch and balance to BHEL purchase department). - Approved Engg documents - 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). 15. MARKING, PACKING AND DESPATCH 15.1 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. 15.2 For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard. 15.3 Part number/Dispatch link-up of all the equipment’s/items supplied and also their co-relation with system/drawing/approved BOQ. 15.4 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. 15.5 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.			

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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.		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.			
		15.6 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.			
		15.7 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.			
		15.8 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.			
		15.9 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.			
		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.			
		15.10 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.			
		15.11 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			
		15.12 Loose vendor items sent by vendor to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items.			
		15.13 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.			
		16. WARRANTY			
		The warranty shall be valid for 36 calendar months commencing from date of supply (or) 24 calendar months commencing from the date of commissioning” whichever is earlier.			

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17. 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 **CALORIFIC VALUE ANALYSER SYSTEM** 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 **CALORIFIC VALUE ANALYSER SYSTEM** 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

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25.02.2019

Original issue

Kamal

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