



# CHHATTISGARH BIOFUEL DEVELOPMENT AUTHORITY

(Department of Energy, Govt. of Chhattisgarh)

## छत्तीसगढ़ बायोफ्यूल विकास प्राधिकरण

(ऊर्जा विभाग, छत्तीसगढ़ शासन)



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### CORRIGENDUM NO. I to TENDER NO. CBDA /2024/LAB/PT/001

This corrigendum contains the following:

S.No.	Particular	Corresponding to Tender Page no(s).
1	<u>ANNEXURE – A of SCC</u> <u>Section II</u> <u>Scope of Work (SoW)</u>  Page No. 55	Page No. 55 to 65

**Note:** The above information is respect to Tender No. CBDA /2024/LAB/PT/001 uploaded in [www.cbda.in](http://www.cbda.in) as per Scope of Work (SoW) of said tender document.

Principal Scientific Officer

**Section II**  
**Scope of Work (SoW)**

Scope of Work and Time Schedule for Activity for: Supply and Installation of Laboratory Equipments at CBDA Laboratories situated at Raipur Dist. Raipur & Vill, Godhi, Dist. Durg , (CG) as per specific quality criteria given below

The scope of work under this contract shall include in general but not limited to the following:

1. Supply and Installation of Laboratory Equipments at CBDA Laboratories situated at Raipur Dist. Raipur & Vill, Godhi, Dist. Durg , (CG) as per **Annexure-XII A to ITB**.
2. Specification and List of Equipments to be supplied and installed at CBDA Laboratories, situated at Raipur ,Dist. Raipur & Vill, Godhi, Dist. Durg , CG as per specifications below. AGENCY has to ensure that each equipments specification should be as mentioned in Table1.

**Table 1: Specifications of Laboratory Equipments**

S. No.	Equipment / Activity Code	Particulars of Equipments		Remarks
		Name & Specification	Details	
1	MSH-2	Magnetic Stirrer with Hot Plate x 4 ( two in one )	Make Neuation or similar to equipment of other OEM	For Biodiesel making laboratory test at Raipur
		A) Heating Function		
		Heating Power (KW)	1.2; 0.5,	
		Heating Zone (mm)	180x180 mm	
		Max. time hot plates temperature (C)	Approx. 10; Ca 500	
		Min. time to boiling point 1 L Water (min.)	Approx. 10; Ca 25	
		Temperature Sensor connector	Yes, Pt 1000 (right heating plate)	
		Setting Accuracy with temp. sensor (C)	1 ±2 to 5	
		Hot plate Material	Glass ceramic	
		Hot plate area (mm)	180x180 mm	
		Digital set/actual temperature display	Yes	
		(Temperature sensor connector)		
		Heating Power (KW)	1.2; 0.5,	
		Heating Zone (mm)	165; 145x145	
		Temperature Sensor connector	Yes, Pt 1000 (right heating plate)	
		Setting Accuracy with temp. sensor (C)	1 ±2 to 5	
		B) Stirring function		
		Max. rpm (min-1)	Upto 2200 rpm	
		Setting accuracy (min-1)	Approx 120	
		Max. stirring volume (1 H2O)	20 lit	
Temperature range:	Ambient +5to 550 Deg C			

		<b>Accessories:</b>		
		(i) Temperature Sensor		
		Stainless steel shaft (v4A),		
		Pt 1000 sensor,		
		1 M solid cable with 2x4 mm banana		
		plug, length Range	120 mm	
		(ii) Stand rod with fixing nut		
		(iii) Temperature sensor holder, clamp	30 to +250 C M8	
		with extension rod, made of Stainless steel, connector		
		(iv) Magnetic stirrer ripe for medium volumes circular cross- section, PTEE coated, 5 pieces		
		(v) Magnetic stirrer for large volumes Sm Co elliptic cross section, PTEE coated 4 pieces	9x15 mm each	
2	DAH-1	<b>Digital Alcohol Hydrometer</b> For on-site measurement of alcohol content in ethanol with accuracy	Anton Paar Model: Snap 51 or Similar to equipment of other OEM	<b>For Ethanol Testing at plant site Vill: Godhi, Dist. Durg (CG)</b>
		Measuring range:	Alcohol: 0 %v/v to 100 %v/v Temperature: 0 °C to 40 °C (32 °F to 104 °F) (automatic temperature correction)	
		Accuracy	Alcohol: 0.1 %v/v Temperature: 0.1 °C (0.2 °F)	
		Repeatability, s.d.*	Alcohol: 0.05 %v/v Temperature: 0.05 °C (0.1 °F)	
		Reproducibility, s.d.*	Alcohol: 0.07 %v/v	
		Resolution	Alcohol: 0.01 %v/v Temperature: 0.01 °C (0.01 °F)	
		Ambient temperature	-10 °C to +50 °C (14 °F to 122 °F)	
		Measuring principle	Oscillating U-tube technology	
		Supported measuring units	Alcohol concentration in %v/v (at 20 °C or at 15 °C) or °Proof Density Sugar/extract concentration in ° Brix or °Plato Ten programmable custom-specific measuring units	
		Internal Storage	1024 measured results, 250 sample IDs, 30 measuring methods	



		Power supply	Three 1.5 V LR06 AA alkaline batteries	
		Sample volume	2 mL	
		Dimensions	468 mm x 108 mm x 119 mm (18.4 in x 4.3 in x 4.7 in)	
		Weight	860 g (30.3 ounces)	
		Interfaces	Bluetooth® (data transfer to a PC or printer), RFID (sample identification)	
		Protection class	IP54	
		Optional available accessories	Wristband, rubber protection housing for the operating panel, portable Bluetooth® printer, Bluetooth® USB adapter	
3	PHE-1	<b>pHe of Ethanol/Denatured Fuel Ethanol / Fuel Ethanol</b>		<b>laboratory test of Ethanol at Raipur</b>
		i) <i>pH Meter-</i>	pH Meter with a sufficiently high impedance and recommended for use with ion specific electrodes. Temperature compensation and readability to 0.01 pH unit.	
		ii) <i>Electrode-</i>	ORION Ross Sure-Flow combination electrode (ORION Cat. No. 8172 BNWP) with a glass body or Metrohm ETOH -Trode with glass body (Metrohm Part 60269100) Ref. D6423 -20a	
		iii) <i>Temperature Compensator-</i>	The thermo-compensator, (A temperature sensitive resistance element) automatically corrects for the change in slope of the glass electrode response (with change in temperature) / corrects for changes in pH electrode response with temperature, the fuel sample must be at $22 \pm 2^{\circ}\text{C}$ . <b>With necessary accessories</b>	
4	IC-1	<b>Ion chromatograph (IC) instrument - Must be compatible for analysis of Inorganic Chloride &amp; Sulfate in fuel Ethanol as per EN 15492 / ASTM D 7319 standard method.</b>		<b>For Ethanol Testing at laboratory Raipur</b>

	Analytical system with all required accessories including syringes, columns, suppressor and detector which can be demonstrated to obtain the precision and detection limits and requirements of the method D-7319		
	<p><i>i) Automatic Injection system</i>, capable of delivering 20 µL with a precision better than 1%, or as recommended for this determination by the manufacturer.</p> <ul style="list-style-type: none"> <li>• One number of dual position 6-Port injector valve with fast response time and controlled through software should be quoted.</li> <li>• One number of high-pressure pump of serial dual piston type with adjustable flow rate of 0.001 to 20mL./min. Pump should have the following specifications:</li> <li>• Serial dual pistons with two inert check valves.</li> <li>• Resolution of flow rate: 0.001mL</li> <li>• Pulsation: Lower than 1% Pressure range: 0 – 5000 PSI</li> </ul>		
	<p><i>ii) Guard Column</i>, for protection of the analytical column from strongly retained constituents. Better separations are obtained with additional theoretical plates. Column Housing: Column housing should be able to identify the columns and set the optimal operating conditions for column operations. The system must be supplied with column heater – range – ambient to 70 Deg C</p>		
	<p><i>iii) Anion Separator Column</i>, 100% solvent compatible and capable of producing satisfactory analyte (sulfate and chloride)</p> <ul style="list-style-type: none"> <li>• Anion exchange resin 250 mm X 4.0 mm, for estimation of inorganic chloride &amp; sulphate in ethanol samples.</li> </ul>		
	<p><i>vi) Anion Suppressor Device</i>, vendor specific and capable of using acid suppression technology.</p> <p>a. <i>Tri-Chamber Approach</i>, 100% solvent compatible tri-chamber micro packed bed with cation exchange</p>		

	<p>resin (or equivalent) Suppressor device should simultaneously be on-line continuously chemically regenerated to its hydrogen form using any mineral acid providing H<sup>+</sup> ion.</p> <p><i>b. Continuous Approach</i> The regenerant channels are flushed with a mineral acid (sulfuric) to supply hydronium ions required for the suppression reaction. The solvent compatible ion exchange membranes provide the transport pathway for the hydronium ions into the eluent channel and the transport of sodium and other cations out of the eluent channel.</p> <ul style="list-style-type: none"> <li>• Chemical suppressor should have high backpressure (at least 350 psi) tolerance with continuous regeneration. The suppressor should be able to take flow rate up to 10mL/min. The regeneration of the suppressor should be by external chemical regeneration mode with the possibility of controlling the regenerant flow rate. Suppressor should have 100% solvent compatibility.</li> </ul>		
	<p>v) <i>Conductivity Detector</i>, (Low volume), temperature controlled to 0.001<sup>o</sup>C, capable of at least 0 μS/cm on linear scale, microprocessor based.</p> <ul style="list-style-type: none"> <li>• One number of Conductivity detector which is microprocessor based.</li> <li>• Conductivity measurement range: 0 – 15000 μS/ cm.</li> <li>• Electronic noise less than 0.1nS at 1nS/cm</li> <li>• Temperature compensation: 0-5%</li> </ul>		
	<p>vi) <i>Integrator or Chromatography Data System Software</i>, capable of measuring peak areas and retention times and correcting the data in accordance with the baseline of the chromatogram.</p> <p><b>Automation:</b></p> <ul style="list-style-type: none"> <li>• Auto sampler with minimum 30 positions should be quoted along with the vials of minimum of 10 mL</li> </ul>		



		<p>capacity and caps for anions and cations. The complete flow path including the sample needle should be non-metallic. The auto sampler should be able to communicate with system and software.</p> <ul style="list-style-type: none"> <li>• The software should be able to control the sample processor completely.</li> <li>• The software should be able to identify columns, pump, detector automatically.</li> </ul> <p><b>Data Processor:</b></p> <ul style="list-style-type: none"> <li>• The system should be PC based with data acquisition and system control through the same software.</li> </ul> <p><b>Others:</b></p> <p>IQ/OQ of the system should be performed by supplier at the time of installation.</p>		
5	PBA-1	<p><b>Portable Biogas Analyzer</b> For Quantitative analysis of Compressed Biogas Gas as per Bureau of Indian Standard Specifications IS 16087: 2016 i.e. Methane(CH<sub>4</sub>), Carbon dioxide(CO<sub>2</sub>), Oxygen (O<sub>2</sub>), Moisture, Total Sulphur including H<sub>2</sub>S and CO<sub>2</sub>+ N<sub>2</sub>+ O<sub>2</sub> percentage</p>		For Biogas Testing at site/ laboratory Vill: Godhi, Dist. Durg (CG)
6	TFFU-1	<p><b>Lab scale Tangential Flow Filtration unit</b></p>	Minimate Stream lines Laboratory- Scale Concentration ,Desalting, and Buffer Exchange Processes	For Research at laboratory Vill: Godhi, Dist. Durg (CG)
		<p><b>Tangential Flow Filtration System Specifications</b></p> <ul style="list-style-type: none"> <li>• Materials of Construction</li> <li>• Reservoir: Polysulfone</li> <li>• Reservoir Cover :Polypropylene</li> <li>• Reservoir O-Ring: Bunau-N rubber (nitrile)</li> <li>• Magnetic Stir Bar: PTFE coated</li> <li>• Gauge Wetted Parts :Type 316L stainless steel</li> <li>• SS Fitting O-ring :EPDM rubber</li> <li>• Gauge Mounting Block: Polypropylene</li> <li>• Luer Fittings :Polypropylene and stainless steel</li> <li>• Tubing: Phar Medu #16</li> <li>• Three-Way Valves: Polycarbonate</li> </ul>		

		body, acetal core • Drip Tray: Urethane		
		<b>TFF System</b> • Includes peristaltic pump, pump head, 2 pressure gauges, reservoir, stir plate, drip tray, and assorted fittings Dimensions • 30.7 cm W x 48.2 cm D x 20.8 cm H (12.1 in. W x 19 in. D x 8.2 in. H) • Weight 6.0 kg (13.2 lbs.) • Maximum Inlet Pressure 4.1 bar (410 kPa, 60 psi) • Operating Temperature Range 0 - 50 °C (0 - 106 °F) Recirculation Flow Rate 10 - 240 mL/min • Minimum System Working Volume < 15 mL		
7	<b>LPH-1</b>	<b>Lab scale Lyophilizer (Vacuum Lyophilization Freeze Dryer)</b>	Microprocessor Controlled Laboratory scale freeze dryer with suitable vacuum pump and facility for lyophilizing the products in 100ml -1L vials and ampoules, sealing under vacuum.	<b>For Research at laboratory Vill: Godhi, Dist. Durg (CG)</b>
		<b>Lyophilizer, Capacity 1liter</b>		
		Model Ordinary Model		
		Dryer Area	0.125 square meter	
		Pressure control	Automatic	
		Ice condenser performance	(L/24hr)3	
		Ice capacity (max)	3 liter	
		Plate Load Capacity	1 liter	
		Height (millimeter)	400-800	
		Cold Trap Size (millimeter)	215160	
		Length (millimeter)	500-1000	
		Width (millimeter)	400-600	
		<b>Power</b>	950 Watt	
		<b>Power supply</b>	220V/50Hz	
		<b>Dimensions &amp;size</b>		
		<b>Height (millimeter)</b>	400-800	
		<b>Interlayer Spacing</b>	70 millimeter	
		<b>Cold Trap Size (millimeter)</b>	215160	
		<b>Length (millimeter)</b>	500-1000	
		<b>Weight (kilogram)</b>	100-150	
		<b>Plate Size</b>	180 millimeter	
		<b>Plate Distance</b>	70 millimeter	



		Width (millimeter)	400-600	
		Warranty		
		Warranty period	1 year	
		Schering Bottle Quantity 12Mm	500-1000	
		Schering Bottle Quantity 16Mm	0-500	
		Dryer Area	0.125 square meter	
		Schering Bottle Quantity 22Mm	0-500	
		Pressure control	Automatic	
		Ice condenser performance (L/24hr)	3	
		Ice capacity (max)	3 liter	
		Defrost	heater defrosting	
		Performance Parameter		
		Plate quantity (Pc)	3	
		Vacuum degree (No Load)	<=10 Pascal	
		Plate Load Capacity	1 liter	
		Plate size (L/mm)	400	
		Amibient Temperature	<=25 deg C	
		Power Kw (220V, 50Hz	1.46 kiloWatt	
		Cold Trap The Lowest Temperature (No Load)	<= -50 deg C	
8	RVE -1	Rotary vacuum evaporator, vacuum pump and chiller.	Vertical rotary Evaporator with vacuum pump and chiller with capacity 100ml- 1L.	For Research at Vill: Godhi, Dist. Durg (CG)
		Rotary Evaporator, Capacity 3 Liter		
		<b>Specification:</b>		
		Display size	3 inch	
		Display type	LCD	
		Control Accuracy	+/-1 degree celsius (water)	
		Heating Bath material	SS Heater	
		Heating Bath Capacity	3 liter	
		Timer	Yes	
		Cooling Surface, cm	21500	
		Vaccum Controller Integrated	No	
		Heating Bath Controller	Digital	
		Lift Motor Rotation Speed,	rpm20-200	
		Vapour Display Temperature Provided	Yes	
		<b>Accessories</b>	Vertical Glassware, Heating Bath, Evaporating Flask, Receiving Flask, Connector, Vapour tube, Protective cover for heating bath ,Vacuum seal	

		Features Smooth Start ,Gradient distillation ,Solvents library ,Vapor temperature ,Auto distillation ,Low Noise ,Chemical Resistance ,Overheating protection ,Compatible with all range of glassware ,Highly resistant and particularly durable PTFE vacuum seals ,flashing and the display of the residual heat warn of the risk of burns greater than 50 degree Celsius ,Stand with clamp to support condenser	
	<b>Power Supply Voltage, Volt:</b>	200-240	
	<b>Frequency:</b>	60 Hertz	
	<b>Display size:</b>	3inch	
	<b>Display type:</b>	LCD	
	<b>Height adjustment:</b>	155 millimeter	
	<b>Setting of Lower end Stop:</b>	NA	
	<b>Control Accuracy:</b>	+/-1 degree celsius (water)	
	<b>Heating bath cut off (over set temperature), degree Celsius :</b>	NA	
	<b>Heating Bath material :</b>	SS Heater	
	<b>Heating Bath Capacity :</b>	3 Liter	
	<b>Motor type:</b>	Brushless DC Motor	
	<b>Timer:</b>	Yes	
	<b>Cooling Surface, cm2:</b>	1500	
	<b>Sped Display:</b>	Digital	
	<b>Vaccum Controller Integrated:</b>	NO	
	<b>Heating bath Controller</b>	Digital	
	<b>Heating Power:</b>	1200 watt	
	<b>Lift:</b>	Motor	
	<b>Secondary over temperature cut-off, degree Celsius</b>	250	
	<b>Rotation Speed, rpm</b>	20-200	
	<b>Temperature Display</b>	Digital	
	<b>Heating Temperature Range, degree Celsius</b>	20-180	
	<b>Stroke Displacement</b>	150 millimeter	
	<b>Vapour Display Temperature Provided</b>	Yes	

	<b>Timing interval operation in clockwise and anticlockwise directions for drying process</b>	No	
	<b>Height adjustment Speed</b>	manual	
	<b>Interface</b>	USB	
	<b>Cooler Type</b>	Vertical	
	<b>Time Setting range (if not "mention 0")</b>	999 minute	
	<b>Head angle adjustable</b>	0 to 60 degree	
	<b>Accessories</b>	Vertical Glassware, Heating Bath, Evaporating Flask, Receiving Flask, Connector, Vapour tube, Protective cover for heating bath, Vacuum seal	
	<b>Relative Humidity, RH (max)</b>	80 percent	
	<b>Ambient Temperature, degree Celsius</b>	5-31	
	<b>Protection Class</b>	IP20	
	<b>Dimensions and size</b>		
	Weight:	50 kilogram	
	Height:	900 millimeter	
	Depth:	600 millimeter	
	Width:	900 millimeter	
	<b>Vacuum Pump, 230 V</b>		
	<b>Catalogue Number</b>	XF5423050	
	<b>Description</b>	Vacuum Pump, 230V	
	<b>Background Information</b> Mini and Maxi vacuum pumps are compact, maintenance-free pumps that provide a consistent source of vacuum for filtration and other laboratory applications. A patented diaphragm design has reduced the footprint of the pumps compared to conventional models.		
	Use Pump to filter water and aqueous solutions <ul style="list-style-type: none"> <li>• Pump to filter larger volumes or viscous solutions</li> <li>• Pump is gas-tight, has a PTFE-coated diaphragm, and is compatible with slightly aggressive or corrosive gases and vapors</li> <li>• Neither pump requires lubrication</li> </ul>		



	and neither is explosion proof Features & Benefits: •Lubrication not required •Quiet, compact design conserves previous lab bench space • pump is gas-tight, has a PTFE-coated diaphragm, and is compatible with slightly aggressive or corrosive gases and vapors		
	<b>Applications:</b> Mini Pump for Water and Aqueous Solutions; Pump for Larger Volumes or Viscous Solutions		
	<b>Product Information</b>		
	<b>HS Code</b>	8414 10 00	
	<b>Fitting Inlet</b>	Hose connector for 4 mm I.D tubing	
	<b>Quality Level</b>	MQ400	
	<b>Physicochemical Information Pressure/Vacuum</b>	Vacuum	
	<b>Voltage</b>	2 30 V / 50 Hz	
	<b>Dimensions</b>		
	<b>Height:</b>	14.1 cm	
	<b>Width:</b>	9 cm	
	<b>Length:</b>	22.6 cm	
	<b>Depth:</b>	600 millimeter	
	<b>Weight</b>	1.9 kg	
	<b>Materials Information Materials of Construction</b>	Ryton head; EPDM membrane with fluoroelastomer valves	
	Re circulating Chiller F-100 / F-105		
	Cooling capacity at 10 °C:	<b>300 – 390 W</b>	
	Cooling range:	<b>-10 – +25 °C</b>	
	Tank capacity:	<b>3 L</b>	

**NOTE:**

1. The cost of delivery of the specified equipments above, shall be at CBDA Laboratory, Biofuel Complex site at Raipur, Dist. Raipur and Vill: Godhi, Dist: Durg, shall include all manpower, transportation costs, tools and tackles, loading & unloading at the point of transfer of ownership
2. SoW includes rate of material (basis rate + GST/other taxes, as applicable, all inclusive), creation of item as per specification in table 1 above including labour, transport, watch & ward is part of the Tender