

## **Detailed Specifications of Global/Open Tender Notice No: 07/2014**

<b>S. NO</b>	<b>TENDER NO.</b>	<b>BRIEF DETAILS OF ITEM(S)</b>	<b>PAGE NOS.</b>
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<b>2.</b>	<b>14-VII/MAA(2413)14-PB/ T-37</b>	AC High Voltage Capacitance Bridge	<b>4</b>
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**Technical specifications for Greenhouse Gas (GHG) Analyzer for continuous Carbon dioxide and Methane measurement in ambient air**

The GHG Analyzer will be installed at western Himalayan monitoring site at IHBT Campus, Palampur (H.P.) and will be integrated with the NPL's 'Continuous Ambient Air Monitoring Station (CAAMS)' for remote monitoring, data acquisition and transmission of data to NPL via GPRS and/or LAN.

S.No.	Item	Specifications
1	Name of instrument	Greenhouse Gas (GHG) Analyzer for continuous measurement of ambient carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ) along with H <sub>2</sub> O using CRDS based technique. The GHG analyzer should be supplied with complete ambient air sampling system (with provision to draw the ambient air samples from a height of ~ 15 meters), calibration gases (traceable to NMI standards), sequencer and other required accessories and spares for continuous operation. Quotation should include itemized quote for each component.
2	Working range	<ul style="list-style-type: none"><li>• CO<sub>2</sub> operating range from 200 to 1000 ppm or better</li><li>• CH<sub>4</sub> operating range from 0.5 to 20 ppm or better</li></ul>
3	Precision	<ul style="list-style-type: none"><li>• <math>\pm 0.1</math> ppm or better for CO<sub>2</sub></li><li>• <math>\pm 2</math> ppb or better for CH<sub>4</sub></li></ul>
4	Lowest Detection limit	<ul style="list-style-type: none"><li>• 600 ppb or better for CO<sub>2</sub></li><li>• 4 ppb or better for CH<sub>4</sub></li></ul>
5	Accuracy	+ 4%, or better
6	Calibration cylinders	Eight GHG calibration mixtures covering the range of mole fractions of CO <sub>2</sub> from 350 ppm to 500 ppm and CH <sub>4</sub> from 1500 ppb to 3000 ppb in eight cylinders of size $\geq 40$ liters with Two-Stage High-Purity Nickel Plated Brass Regulators- (Noncorrosive Model).
7	Power requirement	230 $\pm$ 10% VAC / 50 $\pm$ 5% Hz

8	Output signals (Either A or B)	<p>A. Industrial output signals of 4-20 mA current loop to be provided for integration of GHG analyzer's data acquisition system with that of CAAMS data system for transmission of data to NPL from remote location through GPRS and/or LAN. Vendor will ensure technical help in integration of data acquisition system with that of CAAMS system.</p> <p>B. Otherwise vendor should provide a complete and compatible data transmission &amp; receiving system for using GPRS from monitoring site to NPL . All SIM recurring rental and modem charges (for first year) will be borne by vendor.</p>
9	Warranty	Two year's on-site warranty after installation and commissioning
10	Installation and training	Onsite demonstration and training for at least two persons for five working days or more (as per requirement )
11	Instrument manual	Operating manuals should be provided
12	Additional Spares and accessories (optional)	Sufficient for two years of operations
13	Onsite Extended Warranty (optional)	For two years after warranty period
14	AMC (optional)	AMC should be quoted for two years after the warranty period

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1) AC High Voltage Capacitance Bridge: Quantity - One

Capacitance Range	$\leq 100$ pF to $\geq 1$ $\mu$ F
Capacitance Ratio	1:1 to 1000:1
Bridge Resolution	1 ppm or better
Accuracy	$\pm 15$ ppm or better
Secondary Current (Cs)	Max. 10 mA
Dissipation Factor Range	0 to 10 % in steps of 0.000001 (1 ppm)
Test Frequencies	50 Hz and 60 Hz
AC Mains Supply	230 V $\pm$ 10 %, 50 Hz $\pm$ 5 %

- i) The Bridge is to be Calibrated from any National Measurement Institute (NMI) covering all ranges (namely capacitance ratios: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, etc. and dissipation factor: 0.01, 0.02, 0.05, 0.08, 0.10, 0.001, 0.002, 0.005, 0.008, 0.010, etc.)
- ii) All the compatible accessories and components required for the operation of the system should be part of the bid.
- iii) At least two Sets of all compatible cables, connectors, etc. for working at low voltage and high voltage standard capacitors should be part of the bid
- iv) Hard and soft copy of Operating Manual, Service Manual, etc should be supplied
- v) Warranty: Minimum 3 years on complete System/ Units from the principals after satisfactory installation & commissioning by Supplier/Manufacturer or competent Indian Representative
- vi) Spare parts and after sale service should be available for at least 10 years after installation and commissioning
- vii) Training for 5 working days for at least two NPL Personnel at NPL site

**Note: List of users both national and international related to this item should be supplied.**

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**Specifications of "Vector Network Analyzer upto 67 GHz for metrology and research"****Essential Requirements:**

1	Frequency range	10 MHz to 67 GHz
2	Ports	Two (Impedance: 50 Ohms)
3	Dynamic Range	greater than 100 dB at 67 GHz
4	Directivity	$\geq 34$ dB
5	Load Match	After cal: $\geq 33$ dB ; Before cal: $> 7$ dB
6	Source Match	$\geq 34$ dB
7	Reflection Tracking	$< 0.05$ dB
8	Transmission Tracking	$< 0.1$ dB
9	Leveled Output Power	$\geq -2$ dBm
10	Test ports (1.85M & 1.85F) using Phase Stable Flexible test port Cables(1 meter approx. each)	1.85 mm (Male & Female)
11	Calibration kit LRL and SOLT type- Full 2 port calibration and single port calibration.	a) 1.85 mm, b) 2.92 mm, c)3.5 mm
12	Verification kit	a) 1.85 mm, b) 2.92 mm, c)3.5 mm
13	Two Phase Stable Flexible test port Cables	1.85(M) & 1.85(F) as the two Test ports, Length(approx.): 100 cm
14	All Calibration certificates	To be supplied (ISO 17025)
15	Provision of up-gradation	Up-to 110 GHz in future
16	Remote operation.	IEEE, USB Ports and respective cables of 1m length each.
17	Standard Time base stability	$< 1 \times 10^{-8}$

18	Precision Adaptor pair set (all compatible configurations)	1.85mm to 2.92 mm
19	Operating and Service Manual	Hardcopies and softcopies
20	Training	For two persons at NPL-site for 5 working days.
21	Electrical power requirement	AC mains (230V±10%), single phase (50Hz±5%).
22	Warranty	03 (Three) years
23	Time Domain Reflectometry provision.	
24	Support of spare parts for next 10years	
25	Rack mount kit with handles	
26	Demonstration of the the specified/ claimed parameters while installation	
27	10MHz reference	IN & OUT
28	Operating & storage temp.	10 to 40 degree C
29	All required tools, cables and accessories essential for the operation may be provided.	

**Optional requirements:**

1	Precision Adaptor pair set	1.85mm to 3.5mm adaptor pair
2	Precision Adaptor pair set	1.85mm to 2.4 mm
3	Precision connector gauge set.	1.85mm and 2.92mm
4	All relevant and compatible accessories and cables	For up-gradation upto 110 GHz
5	Software for PC (windows-8 based) to fully control the VNA should be provided	-
6	Pulse & Non-linear measurement provision	-

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