INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
Powai, Mumbai - 400076

PR No. 1000039629 **Rfx No. 6100001694**

Technical Specification for Gas Analyzer System

Sr No.	Detailed Specification	Qty	Compliance (Yes/No)
1	**Specifications:** Design, engineering, and supply of Online gas analyzer with secondary sample handling system. **NDIR technology:** Non-dispersive photometry analyzers using infrared (NDIR) have been developed for monitoring a wide range of gases. Simple non-dispersive infrared analyzers use filters or other methods to measure the absorption of light over a relatively small range of wavelengths centered at an absorption peak of the molecule of interest. In a simple NDIR analyzer, infrared light is emitted from a source such as a heated coil or other type of infrared radiator. The light is transmitted through two gas cells: a reference cell and a sample cell. The reference cell contains a gas such as nitrogen or argon that does not absorb light at the wavelength used in the instrument. A sample of the gas is passed through the sample cell of the instrument. As the infrared beam passes through the sample cell, pollutant molecules will absorb some of the light. As a result, when the light emerges from the end of the sample cell it has less energy than when it entered. It will also have less energy than the light emerging from the reference cell. The energy difference is detected by a detector. The ratio of the detector signals from the two cells gives the light transmittance, which can be related to the pollutant gas concentration. **Extractive Gas Analyzer:** The modular analyzer system can be customized to meet the specific measurement requirements of your application. Enclosure: 19” rack mount, IP20.	**1 No.**	

	Common Analyzer to measure all the measuring components(H2/CO/CO2/CH4) in a single analyzer. CO/CO2/ CH4 to be measured with IR technology H2O for cross sensitivity compensation and H2 with Thermal Conductivity Detector. The Analyzer shall be microprocessor based and low maintenance operation with control functions. Self-diagnostics and internal watchdog functions are also to be integrated. The menu-driven operator interface includes text messages on a large LCD. **Thermal Conductivity Detection:** The THERMOR uses the different thermal conductivity of gases to determine the gas concentration of a particular gas in a binary or quasi-binary gas mixture. The influence of other components in non-binary gas mixtures can be taken into account by the cross-sensitivity correction*) in case the components are measured with other modules or by external measuring devices. The module is also available as a high corrosion resistant measuring cell*). **Analyzer to be meet below specification (IR Technology): -** A) Zero-point drift i. ≤ 1% of the smallest measuring span/ week**), B) Sensitivity drift i. ≤ 1%/week Detection limit (4s1) ii. < 0.5% of measuring span at T90, el = 15 s**) C) Linearity deviation i. ≤ 2% of the selected measuring span Ambient temperature influence ii. zero point: ≤ 1.5% of the measuring span/10 K iii. sensitivity: ≤ 2% of the measuring span/10 K Flow dependency		

	D) Display delay (T90) i. dependant on the cuvette length, gas flow rate, and the number of components, maximum 25 s at 16 gal./h (60 l/h) Time constant (T90, el) ii. 1...300 s adjustable Warm-up time • ≈ 45 min **<u>Analyzer to be meet below specification (Thermal Conductivity Detector- TCD): -</u>** A) Zero point drift i. ≤ 1% of smallest measuring span/week**) B) Sensitivity drift i. ≤ 1% per week Detection limit (4s1) ii. < 0.5% of measuring span at T90, el = 15 s**) C) Linearity deviation i. ≤ 1% of the selected output range Ambient temperature influence ii. ≤ 1% of the smallest measuring span per 10 K for the zero point iii. ≤ 1% of the measuring value per 10 K for sensitivity D) Flow dependency i. < 0.2% change in measuring value in the range of 2.6...21 gal./h (10...80 l/h for a change in flow of 2.6 gal./h (10 l/h) ii. for the smallest measuring ranges: < 0.3% change in measuring value in the range of 2.6...21 gal./h (10 ... 80 l/h) change in flow rate Atmospheric pressure influence iii. none Line voltage, Line frequency influence iv. ≤ 0.5% of the smallest measuring span within specified voltage and frequency ranges		

	E) Display delay (T90) i. < 20 s at T90,el = 1 s and sample gas flow 16 gal./h (60 l/h) Time constant (T90, el) ii. 1...300 s adjustable Warm-up time • ≈ 30 min **Analyzer Measuring Component and Measurement Range** **<u>Modular system S700 according to data sheet:</u>** **<u>Module MULTOR:</u>** 1st measuring component : CO2 measuring range : 0 ... 80 Vol% 2nd measuring component : CO measuring range : 0 ... 20 Vol% 3rd measuring component : CH4 measuring range : 0 ... 5 Vol% **<u>Module THERMOR:</u>** measuring component : H2 in N2 measuring range : 0 ... 10 Vol% stainless steel measuring cell **Warranty: 1 Year** **<u>Final Scope of work:</u>** i. Design, engineering & supply of analyzer as per above data. ii. Testing, Integration & Integrated FAT at Vendor factory as required. iii. Supervision of Installation, Commissioning of the offered analyzer at site. (Per Man Day rates to be quoted) iv. Project Management & Project Documentation		

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Process Details as below:

Component or measured variable			Occurring values			Measuring range	
Chemical formula or designation	Measure ?	Unit	Minimum	Normal	Maximum	Minimum	Maximum
Sample-1							
H2 - Hydrogen	Yes	vol %	0	5	10	0	10
N2	No	vol %	90	95	100		
Sample-2							
CO2 - Carbon dioxide	Yes	vol %	0	40	60	0	80
Air	No	vol %	40	60	100		
H2O - Water	No	ppm			100		
Sample-3							
CO2 - Carbon dioxide	Yes	vol %	0	10	20	0	80
SO2 - Sulfur dioxide	No	ppm	0	200	1000		
NO - Nitrogen monoxide	No	ppm	0	200	1000		
O2 - Oxygen	No	vol %	0	0	5		
N2	No	vol %	Balance				
Sample-4							
CO - Carbon monoxide	Yes	vol %	0	10	20	0	20
CO2 - Carbon dioxide	Yes	vol %	0	90	75	0	80
CH4 - Methane	Yes	vol %	0	0	5	0	5