

Indian Institute of Technology, Delhi

Centre for Energy Studies

**NOTICE INVITING QUOTATION**

Ref: IITD/CES/RP02329/709

Dated: 12/08/2011

Sealed quotations are invited for purchasing of the following items for a specific research and development work related to SI engine. Please send the sealed quotations to Prof. L.M. Das, Room No.410, Block -V, Centre for Energy Studies, Indian Institute of Technology Delhi, Hauz Khas, New Delhi 110016. Your sealed quotation should reach latest by 5 PM on 06/09/2011.

**List of items**

1. Chemiluminescence NO<sub>x</sub> Analyzer
2. Engine Exhaust Gas Analyzer

**Specifications or requirement of the equipments/system is given below**

**1. Chemiluminescence NO<sub>x</sub> Analyzer**

Analyzer Principle	Chemiluminescence principle
Compounds to be Measured	NO <sub>x</sub> and NO
NO and NO <sub>x</sub> measuring range	Lowest 0- 10 ppm Higest 0- 10,000 ppm
Detection limit	≤ 0.3 % of lowest measureing range
Noise	≤ 1 % of full Scale
Reproducibility	≤ 0.5% of full Scale
Cross Sensivity	≤ 0.15 % / % H <sub>2</sub> O , ≤ 3ppb / ppm C <sub>3</sub> H <sub>6</sub> , ≤ 1 ppm / 1.000 ppm NH <sub>3</sub>
Ambient operating temperature range	5-40°C( 41-104 F)
Ambient pressure	700 – 1.100 hpa abs
Linearity	≤ 2 % of Measured value (10-100% of measureing range ) ≤ 1% full Scale
Response time Time for NO/ NO <sub>x</sub>	T <sub>10-90</sub> ≤ 1sec T <sub>90</sub> ≤ 2sec
Flow rate sample gas	100 l/h
Flow rate span gas	1.6 l/ min
Sample gas condition	Dew point ≤ 55°C,
Supply and test gas inlet pressure	1000-3000 hpa ( 14.5- 43.5 psi)
Queching	≤ 0.30 % / % H <sub>2</sub> O ≤ 0.06 % / % CO <sub>2</sub>
Inlet Presure sample gas	Atm. ± 300 hpa
Inlet pressure oxygen	1.000 hpa – 2000 hpa
Synchronization error	< 5 % NO Span gas concentration

CES/44/16/8/11

Note:

- Appropriate sample handling system with minimum sampling distance of 7 meters should be provided. Sample handling system should be integrated with the analyzer.
- Detailed technical specifications including calibration chart should be given. Analyzer panel includes mounting of analyzer, painted CRCA with front & rear door. Front door shall have viewing window and it should have lock arrangement for analyzer system and protection against dust & water ingress.

## 2. Specifications of Engine Exhaust Gas Analyzer

Compounds to be Measured	Measuring range:	Resolution:	Accuracy:
CO:	0... 10 % vol	0.01 % vol	< 0.6 % vol: $\pm$ 0.03 % vol
CO <sub>2</sub> :	0... 20 % vol	0.1 % vol	< 10 % vol: $\pm$ 0.5 % vol
HC:	0... 20000 ppm vol	$\leq$ 2000: 1 ppm vol, > 2000: 10 ppm vol	< 200 ppm vol: $\pm$ 10 ppm vol
O <sub>2</sub> :	0... 22 % vol	0.01 % vol	< 2 % vol: $\pm$ 0.1 % vol
NO:	0... 4000 ppm vol	1 ppm vol	< 500 ppm vol $\pm$ 50 ppm vol
Engine speed:	250....9999 rpm	10 min <sup>-1</sup>	$\pm$ 1 % of ind. val.
Oil temperature:	- 30... 125 °C	1 °C	$\pm$ 4 °C
Lambda :	0... 9.999	0.001	
Operating temperature:	5... 45 °C		
Storage temperature:	-20... +60 °C		
Relative humidity:	$\leq$ 90 %Max, non-condensing		
Interfaces:	Oil Temperature Probe		
Modes for fuel type	Petrol, LPG, CNG		

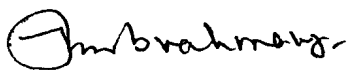
## 3. Terms and Conditions

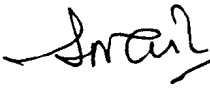
- Price quoted**

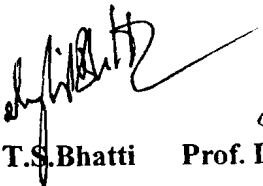
The rate quoted must preferably be for free delivery CIF, IIT Delhi after allowing the discount, if any.
- Terms of payment**


Our normal terms of payments within 30 days after receipt of stores in sound condition by means of cheque or Letter of Credit whichever is applicable.

- iii. Director's rights Director reserves the rights of acceptance or rejection of any or all quotations. The discretion for increasing the quantities demanded also vests with him.
- iv. Validity of quotations Quotations will be considered valid for 3 months from the date of receipt unless otherwise stated.
- v. Correspondence No correspondence regarding the acceptance or rejection of a quotation will be entertained.
- vi. Demonstration/Samples Equipment/System must be demonstrated before finalization of the quotation. Acceptance or rejection of any or all quotations will depend on the satisfactory demonstration.
- vii. Method of submission of quotation Quotation should be sent in a sealed cover marked at the top our N.I.Q. REFERENCE and the DUE DATE. Quotation should contain separately sealed
- (i) Commercial bid and
- (ii) Technical bid
- Both in one main sealed cover
8. Discount/rebates Special discount/rebate may please be indicated. Keeping in view that the item supplied are being made for Educational purpose in respect of Public Institution of National importance.
9. Compliance Statement Compliance Statement against tender specifications must be submitted. Quotation not satisfying the same will be rejected.
10. Warranty 2 year
11. Rejection Quotation not conforming to the set procedures as described above will be rejected.

  
Prof. J.P. Subrahmanyam  
(Chairman)

  
Prof. S.N. Naik  
(Head. CRDT)

  
Prof. T.S. Bhatti  
(CES)

  
Prof. L. M. DAS  
(PI-CES)