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30.12.2019

Department of Mechanical Engineering

Corrigendum-3

Tender Reference no: MEE/ARAM/051/2019

Name of the Item: FTIR ANALYZER

Corrigendum details: Changes in Specification (Item no. 13) & Due date extension

The submission date for the above mentioned tender has been extended to **16.01.2020 at 4 PM.**

Technical Bid Opening on **17.01.2020 at 3 PM.**

All other terms and conditions remain the same.

Tender Inviting Authority:

lms
30/12/19
Senior Manager (Project Purchase)
IC&SR, 2nd Floor, IIT Madras
Chennai 600036

SPECIFICATIONS OF FTIR ANALYSER FOR AUTOMOTIVE EXHAUST

The FTIR analyser should be capable of simultaneous measurement of the concentrations of multiple components of automotive engine emissions by utilizing the Fourier Transform Infrared (FTIR) method along with measurement of THC using the FID principle with all the necessary equipment and cabling from the exhaust of engine to the sampling point of the equipment.

The equipment should be capable of measuring at least 28 components (selectable from a total list) simultaneously with a Sampling Rate of 5 Hz. The other specifications that are to be met are given in Table 1 below.

Table 1 specification of FTIR Analyser

Principle	(a) Fourier Transform infrared spectroscopy (FTIR) With minimum spectrum range 650 to 4000 cm^{-1} & spectral Resolution 0.5 per cm. (b) Total hydrocarbons with FID
Response time (T10-90)	Within 5 seconds.
Warm-up time	Approx. Less than 2 hours after turning on the main power (Sleep to Stand-by).
Operating Environment	Ambient Temperature 15°C to 35°C. The FTIR along with FID shall have inbuilt temperature control mechanism
Zero drift / span drift	Within ± 1.0 % of full scale When the ambient temperature is stable, confirmed with 200ppm CO, 500ppm CH ₄ and 500ppm C ₂ H ₆
Repeatability	(a) For FTIR: Within ± 1.0 % of full scale (When the ambient temperature is stable, confirmed with 200ppm CO, 500ppm CH ₄ and 500ppm C ₂ H ₆) (b) For FID: Within ± 0.5 % of full scale
Accuracy	(a) FTIR: within ± 1 % of full scale. (b) FID: 2% of the reading or 1% of the full scale whichever is smaller
Zero Noise and interference for FID	Zero Noise: 0.02 ppm C Interference: O ₂ 0 vol% to 21 vol%: within ± 1.5 % THC readings (for C ₃ H ₈ 350 ppm C ± 75 ppm C)
Control Unit	Separate PC with touchscreen along with latest OS and Bench software or Rack mounted PC with latest OS and Software Platform.
Heated Sampling line	11m or higher – for transient operation
The system must have the capability to manually perform:	
<ol style="list-style-type: none"> 1. Calibration of each of the analysers in the system. 2. Leak Check. 3. Line Response Check 4. Interference check 	
Warranty inclusive of consumables and spare parts	For 3 years starting from one month after the date of delivery or date of installation – whichever is earlier

Table-2 Details of component needed and its range (FTIR along with FID)

Sl.No	Types of fuel used	Name of the	Chemical formula	Range	
1	Methanol, Ethanol, Butanol, Biogas, Bio-diesel, Natural Gas, Hydrogen, Diesel and Gasoline	Methanol	CH ₃ OH	0-1000 ppm	
2		Formaldehyde	HCOOH	0-1000 ppm	
3		Acetaldehyde	CH ₃ COOH	0-1000 ppm	
4		Benzene	C ₆ H ₆	0-500 ppm	
5		Toluene	C ₇ H ₈	0-1000 ppm	
6		Xylene	C ₈ H ₁₀	0-500 ppm	
7		Ethylene	C ₂ H ₄	0-1000 ppm	
8		1,3 Butadiene	C ₄ H ₆	0-1000 ppm	
9		Acetylene	C ₂ H ₂	0-1000 ppm	
10		N-octane	C ₈ H ₁₈	0-500 ppm	
11		Formic Acid	HCOOH	0-200 ppm	
12		Sulphur Dioxide	SO ₂	0-1000 ppm	
13			Non-methane Hydrocarbons	THC values to be provided based on FID principle	Based on FID & FTIR analyzer ranges
14			Ammonia	NH ₃	0-1000 ppm
15			Nitrous oxide	N ₂ O	0-1000 ppm
16			Ethanol	C ₂ H ₅ OH	0-1000 ppm
17			Hydro-cyanides	HCN	0-500 ppm
18			Iso-Cyanides	HNCO	0-1000 ppm
19			Nitric oxides	NO	0-500, 0-3000 ppm
20			Nitrogen Di-oxide	NO ₂	0-2000 ppm
21			Oxides of Nitrogen	NO _x = NO + NO ₂ (calculated)	0-500, 0-4000 ppm
22			n-pentane	C ₅ H ₁₂	0-200 ppm
23			Propane	C ₃ H ₈	0-300, 0-2000 ppm
24			Ethane	C ₂ H ₆	0-1000 ppm
25			Methane	CH ₄	0-3000 ppm
26			Carbon Monoxide	CO	0-1% , 0-10% Vol.
27			Carbon Dioxide	CO ₂	0-20% Vol
28			Water	H ₂ O	0-20% Vol
29			Iso-pentane	C ₅ H ₁₂	0-1000 ppm
30			THC (FID)	-	0-20000 ppm

Supplier Qualification Requirements

1. The bidder should have supplied at least three FTIR based analysers with BS IV or higher specifications to NATRIP testing centers (National Automotive Testing and R&D Infrastructure Project) and reputed automotive OEMs (Original Equipment Manufacturers) in the last five years. Out of the three at least two should have been supplied to NATRIP testing centers like ARAI (Automotive Research Association of India) or ICAT (International Centre for Automotive Technology) or GARC (Global Automotive Research Centre) or NATRAX (National Automotive Test Tracks) for

automotive applications with BS IV capability or higher. Proof of supply has to be provided along with the technical bid without any financial items being indicated.

2. The supplier should be the sole representative of the manufacturer of the offered item in India.
3. The supplier should be able to offer complete after sales service support in Chennai with office in Chennai. During the warranty period of 3 years the supplier should be able to respond to any service issue within 48 hours.
4. Warranty should be for three years starting from one month after the date of delivery or date of installation – whichever is earlier. The date of supply should be within 6 months of the PO, the rate indicated should be CIP and that the mode of payment should be specified.
5. No financial details should be specified in the technical bid. Violation will lead to disqualification. EMD should be kept in the financial bid only.
6. Any other support systems that are needed for the functioning of the analyser but do Not form a part of the analyser should be specified in the technical bid.