



**NATIONAL CENTER FOR COMBUSTION RESEARCH
AND DEVELOPMENT (NCCRD)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI – 600036, INDIA**

Ref. No. ICS/11-12/013/DSTX/TSUN

Date: 1 Sep. 2015

Due date: 22 Sep. 2015

Item name: SMOKE METER FOR EMISSION MEASUREMENT

1. Quotations are invited in duplicate for the items shown overleaf (in Annexure I). The quotations duly sealed and superscribed on the envelope with reference no. and due date, should be addressed to the undersigned so as to reach on or before the due date mentioned above.
2. The quotations should be valid for sixty days from the due date and the period of delivery required should also be clearly indicated.
3. The total cost of the equipment in terms of CIP Chennai should be clearly mentioned.
4. Terms of warranty and guarantee should be explicitly mentioned.
5. Packing and delivery charges, customs and clearance duty should be clearly stated.
6. Goods shall not be supplied without an official supply order.
7. Local firms : Quotations should be for free delivery to this institute. If quotations for ex-godown delivery charges should be indicated separately.
8. Firms outside Chennai: Quotations should be for F.O.R. Chennai. If F.O.R. consignor station, freight charges by passenger train / lorry transport must be indicated. If ex-godown, packing, forwarding and freight charges must be indicated.
9. The rate of sales / general taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, no claim for sales / general taxes will be admitted at any stage and on any ground whatsoever. The taxes leviable should take into consideration that we are entitled to have Concessional Sales Tax (CST) applicable to non-government educational institutions run with no profit motive for which a concession sales tax certificate will be issued at the time of final settlement of the bill.
10. Payment : Specify the mode of payment and if advanced payment has to be made. Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.
11. IIT Madras is exempt from payment of excise duty and is eligible for concessional rate of customs duty. Necessary certificate will be issued on demand.
12. IIT Madras has the right to accept the whole or any part of the tender or portion of the quantity offered or reject it in full without assigning any reason.
13. In case of any technical queries/clarifications, please contact Prof. A. Ramesh, Dept. of Mechanical Engineering, IIT Madras, Chennai, E-mail: aramesh@iitm.ac.in; Phone: +91-9444462154.
14. The sealed quotation may be sent to

Prof. S. R. Chakravarthy

NCCRD Office

No. 201, Rarefied Gas Dynamics Lab (Behind Aerospace Engineering Dept.)

Chennai – 600036

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Annexure I

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**TECHNICAL SPECIFICATIONS OF SMOKE METER FOR USE IN SI AND CI ENGINE STEADY-
STATE SMOKE EMISSION MEASUREMENT**

Pre-Qualification Requirements:

- The vendor must have supplied at least 20 systems of same model of base equipment which includes the sensors and all relevant electronics and indication system in reputed research and development laboratories of government funded institutions or research and development divisions of leading automobile industries during the past 1 year. The vendor should provide the details of organizations where such systems have been supplied.
- The vendor should be the manufacturer of the system supplied. No agents/representatives will be accepted.
- The vendor should have their Service Centre in India and trained personnel for after-sales service. Vendor has to submit the complete details of the service set up.
- The vendor should clearly indicate the terms of warranty along with their quote.

Specification	Requirement
Suitability	SI and CI engines
Measurement principle	<ul style="list-style-type: none">• Measurement of filter paper blackening• Sampling volume/time should be adjustable
Measured Value output	Filter smoke number (FSN) and mg/m^3 (Soot concentration)
Measurement Range	0 to 10 FSN
Minimum Detection Limit	Atleast 0.002 FSN / $\sim 0.02 \text{ mg/m}^3$
Resolution	0.001 FSN/ 0.01 mg/m^3
Maximum Exhaust Pressure	-100 mbar to 400 mbar gauge pressure
Maximum Exhaust Temperature	Greater than 500 deg.C



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Instrument Controller	Remote instrument controller with digital display
Connectivity	<ul style="list-style-type: none">• Digital/Analog output for connection with standard Dynamometer automation systems.• Should also include cable and PC software for remote logging of data in any standard PC.
Other Features	Filter paper used or remaining indicator

Installation, Commissioning and Training:

- The installation and commissioning of the equipment at site would be the responsibility of the vendor.
- Training on the complete system including software shall be given by the supplier.

Delivery Schedule

The system should be supplied within 12 weeks from the date of technically and commercially clear Purchase Order.

Warranty

The vendor should provide a warranty for at least 24 months from the date of commissioning of the equipment.

For any technical clarifications, please contact:

Prof. A. Ramesh,

IC Engines Lab,

Department of Mechanical Engineering,

IIT Madras, Chennai - 600 036

Mobile No.: 9444462154

e-mail id: aramesh@iitm.ac.in