

	INDIAN INSTITUTE OF TECHNOLOGY MADRAS Chennai 600 036 Telephone: (044) 2257 4121 E-mail: aramesh@iitm.ac.in	
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Prof. Ramesh A
Project Coordinator

Ref: MEE/ARAM/2019/001
Dated: 26.08.2019

Limited Tender No: MEE/ARAM/2019/001

Due Date: 16.09.2019, 4:00pm

Pre-Bid meeting: - Not required.

Technical Bid opening meeting on Due Date: 16.09.2019, 4:30pm

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of “ENGINE PRESSURE SENSORS AND AMPLIFIER” conforming to the specifications given in (Annexure-I):

Instructions to the Bidder

- I. **Preparation of Bids:** - The Limited tenders should be submitted under one bid system (i.e.) Technical-cum-Financial bid.
- II. **Delivery of the tender:** - The tender shall be sent to the below-mentioned addresses either by post or by courier so as to reach the following address before the due date and time specified in our Schedule:
Prof. Ramesh A
I.C.Enignes Laboratory
Department of Mechanical Engineering
IIT Madras
Chennai - 600 036.
- III. **Opening of the tender:** - The offer/Bids will be opened by a committee duly constituted for this purpose.

Prices: - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges **to I.C.Engines Laboratory, Department of Mechanical Engineering.**

The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for concessional GST and relevant certificate will be issued.

In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP basis indicating the mode of shipment.

- IV. **Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in Rupees on receipt of the equipment and after satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate about the percentage of payment and it should be included in the originally quoted basic price, if any.
- V. **Terms of Delivery:** - The item should be supplied to our Departments as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
- VI. **Technical-cum-financial bid opening:** The bids will be opened on **16.09.2019, 4:30pm** at the Department of Mechanical Engineering IIT Madras.
- VII. IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.

Yours sincerely,

Prof. Ramesh A
I.C.Engines Laboratory
Department of Mechanical Engineering
IIT Madras
Chennai - 600 036

SCHEDULE

Important Conditions of the tender

1. The due date for the submission of the tender is **16.09.2019, 4:00pm**.
The offers / bids should be submitted in one bid systems (i.e.) Technical-cum-financial bid. Also, it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The bid should be put in cover and sealed. The Limited Tender for supply of “**ENGINE PRESSURE SENSORS AND AMPLIFIER**” should be written on the left side of the cover.
2. If an Indian agent is involved, the following documents must be enclosed:
Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
 - ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
3. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical-cum-financial bid.
4. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
5. **Validity:** Validity of Quotation not less than 60 days from the due date of tender.
6. **Delivery Schedule:** - The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
7. **Risk Purchase Clause:** - In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
8. **Payment:** -
 - i. No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).
 - ii. **Advance Payment:** - No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.

9. **Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately. (For more details please refer our Technical Specifications).
10. **Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.
11. **Acceptance and Rejection:** - I.I.T. 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.
12. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**
13. **Disputes and Jurisdiction:** -
 - a. **Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate one arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceedings shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai..
 - b. **The Applicable Law:** This Purchase Order shall be construed, interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
 - c. Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
14. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement: - It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE COMPANY WITH DATE**

SPECIFICATIONS OF ENGINE PRESSURE SENSORS AND AMPLIFIER

This includes :-

a) IC Engine Piezo Electric In-Cylinder Pressure sensor

1. The measuring range of the sensor must be 0-250bar with an overload extending up to 300bar of pressure
2. The thread size must be M5 X 0.5
3. Sensitivity of the instrument must be greater than 15pC/bar
4. No cooling should be needed
5. It must have at least 3 calibrated ranges
6. The natural frequency of the system must be either 150kHz or above
7. The acceleration sensitivity must be less than 0.001 bar/g both axial and radial.
8. The linearity must be better than $\pm 0.4\%$ FSO
9. The insulation resistance must be at least 10^{13} ohms.
10. The sensor must be capable of withstanding a max of 400°C and a min of -30°C
11. Thermal sensitivity change must be a max of 2% for the entire operational pressure range
12. The Sensors must be warranted for term of 1 years.
13. It must be compatible with standard engine pressure measuring charge amplifiers
14. Along with the sensor following needs to be supplied: -
 - Cables and couplings
 - Cable mounting tools
 - Dummy and its removal tools
 - Machining tools

b) I C ENGINE EXHAUST MANIFOLD PIEZORESISTIVE PRESSURE SENSOR WITH AMPLIFIER

1. The Sensor must measure a pressure range of 0-10bar (absolute)
2. Overload 25 bar
3. Sensor must have provision for water cooling.
4. Sensor must be able to measure both static and dynamic pressure variations.
5. Sensitivity of the sensor and amplifier must be about 1000 mV/bar
6. Sensor must have an accuracy less than 0.4% FSO, amplifier must have an amplifier accuracy of less than 0.3% FSO. If a combination sensor amplifier is provided it must have a an accuracy of better than 1 %
7. Linearity of the sensor must be within $\pm 0.2\%$ FSO and that of the amplifier must be less than 0.25% FSO. If a combined sensor amplifier is used the overall linearity must be less than 0.5%.
8. It must have a frequency response of 40 kHz or above
9. Must be compatible with working with exhaust from fuels like: Methanol, Gasoline, diesel, Ethanol and biodiesel.
10. The sensor with cooling should be capable of working with exhaust gases at temperatures of about 1000°C and the separate amplifier is provided must be able to operate from 0-125 °C.
11. Warranty must be for 1 years for the sensor and amplifier.
12. Along with the sensor following needs to be supplied: -
 - Measurement cable extension-5m or above
 - Gaskets for the sensor and dummy sensor
 - Power supply cables
 - Mounting tools
13. The matched amplifier/inbuilt amplifier output must be about 0-10V
14. The input supply must be within 0-48 V DC

The Qualifying conditions for both the products are as follows:

1. The bidder should have supplied at least ten numbers of the quoted product or equivalent in specifications or higher in 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 10 at least 5 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 bid.
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.
4. Warranty 1 year
5. Any other support systems that are needed for the functioning of the analyzer but do not form a part of the instrument should be specified in the technical bid.