



**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: 2 Jan. 2014

Due date: 22 Jan. 2014

Item name: Bomb Calorimeter

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 queries/clarifications, please contact Dr. R. Vinu, Chemical Engineering, IIT Madras, Chennai, Ph. +91-44-22574187, E-mail: vinu@iitm.ac.in.
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

(P) +91-44-22575025



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Annexure I

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Specifications for Bomb calorimeter

Measurement variables: heat of combustion, gross calorific value of solid and liquid fuels

Scope of application: coal, biomass, hydrocarbon liquid fuels, crude oil, bio-/pyrolysis oils

Analysis type: isoperibol or continuously compensated isoperibol

Measurement units: J/kg, cal/gm, BTU/lb

Temperature: highly accurate electronic measurement

Temperature resolution: 0.0001 °C

Combustion vessel/Bomb: stabilized stainless steel to resist corrosion

Resolution: 0.001 cal/gm or better

Relative standard deviation: 0.1% or better

Measurement range: upto 40,000 J/gm

Crucible type: metallic Ni-Cr alloy or quartz

Gelatin capsules for volatile liquid samples

Analysis time per sample: 15 to 30 minutes

Chiller (if required)

Automatic oxygen filling

Capability in-built for correction of spikes, ash/nitrogen, acid, fusewire, sulfur and hydrogen

Measurements should conform to ASTM D-5865 and other methods

Bomb type: same or different bombs for solid and liquid samples

The equipment should have an internal graphic display (touch screen is preferred) for standalone operation and display of results. (Optional: upgradeable to a software controlled system)

In-built data storage capability for atleast 1000 analyses and test report archiving using SD memory card

Power supply: 230 V, 50/60 Hz

Consumables

O₂ gas cylinder and regulator with filter cartridge

Sample crucibles (Ni-Cr alloy or quartz), gelatin capsules (100 nos.)

Ignition threads for atleast 2000 analysis

Calibration standard with certificates

Warranty

1 year at the minimum + 2 years AMC