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: 7 Mar. 2014**

Due date: 28 Mar. 2014

Item name: ASH FUSION TESTING EQUIPMENT

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, Dept. of 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 ASH FUSION TESTER

Scope: Measurement of ash fusion temperature, deformation temperature, softening temperature, hemisphere temperature, floating temperature, sintering and flowability of different ashes obtained from coals and biomass

Principle: Melting of ash and measurement of shrinkage with time

Conformation to standards: Coal standard - ASTM D 1857-04, Biomass standard - CEN/TS 15370-1:2006

Maximum furnace temperature: atleast 1550 ^{o}C (desired 1600 ^{o}C)

Temperature precision: ± 1 ^{o}C

Temperature accuracy: < 5 ^{o}C

Maximum no. of samples per analysis: atleast 5

Sample atmospheres: oxidizing and reducing

Sample heating rate: In-built sample heating rate programs according to ASTM standard for coal ash and CEN standard for biomass ash. Possiblility of custom heating rate setting should be an essential feature. Multiple steps in temperature program should be possible.

Heating element should be durable with special alloy material

In-built high resolution camera to collect and store photographs of deformation point, softening point, hemisphere point and floating point

Image saving interval: should be adjustable in the software (atleast 1 frame per 2 ^{o}C)

Video recording of the ash fusion process and various transformations (Desired feature)

Accessories: standard ash sample, other standards (like activated carbon, graphite, dextrin, etc.), sample cups (20 nos.), ash pyramid plate (200 nos.), heating element (2 nos.), sample preparation kit

Optional items: CO_2 and H_2 – cylinders, gases (UHP grade) and two stage SS regulators (quote separately)

Computer: Not required (will be procured by IIT Madras)

Software: compatible with Windows 7, capable of displaying the ash graph in real time and also allows further processing of the data

Warranty: 1 year + 2 years AMC (quote separately)

Power supply: 220 V, 50/60 Hz, power socket – Indian type