



**DEPARTMENT OF APPLIED MECHANICS
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI – 600036, INDIA**

16 Oct.2019

Ref. No. APM/1819/156/ARCI/SATN/002

Due date and Time: 05 Nov.2019, 3:30 PM

Opening date: 05 Nov.2019, 4 PM at the dept. of Applied Mechanics, IIT Madras.

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of “**ULTRA SUPERCRITICAL AUTOCLAVE SYSTEM**” conforming to the specifications given in (Annexure – 1).

Instructions to the Bidder

- (i) Preparation of Bids: The Open tenders should be submitted under two bid system only, (i.e.) Technical bid and financial bid separately in two envelopes within a bigger envelop. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in single cover and sealed. The Tender for supply of “**ULTRA SUPERCRITICAL AUTOCLAVE SYSTEM**” should be written on the left side of the cover and sealed.
- (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:

Dr. Satyanarayanan Seshadri, Dept. of Applied Mechanics, IIT Madras, Chennai 600 036

Prices: The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to Department of Applied Mechanics. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. However, the percentage of tax & duties should be clearly indicated. The price should be quoted without custom duty and excise duty, since I.I.T. Madras is exempt from payment of excise duty, and the custom duty will be paid at concessional rate against duty exemption certificate. In case of import supply, the price should be quoted on EX-WORKS and CIP basis (stating the Cost, Insurance, Freight separately) indicating the mode of shipment.

- (iii) 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 details should be explicitly shown in Tender even in the case of ‘Nil’ commission. 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



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included in the originally quoted basic price, if any.



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(iv) 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.

(v) IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.

Yours sincerely,

Dr. Satyanarayanan Seshadri

Email: satya@iitm.ac.in

Phone: [+91] (44) 2257 4078

SCHEDULE

Important Conditions of the tender:

(1) The due date for the submission of the tender is 05.11.2019, 3:30 pm. The offers / bids should be submitted. (i.e.) Technical bid and Financial bid separately in two envelopes within a bigger envelop. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers inside a bigger envelop and sealed. The Open Tender for supply of “**ULTRA SUPERCRITICAL AUTOCLAVE SYSTEM**” should be written on the left side of the Outer bigger cover and sealed

(2) If an Indian agent is involved, the following documents must be closed:

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. The enlistment of the Indian agent with Director General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.

(3) The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.

(4) Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the bid.



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- (5) Documentary proof for the claimed position and repetition accuracies must be obtained from the principals and submitted along with the relevant pages of the standards.
- (6) Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
- (7) Validity: Validity of Quotation not less than 90 days from the due date of tender.
- (8) 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.
- (9) 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.
- (10) Payment:
No advance payment is generally admissible. In case of specific percentage of advance payment is paid the Foreign Vendor
- (11) On-site Installation:
The equipment or machinery has to be installed or commissioned by the successful bidder within 7 to 14 days from the date of receipt of the item at site of IIT Madras.
- (12) Previous Experience:
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). **The vendor should clearly specify the details and references of the at least three organizations (Specifically include Public sector undertakings, Central government and Institution of National Importance) where such systems have been supplied. Supply of the same system to any other IITs will be a deciding factor.**
- (13) 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.
- (14) 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.
- (15) Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents /Specifications.**



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(16) 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 arbitrate on 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 TamilNadu.

(17) 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



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Annexure I

Ref. No. APM/1819/156/ARCI/SATN/001

Opening date: 16 Oct 2019

Due date: 05 Nov 2019

TECHNICAL SPECIFICATION FOR ULTRA SUPERCRITICAL AUTOCLAVE SYSTEM

OBJECTIVE:

To test materials for steam behavior under Ultra supercritical steam conditions of 600 °C and 350 barg.

BASIC FUNCTIONALITY:

Test materials are treated under high pressure (350 barg) and high temperature (600 °C) for sufficient amount of time in autoclave, which mimics the Ultra Supercritical Boiler conditions. High pressure is obtained using a gas booster or any suitable mechanism. The outlet is pressure controlled using a backpressure system. Electric heating is used to supply necessary heat load for generating steam. A PID based temperature and pressure feedback is used to control system temperature and pressure respectively. A VFD based RPM control for stirrer-coupon assembly.

SCOPE:

Supply, Installation and commissioning of Ultra Supercritical Autoclave setup along with accessories as mentioned in specifications.

ACCEPTANCE CRITERIA:

1. The organization should be registered with NISC and their workshop should be ASME “U” stamp certified.
2. Detailed Design document along with make and model of the parts for bought out components and drawings, including standards followed for fabricated components.
3. After successful installation and commissioning, the capability of system (as per the design) shall be demonstrated operating the autoclave at max temperature and pressure for a continuous period of 24 hours.
4. The test rig operation should be demonstrated for a range of operating pressures and temperatures up to the maximum rated capacity.
5. Detailed operational and troubleshooting manuals to be provided, along with list of spares and maintenance procedure.
6. Documents supporting the working of equipment like temperature rise per min (claim), Pressure rise assurance certificate, reliability of joints for the warranty etc must be provided as a written document.
7. Warranty of 2 years from the date of delivery.

DESIGN REQUIREMENTS:

1. Water leaving the autoclave needs to be cooled with a heat exchanger (Chiller).
2. Backpressure regulator should step down pressure to atmospheric at outlet of autoclave along with a catch pot of suitable capacity.
3. The autoclave should be completely closed and sealed during experiments.
4. Max pressure rating of the system shall be 350 bar(gauge) and temperature capability shall be 600 ±20 °C



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SPECIFICATIONS:

Autoclave system:

(Quantity: 1 Unit)

1. Design pressure and maximum stable working temperature of 350 bar/600 °C.
2. Volume of the reactor vessel shall be of 1L capacity.
3. The material of construction shall be of Inconel 625 material for reactor.
4. Heating mechanism shall be Electrical heating only along with high temperature insulation and cladding with all applicable safety standards.
5. Cascade temperature control to prevent temperature overshoot.
6. PID Temperature controller to vary temperature up to 600 °C in step of 5 °C.
7. Motor connected to stirrer must be RPM controlled (VFD control).
8. Pressure shall be controlled by a suitable mechanism preferably like Gas boosting for charging upto 350 barg.
9. A manual Back Pressure regulator to regulate pressure 0-350 barg.
10. Purge system to support nitrogen gas purging.
11. Safety Rupture disc made of Inconel along with vacuum protection is mandatory.
12. Coupon holder arrangement must be present along with the stirrer will be in supplier's scope made of Inconel.
13. Stirrer Shaft must have proper sealing.
14. Chiller and catch pot shall be present to reduce temperature and pressure to atmospheric conditions before letting out at a location about 4 m away from setup.
15. Pressure gauge, Pressure transmitter (Inconel), Thermowell with temperature sensor and dip tube shall be present along with standard fittings of Autoclave.
16. SCADA system for storing data and retrieve.
17. Forced Auto cooling system is mandatory.
18. Sufficient water recirculation to save water is preferred.

SAFETY:

Maximum pressure and temperature of the system is 350 bar/600 °C and automatic electrical cut-off system other than steam relief outlet should be provided to vent the system if pressure has exceeded the limit.

Light indicators shall be provided and available safety devices should be able to shutoff the whole system, if it exceeds the safe operating conditions.