

**Department for Ocean Engineering  
Indian Institute of Technology Madras  
Chennai – 600 036**

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Date: 18<sup>th</sup> February 2013

Ref.: OED/2012-13/PE/JS/React

Due date: 9<sup>th</sup> March 2013

1. Quotations are invited in duplicate to meet the objective and specifications for the item shown in Enclosed list as Annexure 1.
2. The Quotations containing technical and financial details and duly sealed and super scribed on the envelope with the reference No. and due date, should be addressed to the undersigned so as to reach him on or before the due date stipulated above.
3. The Quotations should be valid for sixty (60) days from the due date and the period of delivery required, warranty terms etc. should also be clearly indicated. A minimum of one year warranty is required.
4. Brochure detailing technical specifications and performance, list of industrial and educational establishments where the items enquired have been supplied earlier must be provided.
5. Compliancy certificate is to be provided indicating conformity to the technical specifications.
6. If the item is under DGS&D Rate contract No. and the price must be mentioned. It may also please be indicated whether the supply can be made direct to us at the Rate contract price (Please note that we are not Direct Demanding Officers). If so please send copy of the RC.
7. Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be sent along with the Quotations, wherever applicable. Samples / machine/ equipment if called for should be submitted / demonstrated at free of charges, and collected back at the supplier's expenses.
8. Packing and delivery charges must be clearly 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 applicable to non Government Educational Institutions run with no profit motive for which a concessional Sales Tax Certificate will be issued at the time of final settlement of the bill.
10. IIT Madras is exempt from payment of Excise Duty and is eligible for concessional rate of custom duty. Necessary certificate will be issued on demand. IIT Madras will make necessary arrangements for the clearance of imported goods at the Airport/Seaport. Hence the price should not include the above charges.
11. Goods should be supplied carriage paid and insured.
12. Goods shall not be supplied without an official supply order.
13. Payment terms: Payment will be made after supply and installation of the equipment. Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.
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.

Yours faithfully,

Dr. Jitendra Sangwai (PI), Ocean Engineering

## Annexure 1: Requirement of High Pressure Reactor – 01 no.

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### Specifications:

Size & M.O.C	: 250 ml / SS 316 solid bar stock (no welding) & all wetted parts of SS 316.
Working Pressure	: 100 bar (maximum)
<b>Testing Pressure</b>	<b>: Atleast 150 Bar (testing certificate should be provided at the time of installation)</b>
Max. Working Temp.	: 250 °C
Body & Head Sealing	: Teflon Gasket with split clamp type quick opening system with clamp bolts.
Motor & drive	: ¼ H.P AC Motor and variable frequency drive with 100-1450 RPM infinitely variable speed & digital RPM indication.
Shaft Sealing	: Zero leakage Magnetic drive coupling
Stirrer	: 4 bladed turbine stirrer (should be detachable from head when required).
Heating Mechanism	: Heating/cooling jacket to the reactor for circulation of hot and cold water. No requirement of water bath. No electrical heating required.
Control Panel	: SS control panel with Microprocessor based Programmable P.I.D temperature controller (16 ramp/soak with <b>OSIH over shoot inhibit parameter</b> to control overshoot with <b>standby mode</b> to cut off heating & cooling) with high temperature alarm system & motor speed controller mounted on it.
Mains Power Supply	: 220VAC, 50Hz
Mounting	: Mounted on Table top with buffing of complete autoclave.
Pressure and Temperature Indicator:	Digital P (should give absolute pressure) and T indicator in bar & PSIA and °C. High pressure alarm system.
	Pressure and temperature sensors should be calibrated for the range of application and a calibration certificate should be provided at the time of installation.
View Window	: Provision to have view window for the reactor to capture image
Software	: Software ( <b>SCADA</b> : Front End : vb.net 2008,Back End : Ms Access Database, Reporting Tool Crystal Report ) to log in the data on P, T and time, t, in the computer for every 10 to 15 Sec interval. Should able to set setpoint remotely and operate remotely from PC. Able to display trends online, datalogging & remote set points of temperature, pressure alarm & rpm w.r.t. time on PC.

### Valves, Nozzles & Fittings:

External Fittings: Pressure gauge (should measure absolute values), vent valve, safety rupture disc, gas inlet-valve & liquid sampling valve mounted on common dip tube. Solenoid valve at the inlet of cooling coil pipe for automatic cooling. Valves and fittings : Swagelok valves and fittings

Note: All valve end connections shall be ¼” NPT

**Optional Accessories** (should be quoted as ‘accessories’ separately):

- Digital Gas Mass flow controller (Flow control mode.) for any one gas (for any one hydrocarbon gases, or CO<sub>2</sub>) with totalliser (upto 20 cc per min) (Mention the gas, pressure, flow rate & mode of control required)
- ½ L high pressure liquid/catalyst slurry/gas charging system at high pressure (up to 100 bar) during the reaction under pressure. It should consists of a high pressure SS-316 pot, inlet & outlet valves, pressure guage , high pr. Hose pipe , NRV & Pressure Safety Valve and pressure gauge (working pressure upto 100 bar and testing pressure upto 150 bar).with Swagelok valves & fittings. Testing certificate should be provided at the time of installation.
- High resolution video camera or microscope to view the reaction inside the vessel.

**For any technical query, please contact Dr. Jitendra Sangwai:**

**All quotation may send in “HARDCOPY” by speed-post/courier latest by 9<sup>th</sup> March 2013:**

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