UNIVERSITY OF DELHI SOUTH CAMPUS
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No: BioNest-UDSC/PI-2022-02 **Date: 25.02.2022**

Tender for "IN SITU STERILIZABLE FERMENTOR FOR 30 LITERS WORKING VOLUME CAPACITY FOR MICROBIAL CULTURES With Accessories"

Organisation Chain	Delhi University||Department of Microbiology - DU
Tender Reference Number	BioNest-UDSC/PI-2022-02
Tender ID	2022_DU_675665_1

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Tender specification for **"IN SITU STERILIZABLE FERMENTOR FOR 30 LITERS WORKING VOLUME CAPACITY FOR MICROBIAL CULTURES With Accessories"** purchase through e-procurement portal.

The quotations are invited through etender for **one Unit** of **"IN SITU STERILIZABLE FERMENTOR FOR 30 LITERS WORKING VOLUME CAPACITY FOR MICROBIAL CULTURES With Accessories" The quoted price should be FOR destination in INR** (Indian Rupees only) upto Department of Microbiology, University of Delhi South Campus, including supplying, installation and training. The last date of bid submission is **26th March 2022 by 05:00 PM as per the tender specifications mentioned below**

TECHNICAL SPECIFICATIONS FOR IN-SITU BIOREACTOR / FERMENTOR (Qty – 01 nos.)

1.) VESSEL Design DESCRIPTION

a) Working volume at least with a range of 10 L to 30L. However the minimum volume can go below 10L and Maximum volume can be higher upto 40L

b) The D:H ratio must be 1 : 3 with top plate enclosure bolted to shell and bottom dish welded to shell. The shell must be enclosed with a jacket. The SS jacket should cover minimum Cover 80% of maximum Working Volume of Bioreactor

c) The vessel must be mounted on floor over legs and must be made up of SS with contact parts made up of SS316L and non-contact parts made up of SS304

d) The vessel must also be insulated with hot and cold insulation with SS304 cladding

e) Surface Finish: Internal surface finish (at least ≤0.4µ Mirror Finish or better); External surface finish (≤1.2µ Matt Finish or better)

f) The vessel must have a LED lamp for inside viewing with a view glass made up of toughened borosilicate glass at least 60 mm internal diameter should be there for Lamp.

g) The o – rings, gaskets and septa must be made up of Silicone or EPDM. The filter elements must be made up of PTFE.

h) Vessel must be able to handle the following specifications:

- Design Temperature: Shell (0 to 150 ^{o}C) Jacket (0 to 150 ^{o}C)

- Working Temperature: Shell (5 to 130 °C) Jacket (5 to 140 °C)
- Design Pressure: Shell (-1 to 3.0 Bar) Jacket (- 1 to 4.0 Bar)
- Working Pressure: Shell (-1 to 2.0 Bar) Jacket (-1 to 3.0 Bar)

i) There must be ports available for installation of the following

PORTS	SPECIFICATION	QUANTITY
Top Plate		
Agitator (Top Driven)		1
Spray ball	~1 ½" OD Triclover clamp	2
Sterile pressure gauge port	~1 ½" OD Triclover clamp	1
Addition ports	~19mm diameter	4
Anti-foam Probe	~19mm diameter	1
19 mm Spare ports	With Triclover clamp	2
Pressure Transmitter	~1 ½" OD Triclover clamp	1
Safety Relief Valve	~1 ½" OD Triclover clamp	1
Light Glass for LED lamp on top	~60 mm diameter	1
Exhaust port	~1 ½" OD Triclover clamp	1
Level Sensor	Potentiometric	1
Shell Collar		
Sparger	Ring Sparger	1
Overlay	~½" OD Pipe with Triclover clamp	1
Addition ports	~19 mm diameter	2
Addition Ports	3 or 4 Way Valves	2
Jacket (In/Out)	½" NB SS pipe	1
View glass	Longitudinal	1
Shell Bottom		
Jacket (In/Out)	½" NB SS pipe	1
pH Port with adopter	~25mm diameter	1
DO port with adopter	~25mm diameter	1
Temperature port	~25mm diameter	1
Sampling port	Sterilisable connection	1
Jacket drain	~¼" NB SS pipe	1

Bottom Dish		
Bottom Valve	~1" Flush Bottom Valve	1

j) All the installed valves must be In-situ sterilizable type valves.

k) Addition ports to install other process accessories (minimum 2)

l) All the SS pipes installed (in or out) in the fermenter must be Steam Sterilisable

2.) VESSEL ACCESSORIES

a) There must be a longitudinal view glass (~30mmx300mm) as well as a round light glass with LED lamp (~60mm diameter) on top. The glass must stand the SIP and safety protocols.

b) There must be 2 nos. pressure safety valves, one for the vessel preferably installed on top plate and other for the jacket line.

c) There must be sterile pressure gauge installed with pressure range of -1 to 3 bar.

d) There must be a baffle system with 4 nos. blades

e) Sparger must be a ring sparger at bottom of culture vessel.

f) Spare O-rings, Gaskets and Flange must be supplied (10 nos. each)

g) There must be dummy closures (8 nos. – 19mm, 25mm or as per design; 4 each) available as extra spare for the unused Ingold ports.

h) There must be pH and DO housing available in the vessel

i) The sampling valve and harvesting valve must be in situ sterilisable with design of steam sterilization.

3.) AGITATION SYSTEM

a) Stirrer assembly with Single mechanical seal – Dry (Eagle Burgmann or Rolon) with direct coupling.

b) A spare mechanical seal (complete assembly) must be included in the offer. (01 No.)

c) The agitator must be top driven with RPM of 100 – 800 or wider range

d) At least 3 nos. of impellers must be provided of Rushton turbine design with 6 nos. Blades.

e) At least 3 nos. of impellers must be provided of Pitch blade fixed angle with 3-4 nos. Blades.

f) The agitator must be driven by an AC driven motor of at least 1 HP power.

4.) AERATION SYSTEM AND INLET/EXHAUST LINE SYSTEM

a) 2 nos. MFC must be provided along with 2 nos. manual rotameters for Air (0 to 100 LPM) and O_2 (0 to 20 LPM) supply. MFC operational VVM in the range of 0.1 to 2 VVM.

b) Air and Oxygen must be supplied to control a precise gas flow in the bioreactor. The MFC provided must be sufficient for air with O_2 Enrichment or Gas Flow Ratio mixing or Additive Flow 2-gas mixing

c) The aeration system must have full draining SS filter housing with 0.2 µ and 6" or large filter size for both inlet as well as exhaust. 8 No. Spare filters must be provided for these assemblies.

d) Two air dryer must be supplied to protect 2 nos. of MFC.

e) An automated Back pressure control valve must be available in the exhaust line with a manual bypass line as well for the pressure control in emergency situation.

f) A pressure gauge must be available in the exhaust line with a valve for venting purpose.

g) A condenser must also be available in the exhaust line. One Stainless steel Exhaust condenser assembly with inlet and outlet of chiller connection with facility of in place steam sterilization of exhaust air filter 6" or large filter size (0.2 µm PTFE). 4 No. Spare filter must be provided for this assembly.

h) Except for the harvesting line and the sampling line, all other remaining lines must be automatically controlled through the automation system with proper safety control. The harvesting line and the sampling line must be in place steam sterilisable.

i) All the lines must be made up of SS304 pipes and fittings

j) The vessel must get cooled by passing cooling water and must get sterilized by passing steam through jacket. And also inside the vessel through steam purging

k) 1 nos. heat exchanger with 1 nos. recirculation pump (~0.5 HP) must be provided

5.) INSTRUMENTATION AND PROBE SYSTEM

a) Temperature – PT100

b) Temp. range – 0 to 150 °C

c) pH Probe– Gel filled In-situ sterilizable probe (Mettler Toledo) with 250ml each standard reference Buffer (4,7 &10).

d) The pH housing assembly made of stainless steel must be provided to install probe during fermentation process

e) pH range – 0 to 14 pH

f) Foam system – Stainless steel, Electrical conductivity based foam sensor with ceramic insulation

g) Pressure system – -1 to 3 bar

h) DO Probe – Polarographic (0 to 100%) (Mettler Toledo) along with 2 nos. of 25 mL electrolyte and 4 nos. of DO membrane.
i) The DO housing assembly made of stainless steel must be provided to install probe during fermentation process.
j) Flow control – Through MFC in Air and O_2 line
k) Level systems – Potentiometric (Stainless steel)
l) Above mentioned pH and DO probes, transmitters and Cables must be from original manufacturer i.e. Mettler Toledo
m) All the above mentioned instrumentation system must be controllable through SCADA with HMI display
n) External Signal Inputs: Minimum two External Signal Inputs (4-20mA & 0-10V) to attach other accessory pieces of equipment. The controller must have RS232/485 ports for external communications and control.

6.) ADDITION SYSTEMS requirements

a) There must be 3 nos. fixed speed PLC controllable peristaltic pumps of minimum 40 mL / min for Acid, Base and Anti-foam addition. The integration of pumps must be done with PLC with appropriate connectors. These pumps must be under comprehensive warranty of 2 years.
b) 2 nos. of variable speed PLC controllable peristaltic pumps must be supplied for feed addition and inoculation addition – One with 10-100 mL/min flow rate and the other with 50-500 mL/min flow rate. These pumps must be under comprehensive warranty of 2 years. The integration of pumps must be done with PLC with appropriate connectors.
c) 5 nos. of 5L PPE feed Bottles (autoclavable) to be provided along with disposable disc filters and silicone tubings. The feeding bottle must have options of inlet and outlet ports. The complete assembly must be autoclavable.
d) Silicon tubing (Four types, 25 Meter each): 1.6mm, 3.2 mm, 4.8mm, and 6.4mm internal diameters. These tubings wall thickness must be suitable for supplied feeding pumps as mentioned earlier.
e) Inoculation needles must be provided – for 19 mm and 13 mm ports (4 each)
f) Set of Inoculation septa (25 nos.)

7.) PLC CONTROL SEQUENCE and Programming

a) Temperature control must be through automated valves in jacket line for Heating/Cooling and 1 No Heat exchanger (Shell & Tube) & Recirculation pump.
b) Agitator Speed control must be through Variable Frequency Drive (VFD)
c) pH level must be controlled through acid/alkali addition through fixed speed peristaltic pump from Acid/alkali bottles.

d) Foam level must be controlled through Anti-foam addition through fixed speed peristaltic pump from dosing bottle.
e) Pressure level must be controlled through automatic Back Pressure control valve in exhaust line of the Bioreactor. However, one Bypass line with a manual valve must be provided in exhaust line if in case of PCV behave faulty to match safety standards.
f) Dissolved Oxygen content in the media will be controlled through agitation, Aeration & O2 through cascade philosophy
g) Gas flow control should be through MFC in Air/O2 inlet line of the Bioreactor. The flow control will be a part of DO Cascade control.

8.) AUTOMATION, DISPLAY AND RECORDING SYSTEM

a) There must be a SS control panel that must be wired and integrated under bidder's scope
b) The system must be provided with PLC along with I/O modules either from **Siemens, Allen Bradley, ABB, Schneider, Hitachi, Mitsubishi**, (Brand should be mentioned). The PLC modules, including HMI and I/O modules to be covered under **2 years warranty**. This includes FOC integration of the new replaced modules in case needed during the warranty period.
c) Transmitters, Terminal blocks (to protect from power fluctuations) must be provided
d) Indication lights to indicate the state of the panel (On/OFF) must be provided for all the parameters
e) 1 No. multicolour Touch Screen HMI (12") display must be provided
f) All the hardware components/switches must be labelled appropriately for identification purposes.
g) SCADA software to be provided to control and record all the parameters and must be compatible with MS Windows 10 Pro or higher version.
h) Computer to run SCADA software: To run SCADA software a Branded PC (Either Dell, HP, or Acer) with original windows 10 professional or higher, core i7 10th generation processor, antivirus, 22-inch monitor, 1 TB HDD, 16 GB RAM or better specifications must be included in the quotation. The computer system should run the software for proper management of fermentor to control various parameters from remote. **The supplied computer must be under 3 Years warranty.**
i) The SCADA software need not be CFR part-11 compliant as the instrument will be used for R&D purposes
j) It must have the data recording features for Batch, Trends, Alarms, Data acquisition, Setpoint Control, Data generation, Recipe based algorithms, and Data export to an MS window based software. The system must be fully controllable through software from PC.

9.) UTILITIES TO BE PROVIDED ALONG WITH Fermentor

a) Air compressor :- Low noise, Oil free compressor with 2 HP or more power along with necessary SS pipes and fittings to the bioreactor (40 L Storage tank or higher) - Capacity 80 LPM with valves for control for back-pressure release. A pressure control valve must be provided for safety purposes. Compressor Safety valves, NRV and Pressure gauge with moisture trap and suitable connectors must be provided.

b) Chiller:- 2 TR Chiller along with a suitable size water tank of minimum 50L capacity and SS pipelines and fittings with suitable cladding.

c) Steam Generator / Boiler:- 12 KW along with necessary SS as well as insulated pipelines and SS Fittings (~ 15 KG steam per hour)

d) Steam generator / Boiler must be able to heat the vessel to 120 °C within an hour.

e) UPS:- 3 KVA Online UPS with 30 minutes back up must be provided (APC/ Emerson Liebert)

f) All the above-mentioned utilities, along with pipelines, fittings, and their insulation, must be under the bidder's scope with colour coding.

g) All pipe connection/coupling must be SS304

10.). DOCUMENTATION REQUIRED

All MOC certificates, Welding documentation, P&I diagrams, Hardware components literature, Calibration certificates, testing certificates, GA drawings, DQ, FAT, IQ, OQ, PQ protocols, Pressure hold test certificates, Hydro test certificates, Agitator test certificates must be provided.

11.) SCOPE OF WORK

a) All hardware work from installation up till complete operational verification, including nomenclature, labels and training must be included in the bidder's scope of work only.

b) The system must be fully labelled with Colour coded labels/tags. A schematic flow diagram must be provided for all the wirings as well as pipelines for the ease of operation.

c) All software work from installation up till complete operational verification, including cables etc. must be included in the bidder's scope of work.

d) Only O2 cylinder, raw water and power supply shall be under the buyer's scope.

e) Successful demonstration and Training of facility staff shall be done by bidder.

Very Important Note: Nothing is optional in this tender, So quote your FOR price in INR in BOQ, (IN SITU STERILIZABLE FERMENTOR FOR 30 LITERS WORKING VOLUME CAPACITY FOR MICROBIAL CULTURES With Accessories). The BOQ price must include everything that has been asked above in the tender documents.

Important: For technical compliance, read the complete tender document very carefully before bidding.

1. Nothing is optional in this tender, so quote the final price, including all the above requirements **FOR destination price in Indian Rupee must be quoted.** Quotations are invited on CPP portal through e-tender.
2. ISO certification from bidder as well as manufacturer must be provided.
3. The vendor should have at least 15 years of track record of supplying **Fermentors to academic institutes and industries**. Documentary proof must be submitted.
4. The vendor/manufacturer should enclose user list with the address of at **least 30 users** of the same model or higher/Configurations of Fermenter or higher installed throughout India in various reputed government Institutes/Academic institutes/Universities/ ICAR/CSIR/ICMR/IITs/Reputed industries other research labs in government-funded institutions.
5. **Note: Documentary proof of at least 20 users in terms of both purchase orders and installation reports for same or higher model required, with phone no and complete address of the buyer.**
6. The vendor should submit an authorized distributor certificate issued by the original manufacturer for the quoted item. The manufacturer or vendor must have a post-sale service provider in India where service can be provided within 2-3 days.
7. All vendors are requested to attach original technical literature/ catalogue in support of the technical bid. The vendor must provide the website of company where same/similar products are available.
8. **The fermentor should be under 2 Years of "Comprehensive warranty" from the installation date.**

Important Information:

1. Bidder should be Manufacturer/ Authorized Partner/ Reseller of the manufacturer and a Letter of Authorization from the manufacturer for the same and specific to the tender should also be enclosed. The bidder should also be the Authorized Service Provider. (attach the required certificate)
2. All vendors are requested to attach original technical literature/ catalogue in support of the mentioned specifications & highlight the above features.
3. Please note: **IGST/CGST+SGST@5%** would be applicable for supply to University of Delhi South Campus under **Notfn. No. 47/2017-Integrated Tax (Rate) dt.14.11.2017**. The DSIR Certificate/CDEC would be provided on request.
4. The quotations should be addressed to **Prof. Swati Saha**, BioNEST, Department of Microbiology, University of Delhi South Campus, Benito Juarez Road, New Delhi-110021, and should be **uploaded on the e-procurement portal, latest by 26th March, 2022 by 05:00 PM**
5. Quotations have to be submitted through e-tender **system**. The **Technical bid**, should consist of all technical details and supporting documents with terms and conditions. **A Compliance Sheet must be filled by the bidder** against each point and give reference of the same (page number, line number) in the supporting company brochure/document.
6. The **Financial bid** should contain item-wise pricing of items mentioned in the technical bid.

7. The bidder will have to quote all the required items together: partial quotes will not be accepted. For each item, make and model have to be mentioned clearly. (Nothing is optional)
8. The quote should be valid for 90 days from the due date.
9. Payment will be made by wire transfer or through an online system as per University rules after the successful completion of installation and commissioning of the equipment.

Commitment to Accept Lowest or Any Tender

- Demonstration of the equipment with all accessories (mentioned in the tender document) may be required if recommended by Purchase Committee at BioNEST, University of Delhi South Campus, New Delhi-110021.
- The University of Delhi shall be under no obligation to accept the lowest or any other offer received in response to this tender notice and shall be entitled to reject any or all offers. The University of Delhi will not be obliged to meet and have discussions with any vendor and or to listen to any representations.

Project Investigator
Entitled "BioNEST Fostering.....BioIncubation"
No: BT/BIRAC/BI-DU/2019
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