Annexure-1

Technical Specification - Microbial Fermenter (50 Liter)

Full Vessel Sterilization -in-place (FSIP)

Basic System:

50 Liter fermenter integrated with electrical control panel and in-built steam generator in Single skid [Skid foot print dimension 3 ft (length) x 3 ft (Width)]

Vessel and ports:

1. Total capacity: 50 Liter working volume 35 Liter
2. Jacketed Pressure vessel
3. Material of construction: product contact parts: SS 316 L non-Product contact parts SS 304L
4. Surface Finish: Inside of the vessel 0.4 µm with Electropolished, Outer 0.8 µm Mat finish
5. Pressure vessel Flat Top Lid, no weld ports allowed
6. Bottom tori spherical dish
7. Top Lid at least 12 x 19 mm, port 1 x 25 mm, port 1x 32 mm Exhaust
8. 1 x Top drive with single Mechanical seal AC servo motor Speed range 50 rpm to 1000 rpm
9. 3 x 6 blade Rushton impeller
10. Also provide 3 x marine impeller
11. LED Light arrangement at the top
12. Sight view glass at longitudinal lateral side
13. CIP spray ball at the top lid
14. 25 mm Port x 4 number, 1 x sampling port with SIP valve bottom side
15. 1 x Flush Bottom valve with SIP valve
16. 6 x 19 mm Hyperdermic Needle with septum arrangement
17. Provide silicone tubing and tool kit

Air inlet

18. Sterilizable filter (0.2 micron) with housing, flow meter, Pressure control valve, Pressure indicator, NRV and ring sparger
    Exhaust: Condenser, air filter (0.2 micron) with SS housing, Manual Back pressure control valve (SIP)

Sterilization:

19. Full vessel sterilization air inlet, exhaust lines along with vessel
20. Inbuilt Electrical stream generator within the skid itself to maintain both sterilization and Process temperature. No stream allowed from external source
21. Only pressurized hot water circulation allowed for the temperature control (sterilization as well as process temperature)

Measurement and control

22. **pH Control:** Sterilizable pH Probe, Measuring range 0 to 14 PH with two Peristaltic pumps for auto pH correction
23. **Dissolved Oxygen (DO) control**: Sterilizable DO probe, measuring range 0 to 100 % activated Tacketed valve to maintain, set point value, Cascaded with Speed controller
24. **Temperature Control**: PT 100 sensor, Measuring range 0 to 150°C
25. **Agitation**: AC SERVO-motor with VFD Adjustable speed: 100 to 1000 rpm
26. **Antifoam:** Sterilizable Probe with peristaltic pump to control the foam
27. Require O rings and diaphragm for trouble free operation

Process control Hardware and SCADA

PLC hardware specification

28. Hi-Speed Scanning Time minimum (0.09 micro-seconds for total operations)
29. Expandable modules (25-30 I/O) for future upgradation of the fermenter
30. Hi-Speed communication via Ethernet
31. Up to 16 bid revolution analog input for high accuracy purpose
32. Fail-Safe module should be available
33. Up to 2048 counters
34. Using external software for PID tuning purpose for more accuracy
35. All I/O's should be isolated (Galvanic Isolation)

SCADA for complete Data management interfaced with PC customized mimics

36. Customized operator interface
37. Display all process and set point values
38. Profile, cascade and manual operation
39. Batch management and tagging
40. Alarm and deviation
41. Different Access level
42. Online recording and analyzing of all the set point and measurement value
43. The data should be available in both graphical and text format (CSV and Excel)
44. Store the data more than three months
45. Data comparison and manipulation for different analysis

System requirement

46. PC with windows 10, 4GP RAM, 1TB hard disc, 18" monitor flat, Ethernet port, DVD writer, Keypad and mouse

Note:

i. Required data sheet and brochure should ensure quoted model as per the specification

ii. No separate drain connection should be there to drain hot water after sterilization. It needs to be maintained within the Chiller itself.

Foot print of the Equipment (Mandatory):

1. Fermenter, Control Panel and inbuilt Electrical stream generator combined single skid should not occupy space more than: 3 Ft (length) x 3 ft (Width),
2. Circulating chiller and Compressor: Combined single skid should not occupy space more than 2 ¼ Ft (length) x 2 ¼ Ft (Width)

Additional Requirements

3. Two years warranty
4. Free installation
5. Company should have supplied to IIT Madras or any reputed institute/company
6. Company should have certificate of satisfactory (COS) performance
7. Company should have servicing facility at Chennai
8. Company should have journal publication references
9. Two bid system: separate technical and financial bids