### Specification for Freeze dryer

| General Requirements for Freeze dryer | - Fully automated; Bench top model  
| | - Sample Pre-freezing facility, including Pre-freezing Rack/Shelves assembly  
| | - Vacuum regulation Valve provision for accelerating freeze drying process  
| | - Vacuum valve between Ice Condenser and Vacuum Pump for safety, to facilitate pre-run of Vacuum x Chamber, with min. 3 Stainless Steel Selves  
| | - The cover of dry chamber should be of colorless and clarity organic glass. To easily observe the total vacuum process  
| | - Quick defrost method: Automatic defrosting function (Hot gas defrosting).  
| | - Suitable Stabilizers  
| | - Specify base cabinet dimension in the quote  
| | - Should be ISO certified  
| Monitoring and Safety features | - Graphical user interface:- LCD display for system operating parameters, set-up parameters and alarm messages.  
| | - Facility for Sample temperature dryness check during drying stage  
| | - Vacuum indication in different units (millitorr, microbar, pascals)  
| | - Microproc. Controlled system with delayed start provision and Alarm facility, incl. display of Operation  
| | - The temperature, vacuum are exactly and intuitionistic displayed with LCD  
| | - Status – viz. Digital display of Condenser temperature. Vacuum, Time logged, etc  
| | - Safety alarm for various stages of Condenser cooling for effective freeze drying  
| | - Should alarm if voltage and ambient temperature go out of acceptable range for system  
| | - System should have provision to start pump after condenser temp
| **Manifold** | - Transparent drying chamber with three shelves and vial stoppering device for sealing vials
- Facilities to keep eppendrofs, plates as well as round Bottom flasks in drying chamber
- Comprising base plate/adaptor plate, three shelves, and distributors for ampoules/vials. Freeze drying ampoules and vials of 2 to 5 ml capacity (500Nos) must be supplied with system
- Flasks required:
  - Wide mouth flasks of 150 ml and 300 ml – 2 each and Round Bottom Flasks of 250 ml and 500 ml – 2 each with suitable stainless steel adapters, O-rings, filter papers, flask cover (rubber lid) should be supplied for all the Flasks
- Mechanical Crimper for sealing of Aluminium Caps.30 |
| **Condenser** | - Ice Condenser capacity of 8 Ltrs or more
- Condenser Temperature of -105°C or more
- Should be suitable for both aqueous and organic samples and drying of even critical biological samples
- Condenser and Cooling Coil should be of corrosion resistant Stainless Steel (316)
- Ice condensing capacity of 3 litres or more in 24 hrs
- Cooling Coil built external – for utilization of entire Condenser surface area for better trapping of vapour
- 2 or more number of compressors for better performance
- Compressor horsepower of 1/3, 3/8 HP |
| **Rotary vane vacuum pump** | - High Vacuum Oil Pump should be of high quality
- 2 Stage Rotary Oil sealed with min. capacity of 200 L/min and above together with Connection Nozzle Kits & High Vacuum Hose Pipe
- Should have vacuum break solenoid value to avoid oil back streaming
- Ultimate vacuum (partial pressure) $2 \times 10^{-3}$ mBar or better
- Operating voltage, 230 volts, 50 Hz
- Average vacuum time required for 100 millitorr should be 14-18 minutes |
- Capable of delivering the maximum performance of the freeze dryer

Safety device to protect vacuum pump from high temperature; oil and air back suction protection. System must be quoted with Vacuum Grease, Vacuum Oil.

Noise: To the safety level preferably below 55dB