

## Appendix-I

Sr. No.	Name of the item with specifications	Qty.
1.	<p><b>Mini cold Storage, cold room with controls (Fully Computerized Setup)</b></p> <p><b>Cold room :</b> 12ft. x 8ft. x 8ft. (H) External Dimension. (door size 0.9m x 2m) Includes: Storing Racks, Crate box, and packing Material with suitable placement for the proper flow.</p> <p><b>No. of rooms :</b> 01</p> <p><b>capacity of room:</b> 5 MT</p> <p><b>Process involved:</b> Precooling, Storage and Ripening.</p> <p><b>Insulation of room:</b> Prefabricated 80-100mm PUF Panels with 40+/- 2kg/m<sup>3</sup> Density inside and outside Pre Painted 0.5mm Thick GI Sheets with cam lock for air tight construction, facing material GI precoated sheets &amp; Flooring with 80mm PUF panels over and above 12mm thick marine ply with 1.2mm thick Aluminium chequered plate</p> <p><b>Expected temp. before Cooling (Product incoming temp.:</b> +35°C</p> <p><b>Temp. after cooling (Final product Temp./ Room temp :)</b> +0° to +5°C(Air Flow Constant)</p> <p><b>Relative humidity:</b> 90-95%</p> <p><b>Humidifier:</b>          Ultrasonic Humidifier,          Evaporation cap - 2.5-4 kg/hr.,          Automatic Water level control,          Humidity control and display.          SS Powder coated body,          Air volume -300-400 m<sup>3</sup>/hr.,          working temp 0°C to 40°C,  <b>(Should be given with humidistat)</b></p> <p><b>RO System for Humidifier:</b>          System Flow Rate 10 LPH          Output TDS : Less than 100 ppm IF Input TDS less than 1500          No. of Total treatment stages <b>Six (06)</b>          Pre-treatment System:</p> <ul style="list-style-type: none"> <li>• Spun Cartridge Filter</li> <li>• Antiscalent Cartridge(Balls)</li> <li>• Extruded Carbon Block</li> </ul>	01 Unit

	<ul style="list-style-type: none"> <li>• Granular Activated Carbon System</li> <li>• Extruded Carbon Block</li> </ul> <p><b>Dehumidifier:</b> Dehumidifier- to maintain the humidity inside the room to maintain 80% to 60%</p> <p><b>Ethylene Injection System + Co2 Exhaust System + Control Panel:</b> Micro-controller based programmable</p> <p><b>Refrigerant:</b> R-22 / R404A</p> <p><b>Outside ambient temp.:</b> 52°C maximum (for insulation purpose)+45°C (for design of ripening system)</p> <p><b>Compressor:</b> Hermetic (Danfoss/Emersons made)</p> <p><b>Fan for evaporators (Indoor unit):</b></p> <ul style="list-style-type: none"> <li>• G.I. Powder coated body</li> <li>• Designed Capacity Fan with Axial Flow</li> <li>• Customize designed cooling coil</li> <li>• Screw less wiring connector , Big size drain outlet</li> <li>• Cooling coil fan, Capillary/expansion valve</li> <li>• Capillary tube gas distributor, Electrical Box</li> </ul> <p><b>Room lighting:</b> 4-6 Watt/<math>m^2</math> with vapour proof light fixture</p> <p><b>Voltage stabilizer:</b> 3 phase Servo controlled voltage stabilizer</p> <p><b>Control panels:</b> Display with HMI with temperature,RH,O2 indicator, CO2, C2H4</p> <p><b>Switchgears:</b> All reputed make will be used</p> <p><b>Coils &amp; pipe:</b> All coils &amp; pipes are of copper make duly insulated</p> <p><b>Condenser:</b> Air-cooled</p> <p><b>Wiring:</b> Power wiring &amp; control wiring with ISI approved PVC insulated copper conductor with supports in PVC piping</p> <p><b>Temperature sensor:</b> Sensitivity <math>\pm 1</math> Deg.C (Response time <math>\leq 60</math>sec)</p> <p><b>Oxygen indicator:</b> Oxygen gas Detection System- Fixed Type model: TX-XT, With relay and with display range: 0-30 %.</p>	
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**CO2 control mechanism:**

CO2 control mechanism with Co2 indicator should be given Range: 0-2000ppm, with Display Co2 Sensors.

- Small exhaust fan for fresh air
- Timer based controls for fan on/off
- Exhaust Fans fitting powder coated box
- CO2 gas exhaust fan

**Ethylene injection system:**

Ethylene gas injection system along with control mechanism and one ethylene gas filled cylinder

- Ethylene Gas manifold system
- Ethylene gas regulator
- Ethylene gas PU pipe

**Ethylene gas sensor**

Gas detector/Transmitter

- Range : 20-2000 ppm C<sub>2</sub>H<sub>4</sub>
- Sensor Cell : Semiconductor
- Housed in IP44 enclosure(also available in IP 54, IP 65)
- Response time: T<sub>90</sub> & 50 s
- Wall mounting installation
- Zero point drift
- Long life sensor
- Short circuit and overload protected
- Reverse polarity protected
- Easy maintenance and calibration

**Note:** All the control of refrigeration side is Danfoss make and for electrical side Siemens/L&T make.

**Plastic Crates:**

- Sufficient numbers according the size of cold room and ripening chambers
- Tough construction with perforation
- Light weight
- High strength
- 542 (L) X 390 (B) X 345 (H) mm
- 510 (L) X 360 (B) X 330(H) mm

**Racks:**

1730 MM (H) X 900 MM (W) X 400 MM (D)

5 Shelves Open Type making 4 Compartments From Slotted Angle L 40 x 40 x 3 mm Thick Shelf from 20 Gauge thick CRC Sheet duly Powder Coated Grey Color Finish

	<p><b>Portable Instruments Digital Type:</b></p> <ol style="list-style-type: none"> <li>1. Humidity, RH (accuracy +/- 1%)</li> <li>2. Velocity, (accuracy +/- 1%)</li> <li>3. Temperature hand held meter (accuracy +/- 1°C)</li> </ol> <p><b>Ducting:</b> Ducting should be provided on one fan of pre-cooler for studying and pressure purpose. (Properly designed for demonstrating the duct design, includes branching of the duct)</p> <p><b>Safety Devices &amp; equipment:</b> Fire Alarm &amp; Extinguisher bottle</p> <p><b>SCADA system:</b> Computerized SCADA system will be provided with software and Computer as per the requirement (if any)</p> <p><b>Note:</b> Tentative schematic diagram or Photographs of the quoted setup (complete setup) must be provided along with the technical specification.</p> <p><b>Specific Requirement:</b></p> <ul style="list-style-type: none"> <li>• System can be used for performing experiment and demonstration of Precooling, Storage and Ripening of fruit and vegetables with control atmosphere.</li> <li>• Whole system will be control and display with SCADA System. Fully computerized control and must have high quality display placed on the front wall of the Cold Room.</li> <li>• System must be flexible enough to operate and control at wide range of temperature, RH and Air flow.</li> <li>• Fruit and vegetable packing materials (as sample should be given).</li> <li>• One set of duct should be placed with three or more branches for understanding the air flow and duct design.</li> <li>• Duct should have the provision to measure the pressures and velocity at every cross section changes.</li> <li>• Full warranty against material performance and repairing and maintenance for three year from commissioning of room.</li> <li>• Lab manual should be provide in soft and hardcopy along with the sample calculation and validations.</li> </ul>	
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