

Annexure-V(A) Compliance report

Note: The bidder is required to mention detailed specifications clearly in column named as Specifications from Bidder against each item as mentioned in below format. Please note that merely mentioning Yes/No in deviation column will lead to disqualification of the bidder.

(I) Name of Instrument : Mini cold Storage, cold room with controls

Sr. No.	Specification of e-Tender	Specification of Bidder/Vendor	Deviation (Yes/No)	Remarks
1.	<p>Mini cold Storage, cold room with controls (Fully Computerized Setup)</p> <p>Cold room : 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>No. of rooms : 01</p> <p>capacity of room: 5 MT</p> <p>Process involved: Precooling, Storage and Ripening.</p> <p>Insulation of room: Prefabricated 80-100mm PUF Panels with 40+/-2kg/m³ Density inside and outside Pre Painted 0.5mm Thick GI Sheets with cam lock for air tight construction, facing material GI pre-coated sheets & Flooring with 80mm PUF panels over and above 12mm thick marine ply with 1.2mm thick Aluminium chequered plate</p> <p>Expected temp. before Cooling (Product incoming temp. :) +35°C</p> <p>Temp. after cooling (Final product Temp./ Room temp :) +0° to +5°C(Air Flow Constant)</p> <p>Relative humidity: 90-95%</p> <p>Humidifier: 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 m³/hr., working temp 0°C to 40°C, (Should be given with humidistat)</p>			

<p>RO System for Humidifier: System Flow Rate 10 LPH Output TDS : Less than 100 ppm IF Input TDS less than 1500 No. of Total treatment stages Six (06) Pre-treatment System:</p> <ul style="list-style-type: none"> • Spun Cartridge Filter • Antiscalent Cartridge(Balls) • Extruded Carbon Block • Granular Activated Carbon System • Extruded Carbon Block <p>Dehumidifier: Dehumidifier- to maintain the humidity inside the room to maintain 80% to 60%</p> <p>Ethylene Injection System + Co2 Exhaust System + Control Panel: Micro-controller based programmable</p> <p>Refrigerant: R-22 / R404A</p> <p>Outside ambient temp.: 52°C maximum (for insulation purpose)+45°C (for design of ripening system)</p> <p>Compressor: Hermetic (Danfoss/Emersons made)</p> <p>textbfFan for evaporators (Indoor unit):</p> <ul style="list-style-type: none"> • G.I. Powder coated body • Designed Capacity Fan with Axial Flow • Customize designed cooling coil • Screw less wiring connector , Big size drain outlet • Cooling coil fan, Capillary/expansion valve • Capillary tube gas distributor, Electrical Box <p>Room lighting: 4-6 Watt/m² with vapour proof light fixture</p> <p>Voltage stabilizer: 3 phase Servo controlled voltage stabilizer</p>			
--	--	--	--

<p>Control panels: Display with HMI with temperature, RH, O₂ indicator, CO₂, C₂H₄</p> <p>Switchgears: All reputed make will be used</p> <p>Coils & pipe: All coils & pipes are of copper make duly insulated</p> <p>Condensor: Air-cooled</p> <p>Wiring: Power wiring & control wiring with ISI approved PVC insulated copper conductor with supports in PVC piping</p> <p>Temperature sensor: Sensitivity ± 1 Deg.C (Response time ≤ 60sec)</p> <p>Oxygen indicator: Oxygen gas Detection System-Fixed Type model: TX-XT, With relay and with display range: 0-30 %.</p> <p>CO₂ control mechanism: CO₂ control mechanism with Co₂ indicator should be given Range: 0-2000ppm, with Display Co₂ Sensors.</p> <ul style="list-style-type: none"> • Small exhaust fan for fresh air • Timer based controls for fan on/off • Exhaust Fans fitting powder coated box • CO₂ gas exhaust fan <p>Ethylene injection system: Ethylene gas injection system along with control mechanism and one ethylene gas filled cylinder</p> <ul style="list-style-type: none"> • Ethylene Gas manifold system • Ethylene gas regulator • Ethylene gas PU pipe <p>Ethylene gas sensor Gas detector/Transmitter</p> <ul style="list-style-type: none"> - Range : 20-2000 ppm C₂H₄ - Sensor Cell : Semiconductor - Housed in IP44 enclosure(also available in IP 54, IP 65) - Response time: T₉₀ & 50 s - Wall mounting installation - Zero point drift - Long life sensor - Short circuit and overload protected 			
---	--	--	--

<p>- 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.</p> <p>Plastic Crates:</p> <ul style="list-style-type: none"> • 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 <p>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> <p>Portable Instruments Digital Type:</p> <ol style="list-style-type: none"> 1. Humidity, RH (accuracy +/- 1%) 2. Velocity, (accuracy +/- 1%) 3. Temperature hand held meter (accuracy +/- 1°C) <p>Ducting: 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>Safety Devices & equipment: Fire Alarm & Extinguisher bottle</p> <p>SCADA system: Computerized SCADA system will be provided with software and Computer as per the requirement (if any)</p> <p>Note: Tentative schematic diagram or Photographs of the quoted setup (complete setup) must be provided along with the technical specification.</p>			
--	--	--	--

Specific Requirement:

- System can be used for performing experiment and demonstration of Precooling, Storage and Ripening of fruit and vegetables with control atmosphere.
- 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.
- System must be flexible enough to operate and control at wide range of temperature, RH and Air flow.
- Fruit and vegetable packing materials (as sample should be given).
- One set of duct should be placed with three or more branches for understanding the air flow and duct design.
- Duct should have the provision to measure the pressures and velocity at every cross section changes.
- Full warranty against material performance and repairing and maintenance for three year from commissioning of room.
- Lab manual should be provide in soft and hardcopy along with the sample calculation and validations.

Annexure-V(B) Compliance report

Note: The bidder is required to mention detailed specifications clearly in column named as Specifications from Bidder against each item as mentioned in below format. Please note that merely mentioning Yes/No in deviation column will lead to disqualification of the bidder.

(I) Name of Instrument : Computerized Air Conditioning Test Rig for year round application with ventilation and cold room, main and recirculating duct

Sr. No.	Specification of e-Tender	Specification of Bidder/Vendor	Deviation (Yes/No)	Remarks
1.	<p>Computerized Air Conditioning Test Rig for year round application with ventilation and cold room, main and recirculating duct. (Fully Computerized Setup)</p> <p>Cooling Capacity : 1.0 - 1.5 TR</p> <p>Refrigerant : R134a/R407C</p> <p>Test Chamber: 200-240 liters (Approximately Same dimension in all sides and Should be detachable from the setup).</p> <p>Features Required: Transparent duct for full visibility of the process and the components.</p> <ul style="list-style-type: none"> • Fully instrumented, with temperature and RH sensors at all process stages with maximum accuracy. • Fully computerized control with data logging (including required computer with meeting the specification of the equipment). <p>Technical Details: Duct size: 200mm x 200mm Air speed: Variable to > 1m/s Preheaters: 400-500W Final heaters: 200-250W Boiler power: 2KW nominal Chiller power: 500W nominal</p>			

Air Contact Evaporator:

Type : Direct Expansion Extended Plate Al-Fin Copper Coil

- Flow pattern : Cross Flow of air & refrigerant Duty : Cooling & Dehumidification of air
- Evaporating Temperature : 2 to 5 deg. Celsius
- Cooling capacity : 1.0 - 1.5 TR

Air Contact Chiller coil:

Type: In-direct Expansion, in separate chilled water tank is connected with Extended Plate Al-Fin Copper Coil.

- Flow pattern : Cross Flow of air & refrigerant Duty : Cooling & Dehumidification of air
- Chilled water operating Temperature: 4.5°C (water inlet) and 14°C (water outlet) with accuracy of +/- 0.5°C.
- Suitable design with pass and no. of circuits.
- Cooling Capacity : 1.0 - 1.5 TR
- Cooling coil must have temperature sensors at end of each tube in the middle circuit, to get the temperature profile
- Also at the inlet and exit of the chiller to get the temperature of water inlet and exit.
- All should be connected to data logger control system.

Compressor Specifications:

- Type : Hermetic, Reciprocating/ Rotary type
- Refrigerant : Any one of these R134a or R407C
- Make : Danfoss/Emerson
- Superheat : $\Delta T_{sup} = 3$ to 7 K
- Cooling Capacity : 1.0 - 1.5TR
- Digital meters: Volts, Amp and Hz

Air Cooled Condenser:

- Type : Air Cooled Extended Plate Al Fin Copper coil
- Flow Pattern : Cross flow of fluids
- Duty : Sensible Heating of Air
- Condensing Temperature : $T_{co} = 50^{\circ}\text{C} - 70^{\circ}\text{C}$

Auxiliary Electrical Heaters:

- Extended fin electric heating elements, 1kW Nominal @ 240 V, 50Hz, AC

Air Flow Ducting:

- MOC : Acrylic and Sheet Metal, AISI 304 SS
- Size : 200mm x 200mm
- Air Throughput : 0.3 to 0.4 m^3/s
- Dampers : As required
- Air vents: 3 Nos.

Fans/Blowers:

Type : Heavy Duty axial flow variable speed (VFD control)

- Power input : 240 V, 50 Hz
- RPM : 0-2400

Ultrasonic Humidifier:

Humidifier details are as under:

- Type : Horizontal
- Construction: Tank made from 1.3mm S.S Sheet (304), welded construction, Top Operable with Rubber gasket, S.S Bolts & Mist output Nozzle, drain, over flow socket. Outer enclosure with 22 Gauge G.I. Sheet duly epoxy painted
- Controls: Water Level Switch for upper & Lower Level, with solenoid valve & filter assembly (5 Micron).
- Control Panel: Made from 18gauges CRC sheet (Epoxy painted), Step down Transformer, Contactor / relay with MCB, ON / OFF Switch With light, Control Module & cooling Fan for control circuit.

- Power : 220 V-AC

Air Washer:

- A portable Air Washer with a provision to connect the main chiller tank.
- A small tank with heater for external heating of water,
- Fan, water pump, valves etc. with suitable measuring point (digitally) to measure temperature, Relative Humidity, air flow and water flow.

Instrumentation & Control:

- Flow Measurement device Air Flow Sensor
- (Accuracy error not more than +/- 2%, response, time not more than 1min)
- For measuring flow of Water, Refrigerant and Air at all the flow inlet and exit.

Temperature Sensors

- All inlet and outlet in Refrigerant Circuit (including compressor, condenser, evaporator, exp device, etc.
- all inlet and outlet in air Circuit and Water Circuit (including the detail given in water chiller section)

Relative Humidity or DBT Sensors

- At every stage of the conditioning of air (RH/WBT at air side at different outlet and inlet of air flowing from each components including fresh and recirculation air, and test chamber)

Pressure Sensors

- At all inlet and outlet in Refrigerant Circuit.
- At all inlet and outlet in air Circuit.

Power measurement:

- Electrical Energy Meter: Watt-hour type for recording electrical input to compressor, fans & auxiliary heaters.

	<ul style="list-style-type: none"> ● Analogue Voltmeter: For Compressor, fans & auxiliary heaters. <p>Cut off:</p> <ul style="list-style-type: none"> ● High temperature cut out (Thermostat) : Located after auxiliary heater to limit the maximum temperature to 80°C ● HP/LP cutout ● MCB'S for all electrical components ● Thermostatic Expansion Valve with provision for changing the superheat point. ● Residual current circuit breaker (RCCB) if $i > 300\text{Ma}$ ● Fan-Heater interlocking ● Power Transmitters 03 Nos ● Provisions for condensate drain and collection tray (SS) ● Data logger / Acquisition system for measuring/recording ● Panel Board: with controls, meters, indicators, displays, main switch and indicator lights. <p>Computer Control: The system is to be provided by vendor with required PC and SCADA Software with following features :</p> <ul style="list-style-type: none"> ● 2-way communication for control & data acquisition. ● Auto/Manual Control mode. ● P,PI,PD and PID modes ● Live mimic diagram of the process including SP, OP and PV. ● Online data display in tabular chart and graphical form. ● Bump less transfer between open & closed loop operations. ● Powerful graphics with trends and bar page 			
--	--	--	--	--

- Data printing facility
- Event recording facility
- Window based user - friendly software.

Computer, Graphics and Software

The system should meet or exceed the following specifications :

- Processor (CPU): intel core i7 processor
- Operating system: 8GB RAM
- Storage: Minimum 500 GB internal Hard Drive
- Sustainability: EPEAT Silver Rating (preferably EPEAT Gold)
- CD-ROM: DVD +/-RW
- Monitor /Display: 21.5" LCD monitor
- Other: Dual-band Wifi-certified 802.11 a/b/g/n- compliant adapter, optical mouse, keyboard, 2serial port & 2 parallel port USB port in front. Interfacing cards: ADC Card 1 no. DAC card. 1 No. communication RS. 232 ports.

Temperature controller and Rh Controller

Input

- Thermocouple: J. K. T. E. B. R. S. N.C
- RTD: DIN PT-100; JIS PT-100
- Linear: 4~20mA; 0~50mV; 1~5V; 0~10V...

Accuracy

- T/C±1°C; RTD±0.2°C; Linear±3μV

Control

- Proportional band: 0.0~300.0% F.S
- Integral time: 0~3600 sec
- Derivative time : 0~900 sec
- Hysteresis: 0.0~200.0 or 0.0~2000
- Cycle Time: 0~100 sec

Cycle Time (0~100)

- Relay 15 sec.
- Pulsed voltage to drive SSR: 1sec.
- Continuous current (Voltage): 0 sec.

<p>Output</p> <ul style="list-style-type: none"> - Relay contact output: 10A/ 240 VAC (Resistive load) - Pulsed Voltage Output to Drive SSR: DC 0/24V (Resistive 250Omin.) - Current Output: 4~20mA; (Resistive 600 Omax.) - Continuous Voltage Output: 0~50mV; 1~5V; 0~10V.... (Resistive 600 Omin.) <p>General</p> <ul style="list-style-type: none"> - Rated Voltage: 90~250VAC 50/60HZ; DC 24V - Ambient Temperature: 0~50°C - Ambient Humidity: 0~90 % - Consumption: Less than 5VA <p>Note: All the control of refrigeration side is Danfoss make and for electrical side Siemens/L&T make.</p> <p>Water Motor:</p> <ul style="list-style-type: none"> • CRI 0.5 HP SS PRESS. PUMP 3 PHASE, • IN LET , OUT LET 25 MM X 25 MM PUMP • CASING : S.S. 304, • IMPELLER : S.S. 304 • MOTOR FRAME : ALUMINUM • SHAFT SEALING : MECHANICAL SEAL (CARBON & CERAMIC) <p>Note: Tentative schematic diagram or Photographs of the quoted setup (complete setup) must be provided along with the technical specification.</p> <p>Other Requirement:</p> <p>Steady state time for whole system should not be more than 15min. Integrated software, computer and DATA Acquisition system with USB, compatible with window 7 also. Software should be capable to produce psychometric diagram for all air conditioning process and the measurement data.</p> <ul style="list-style-type: none"> • The system should be complete in all respect with commissioning and training. • Warranty of full setup with repairing and maintenance for three year from commissioning of room. 			
--	--	--	--

	<ul style="list-style-type: none">• Detail of Individual component, complete circuit diagram for electrical, mechanical and all other connection should be provided.• Lab manual should be provide in soft and hardcopy along with the sample calculation and validations.			
--	---	--	--	--