

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 precoated 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/m^2 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: 1. Humidity, RH (accuracy +/- 1%) 2. Velocity, (accuracy +/- 1%) 3. Temperature hand held meter (accuracy +/- 1°C)</p> <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>			
--	---	--	--	--

	<p>Specific Requirement:</p> <ul style="list-style-type: none"> • 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>			

	<p>Air Contact Evaporator: Type : Direct Expansion Extended Plate Al-Fin Copper Coil</p> <ul style="list-style-type: none"> • 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 <p>Air Contact Chiller coil: Type: In-direct Expansion, in separate chilled water tank is connected with Extended Plate Al-Fin Copper Coil.</p> <ul style="list-style-type: none"> • 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. <p>Compressor Specifications:</p> <ul style="list-style-type: none"> • 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 			
--	---	--	--	--

	<p>Air Cooled Condenser:</p> <ul style="list-style-type: none"> • Type : Air Cooled Extended Plate Al Fin Copper coil • Flow Pattern : Cross flow of fluids • Duty : Sensible Heating of Air • Condensing Temperature : $T_{co} = 50^{\circ}\text{C} - 70^{\circ}\text{C}$ <p>Auxiliary Electrical Heaters:</p> <ul style="list-style-type: none"> • Extended fin electric heating elements, 1kW Nominal @ 240 V, 50Hz, AC <p>Air Flow Ducting:</p> <ul style="list-style-type: none"> • 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. <p>Fans/Blowers: Type : Heavy Duty axial flow variable speed (VFD control)</p> <ul style="list-style-type: none"> • Power input : 240 V, 50 Hz • RPM : 0-2400 <p>Ultrasonic Humidifier: Humidifier details are as under:</p> <ul style="list-style-type: none"> • 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. 			
--	--	--	--	--

	<ul style="list-style-type: none"> • Power : 220 V-AC <p>Air Washer:</p> <ul style="list-style-type: none"> • 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. <p>Instrumentation & Control:</p> <ul style="list-style-type: none"> • 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. <p>Temperature Sensors</p> <ul style="list-style-type: none"> • 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) <p>Relative Humidity or DBT Sensors</p> <ul style="list-style-type: none"> • 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) <p>Pressure Sensors</p> <ul style="list-style-type: none"> • At all inlet and outlet in Refrigerant Circuit. • At all inlet and outlet in air Circuit. <p>Power measurement:</p> <ul style="list-style-type: none"> • 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 			
--	--	--	--	--

	<ul style="list-style-type: none"> • Data printing facility • Event recording facility • Window based user - friendly software. <p>Computer, Graphics and Software The system should meet or exceed the following specifications :</p> <ul style="list-style-type: none"> • 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. <p>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...</p> <p>Accuracy - T/C\pm1°C; RTD\pm0.2°C; Linear\pm3μV</p> <p>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</p> <p>Cycle Time (0~100) - Relay 15 sec. - Pulsed voltage to drive SSR: 1sec. - Continuous current (Voltage): 0 sec.</p>			
--	---	--	--	--

<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. 			
--	--	--	--	--