

## MODIFIED TECHNICAL SPECIFICATIONS AFTER PRE-BID MEETING HELD ON 19<sup>TH</sup> Feb. 2019

### Amendments/Changes mentioned in Yellow Colour

#### Plant Growth Chambers

Quantity – 10 Units

##### A) CONSTRUCTION:

- 1) **Exterior Dimension:** Not more than 2800mmW x 1000mmD x 2100mmH.
- 2) **Exterior Structure:** Material should be corrosion resistance, long life and easy of cleaning.
- 3) **Growth chamber type:** "Reach-in" type Plant growth chamber.
- 4) **Number of Tiers/shelves:**

**a) 05 (Five) chambers: One tier system (Three chambers with only white LED, Intensity of > 700  $\mu$ moles/  $m^2/s$  and Two chambers with LEDs combinations of White, Red, Blue, and Far red, Intensity should be >600  $\mu$ moles/  $m^2/s$  achievable from the distance of nearly 15 cm of the light source/light canopy).**

**b) 05 (Five) chambers: Two tier system (Two chambers with only white LED, Intensity of > 700  $\mu$ moles/  $m^2/s$  and Three chambers with LEDs combinations of White, Red, Blue, and Far red, Intensity should be >600  $\mu$ moles/  $m^2/s$ ) in each tier from the distance of nearly 15 cm of the light source/light canopy.**

- 5) **Growth Area:** a) For one tier system: 0.9  $m^2$  or more.  
b) For two tier system: 1.8  $m^2$  or more.
- 6) **Growth Height:** a) For one tier system: 1000mm or more.  
b) For two tier system: 450mm or more.
- 7) **Shelf/tiers adjustable:** Each of the Shelf/tiers should have provision for height adjustability and each removability
- 8) **Interior Structure:**
  - a) **Material type:** stainless steel (SS304) or Aluminium
  - b) **Finishing:** Reflective white powder coated stainless steel/Aluminium or better for corrosion resistance, easy of cleaning and maximum light uniformity.
  - c) **Insulation:** Insulation panel should be without wood, Non-CFC urethane or better and over all wall thickness should be minimum of 40mm
- 9) **Condensing unit:** Should be inbuilt with chamber and easy access to compressor and refrigeration component.
- 10) **Doors:** Each chamber should have two reach-in doors and while opening should allow full access to the interior of the chamber and when closed keeps the door against doorframe tight via magnetic gasket seal so that internal moisture and cool air does not get leaked with magnetic lock. The door should have locks with three keys.
- 11) **Observing Window:** At least one per door, and should be made of condensation free glass with light tight cover. **Window dimension should match the clear visibility of plants growth inside the chamber.**
- 12) **Electrical utilities:** Provision of at least 2 nos. electrical sockets (230 V, 6/16 A, 50 Hz) inside the chamber.

##### B) Controller:

- 1) **User Interface Screen:** The control system should be designed specifically for plant growth chambers and should have atleast 15 cm screen for easy visibility. It should have full colour, high resolution, user friendly touch screen interface. The controller should display both actual & set point conditions for all control parameters. The system should auto-start in case of power failure. The online UPS connection should be provided for break free use for controller.
- 2) **Data logging and Graphical Display:** All controlled parameters to be recorded log of actual result. Graphing of set point and actual performance and historical data.
- 3) Controller should be located in front of chamber and can be handled and viewed easily. Record temperature, humidity and light and should have USB data port.
- 4) **Security:** Multi-level password protection.
- 5) **Trouble shooting:** On board diagnostic screen.
- 6) **Alarms:** Audible and color-coded alarms should be displayed on the touch screen for alert regarding any deviation of condition within the chamber.
- 7) **Start-up delay:** Chambers should be programmed with varying restart times to reduce start-up loads after a power failure.
- 8) **Program:** User program should have provision to store atleast 15 real time programmes
- 9) **Communication:** Ethernet connectivity should be delivered with every controller in order to have direct connection with computer (PC) for monitoring and control. The chamber should be 'communication-ready'.

### C) Illumination system:

**a) 05 (Five) chambers: One tier system (Three chambers with only white LED, Intensity of > 700  $\mu\text{moles}/\text{m}^2/\text{s}$  and Two chambers with LEDs combinations of White, Red, Blue, and Far red, Intensity should be >600  $\mu\text{moles}/\text{m}^2/\text{s}$  achievable from the distance of nearly 15 cm of the light source/light canopy).**

**b) 05 (Five) chambers: Two tier system (Two chambers with only white LED, Intensity of > 700  $\mu\text{moles}/\text{m}^2/\text{s}$  and Three chambers with LEDs combinations of White, Red, Blue, and Far red, Intensity should be >600  $\mu\text{moles}/\text{m}^2/\text{s}$ ) in each tier from the distance of nearly 15 cm of the light source/light canopy.**

- 1) Horizontally placed light canopy with each canopy should have dimming system
- 2) Light Intensity can be measured from the distance of nearly 15 cm of the light source/light canopy. The provision should be available for controlling each LED color Individual from 0 to 100% of light intensity
- 3) Light intensity should be programmable through the controller
- 4) In LED light combination canopy, individual color light should be adjustable to achieve the ratio of 100% for white; 40-60% for red; 40-60% for blue; and 5% for Far red from the maximum total light intensity.
- 5) Light Intensity adjustable with on and off features and adjustable from 10 to 100%
- 6) Uniform light distribution over entire shelf.
- 7) LED lights should be PAR optimized and can be make of Fluence/LumiGrow/Valoya/Philips or equivalents from reputed company

### D) TEMPERATURE CONTROL

- 1) Temperature range lights Off: +5°C to + 40°C or better range
- 2) Temperature range lights On: +10°C to + 44°C or better range
- 3) Temperature Control: +/- 1°C at set point and least count minimum 0.1 °C.
- 4) **Temperature Safety Limits:**
  - a) Programmable High and Low temperature limits tracking alarm, automatically following programmed set point.
  - b) Independent, high and low temperature limits for secondary safety.
  - c) Audible alarm for both safety devices and automatic Chamber power off on reaching limits.

### E) REFRIGERATION

- 1) **Condensing unit:** Cabinet should have self-contained air-cooled condensing unit with hot air bypass system for continuous compressor operation.
- 2) **Circulation:** Electronic modulating 2 way stepper valve or solenoid valve for smooth and uniform modulation of heating and cooling.
- 3) **Refrigerant:** Condensing unit should be charged with CFC-free refrigerant.

### F) AIR FLOW

- 1) Air should be delivered horizontally from rear wall plenum/side wall (two tier) and from bottom to top (single tier) providing uniform environmental conditions.
- 2) Fresh Air: Adjustable or fixed from outside of the unit.

### G) HUMIDITY CONTROL

- 1) **Range:** 50% to 90% RH or better (lights OFF) and 40% to 85% or better (Light ON).
- 2) **Humidity Control:** +/- 5 % at set point.
- 3) **Humidification type:** Ultrasonic Humidifier.
- 4) **Programming:** Humidity should be programmable through the controller.
- 5) **Dehumidification:** The provision should have in-built in the chamber.
- 6) Water supply will be provided in the designated area for piping and connections.

**Note:** Steam generation/pan type humidity system not acceptable.

### H) ELECTRICAL

1. Each chamber should run on 220/230 – 240/400 V AC, 50 Hz, single phase / three phase
2. Suitable Servo regulating Voltage Stabilizer should be provided with each chamber

### I) OTHER REQUIREMENTS:

- 1) The chamber should have high quality castor wheels (with locking option) for ease of mobility.
- 2) Floor drain at the bottom and should be install with suitable piping.
- 3) A high-performance branded vacuum cleaner (2000-watt capacity) should be given by the supplier to clean the chambers.
- 4) Branded Light, humidity and temperature measurement meters should be provided.

J) A complete set of data storage, monitoring and controlling system should be quoted in the bid. The bidder will be encouraged to connect the existing plant growth chambers with the provided data storage, monitoring and controlling system. Suitable branded Computer with minimum specifications as follows: Intel Core i5, >19" LED, 4GB RAM, 1TB HDD, DVD ROM, 4 USB PORTS, 2 USB 3.0 Ports, Windows 8 OS or better, keyboard, optical mouse. The online UPS connection should be provided for break free use for system.

K) **Warranty:** 3 years from the date of installation for the complete system including spares.

**Specific Conditions:**

- 1) For evaluating price bids, the final collective cost quoted by venders/firm for all ten chambers will be considered only from the technical qualified bids.
- 2) The bidder is also requested to quote for the AMC and CMC/Extended Warranty of five years after the completion of warranty from the date of installation.
- 3) The bidder should have supplied at least 10 quoted equipments or Plant Growth Chambers with higher specifications to any Foreign research institute/Central Govt./State Govt./PSUs/Autonomous bodies or reputed private research organizations in the past five years. Purchase Order copy should be provided as a proof for it. The satisfactory installation and performance certificate from the users of these 10 installed equipments should be provided by the bidders on behalf of manufacturer.
- 4) The quoted models should be available on manufacturers website and catalogue. Each specification points should be marked/highlighted in the provided model in manufacturer catalogue.
- 5) Valid ISO certificate from Manufacturer/Bidder should be provided.

**For MSME Exemption clarifications:** In case the bid is submitted as an Indian dealer or distributor or agent or subsidiary of a foreign bidder and the eligibility criteria conditions were met thru foreign company, then the EMD Exemption cannot be claimed under the MSME status of Indian dealer or distributor or agent or subsidiary of Foreign company/firms.

**All other Terms and Conditions of the tender remain unchanged**

**Stores and Purchase Officer**