ANNEXURE: I

TECHNICAL BID PROFORMA
Item Name: TWO ENVIRONMENTAL CHAMBERS (CARBONATION)

1. **Bidder Eligibility Criteria:**

I	**Bidder Eligibility Criteria-I (Public Procurement – Preference to Make in India)**	**Class I / Class II**	**Local Content value**	**Reference, Page No.**
I	Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein.			
2.0	**Bidder Eligibility Criteria-II**	**Complied/Not Complied**	**Reference Page No.**	**Remarks, If any**
1	The supplier/vendor must be an original equipment manufacturer or an authorized agent/dealer/seller of the item. The vendor should have supplied at least 3 or equivalent similar systems at other IITs or NITs, or national laboratories and research centres (DRDO/CSIR/BARC/IGCAR), or R&D centres of reputed multinational companies, or globally recognized universities, in the last 5 years. PO copy, or performance certificate, along with contact details (for these organizations) needs to be submitted.			

1. **Technical Compliance:**

S.No	Specification	Complied/Not Complied	Reference no
General			
1.	Size of the storage area minimum (WxDxH): 1000 X 1000 X 1200mm (Volume: 1200 Ltrs.)		
2.	Overall External Dimensions can be upto (WxDxH): 1500 X 1500 X 2000 mm		
3.	Heavy duty castors must be provided for easy handling and transportation (chamber weight plus 2000 kg)		
4.	Non-flammable rock wool with at least 10 cm thickness and at least 90 kg/m3 density should be provided (on walls and door).		
5.	The exterior of the chamber should be fabricated using at least 18 SWG mild steel or better and Powder Coated Material for corrosion resistance		
6.	Inner chamber should be fabricated using at least 16 SWG SS304. The stainless-steel work could be stiffened with mild steel frame.		
7.	Appropriate slope/drain should be provided from within the chamber and near the door.		
8.	Five SS304 detachable and height adjustable type loading tray (wire shelving system) each with at least 200 kg load bearing capacity need to be provided within the chamber		
Temperature Control			

1.	Temperature Range: 5 to 60 ºC, Programmable with durable temperature sensors (high stability) with auto-calibrating features		
2.	Measurement accuracy: at least ±0.1 ºC		
3.	Control accuracy: within ±1 ºC after stabilization		
4.	Inconel sheathed type heaters must be used to prevent bursting under long-term usage.		
5.	Single stage (one compressor) air-cooled refrigeration system and a non-CFC based refrigeration gas should be used for temperature and humidity control.		
Relative Humidity (RH) control			
1.	Programmable RH range: 40 to 100%		
2.	RH accuracy: ±1.5%, with durable RH sensors (high stability) with auto-calibrating features		
3.	Air atomizers must be used for humidification process		
4.	Water vapor generator (with auto-refill facility) and a humidity blower must be used		
5.	The storage tank for distilled water should be provided		
6.	A water level indicator must be provided on the control panel		
7.	Capacitance type RH probe with high stability, fast response and wide survival temperature range, shall be used for the measurement and control of the RH (probes matching the quality standards of Rotronics Inc. / Vaisala/ Sensirion AG should be used)		
8.	Noiseless air compressor to produce dry air with at least @ 3-4 bar pressure range should be provided and used for de-humidification		
Carbon dioxide (CO2) control			
1.	Programmable CO2 range: 0 to 10%, with durable CO2 sensors (high stability) with auto-calibrating features		
2.	Accuracy of the CO2 Sensor: ±30 ppm of measuring range or 5% of the set value, whichever is smaller		
3.	A precision valve assembly (with both manual and automatic control) should be provided for purging CO2 into the chamber and remove the excess CO2 from the chamber.		
4.	An air compressor should be used to purge dry air into the chamber and remove the excess CO2 from the chamber.		
5.	CO2 Transmitter with a sensor using NDIR sensor technology with Automatic Base Line correction to measure CO2 should be used		
6.	Transmitter should provide 4-20 mA output with respect to 0-10% CO2 concentration in the air and control the opening and closing of purging		

	valve to maintain the set concentration level		
7.	Response time of the CO2 sensor should be less than 30 sec		
Display and Control panel			
1.	A separate panel for controlling and displaying the current values and set values of Temperature in ºC, RH in % and CO2 in ppm) should be provided on the control panel attached to the chamber. All these values should be displayed at all time.		
Door Assembly and viewing window			
1.	Door system should be full front opening type (180 degrees), with heavy duty and durable hinges with suitable locking mechanism		
2.	Door should be provided with 500 X 500mm 5-pane viewing window; without condensation		
3.	The door should be equipped with an interlock protection system (automatic switching On/Off of the chamber)		
4.	An outside light/switch should be provided for viewing the samples through the viewing window		
Air-circulation system			
1.	Two small circulation fans (with SS304 blades) with adjustable speed should be used for the uniform control of environment inside the chamber. (Note: We may place powder materials in this chamber for testing; fan should shoult not blow the powder away.)		
2.	The motor should be kept outside the chamber and SS 304 shaft should be used to drive the fans.		
Controller and computer system			
1.	High performance 2 Loop PID Profile Controller with percentage output control should be used for controlling the temperature and humidity. These must match the quality standards of Eurotherm controllers or Siemens.		
2.	Advanced control algorithm for stable straight-line control.		
3.	Automatic tuning to perform a one-shot tune to calculate the optimum PID and cutback valves for each loop		
4.	Real-time clock must be provided and the temperature, RH, and CO2 data for a running 30 days should be recorded in internal memory. Provide a system to transfer this data to a USB flash drive every month.		
Safety			
1.	An over-heat safety system (with a maximum temperature = 50 ºC) and an over-cool safety system (with a minimum temperature = 5 ºC) should be installed.		
2.	Thermal overload relay for the fans and compressor are needed.		
3.	Safety alarm for chamber malfunction must be provided.		
4.	A separate switch/button for switching off the main power supply should be provided		
5.	“Caution Notices”, based on international standards, should be provided on printed metallic plates and affixed onto the door		

6.	Wiring for electrically grounding the entire chamber should be provided.		
7.	Noise Level of the chamber should be within 65 dBA measured at 1 m distance (as per TNPCB norms)		
8.	All the electrical items should meet the Standard Ingress Protection 55 (IP 55) grade or better suitable for humidity chambers		
9.	All the Switchgears and Metal Circuit Breakers used should be of proven, very high-quality reputed brands (matching the quality standards of Telemechanic/Merlin Gerin etc. should be used)		
Calibration certificate			
1.	Calibration certificate, which has traceability to NABL for the complete system should be provided at the time of supply. Original calibration certificate of the Sensors used, which has international traceability, should also be supplied along with the system.		

1	**Warranty:**	3 years onsite.		
1.		Optional Quote-1: Additional 2 years warranty may be quoted separately.		
2.		Optional Quote-2: AMC beyond 3 Years Warranty period		
3.		(Optional quotes will not be taken up for price bid comparison)		
Other Terms and Conditions				
1.	The system should be delivered within 14-16 weeks from the opening of the letter of credit or issue of the purchase order, whichever is later.			
2.	Costs and related information should be given only in the financial bid.			
3.	The cost should include all delivery costs up to IIT Madras.			
4.	The warranty shall commence only from the date of equipment installation at IITM.			
5.	IIT Madras reserves the right to exclude some items from the purchase.			
6.	As part of tender technical evaluation, IIT Madras will approach the past end users for feedback and in case of any adverse feedback the bidder will be technically disqualified.			
7.	The system should be installed and commissioned with no additional cost.			
8.	Training at IIT Madras should be provided with no additional cost.			
9.	System manual should be provided in CD or pen drive form.			
10.	Services and spares should be necessarily available within India.			

S.No	Technical Bid should comprise of the following	Complied/Not Complied	Reference Page No.
1.	The vendor should guarantee round the clock technical support not only during the warranty period but even beyond through an annual maintenance contract. Demonstration of having provided such satisfactory technical support to customers shall be enclosed with the technical bid.		
2.	The manufacturer must have a well-qualified technical supp		
3.	Detailed Technical brochure		
4.	Detailed technical write up explaining how each of the Technical Specifications are complied with, indicating the location in the brochure		

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the above points with document proof as required. Failing which bidders will be technically disqualified)

SIGNATURE OF BIDDER ALONG WITH
SEAL OF THE COMPANY WITH DATE