

Aging Chamber (Temperature and Humidity Control) detail specification

1. Chamber interior dimension
 - Length = 5500 mm
 - Width = 4000 mm
 - Height = 3500 mm
2. Temperature range
 - 5°C to 60°C
 - Temperature accuracy ± 2 °C in operational work
 - The temperature of the chamber should be maintained at any required temperature within the specified range, i.e. 5°C to 60°C.
3. Humidity range
 - 20% to 99% RH
 - Relative humidity accuracy $\pm 3\%$
 - Humidity (steam) generation system should be provided in a compact size to serves humidity and condition the circulation air with mineral free and odorless steam.
 - Dehumidification system should be provided for dry air purging solenoid valve with the flood restoration (FR unit) as per chamber capacity and should be fitted back side of the chamber for purging the fresh dry air.
4. Chamber Details
 - Insulation should be done 150 mm thick of the polyurethane foam (PUF) insulation.
 - Wall and ceiling should be done using 150 mm thick PUF sandwich panels.
 - 150 mm thick mono-wall insulated sandwich PUF panel with internal 1.2 mm stainless steel and external 1.2 mm pre-painted galvanized iron (PPGI) powder coated of RAL 7035, tongue and groove joint.
 - Flooring should be done using concrete with a proper drainage system. Drain port should be provided for condensate and cleaning water from test space.
 - Halogen light should be fitted inside the testing chamber for viewing the specimen under the test.
5. Chamber Door
 - Chamber door should be of size 2000 mm \times 2000 mm with heavy duty hinges, clamp and latch type locking arrangement.
 - Outside of the door should be made of galvanized steel, primed inside and outside, and painted with good quality of paint outside (corrosion resistance).
 - Inner side of the door should be made of non-magnetic stainless steel.
 - Door should be continuous seal rings of silicon rubber mounted on a thermal breaker strip as the gasket to complete sealing and zero conduction from the test space to the exterior.
 - Door should be a micro switch for interlocking between conditioning fan and the door opening.
6. Glazed heated window view port
 - Vacuumed multilane toughened glass (transparent) for viewing inside the chamber of size 1000 mm \times 1000 mm on side wall.
7. Port Hole
 - One single port hole of 75 mm diameter should be provided for cable arrangement.
8. Refrigeration system (frost free)

- Air cooled refrigeration system should be provide with hermetically sealed compressor mount on anti-vibration pads and working on environmental friendly Chlorofluorocarbon (CFC) refrigerant.
- Cooling should be achieved by means of heat exchanger (evaporator) and installed in the re-circulated air duct of the testing chamber.
- Water cooled condenser should be provided.
- Hot gas bypass system should be provide for non-load condition and superior stability and control in temperature.
- Environment friendly CFC R-404A & R-23.
- Noise level should be less than 60 dB.

9. Heating system

- Low surface loading sealed (Flame proof) inconel tube heaters should be provided to add heat in the chamber to maintain uniform temperature.
- The heat output should be controlled through solid state triac firing energy regulator.
- The heaters should be located in the conditioning space and there shall not be any direct radiation of heat on the item under test.

10. Test space conditioning

- The blower should be mounted at top of the test space with continuous duty rated Totally Enclosed Fan-Cooled (TEFC) motor for air circulation. Conditioning space should be provided in the main chamber which is baffled the heaters and cooling coil, etc. and to be located in the conditioning space. Conditioned air should be admitted in the main chamber to maintain vertical laminar air flow and uniform temperature and easy access for maintenance.

11. Instrumentation and control system

- 10 inch color touches screen display.
- PLC (microprocessor based PID) temperature and humidity control system.
- User-friendly test programming and test sequence (step programming).
- Instant program profile preview in graphical format.
- Ethernet connectivity for PC and LAN communication.
- Windows based facility to read a data and computable to export data at MS Excel.
- Memory for up to 5 programs.
- Fault diagnostic system.
- Real time trend graph (temperature and humidity versus time).
- Modify any previously created test programmes and delete test programmes that are no longer needed.
- Programmes easily stored and recalled at any time and activated without the necessity of operation having prior programming knowledge.
- Digital set point and actual display of temperature.
- Real time clock to count the total running time of chamber, cycle time, event time, segment time, total program time, counter.
- Resolution of controller should be 0.1°C.
- Language of programming and display should be in English
- Data logging should be real time monitoring and printing of chamber temperature using internal memory of PLC and external PC interface via LAN (apart from HMI meant for chamber programme control).

- Software design such that the chamber restart and continue automatically, and resume the programme after power failure.
12. Electrical power supply
- 3-phase 415V AC, 50Hz
13. Safety and protection devices
- Fire alarm system.
 - Flame retardant cables (Class A) used for mains and control circuit.
 - Branded electrical and switch gear should be used.
 - Complete circuit relevant protection based on fault with audio-visual alarm.
 - Software temperature limiter for minimum and maximum test chamber temperature.
 - Bypass protection at no load conditions of refrigeration system.
 - Protection for excess pressure in refrigeration system with pressure gauges.
 - Over load protection for motors.
 - Miniature Circuit Breaker (MCB) for all motors, compressors and heaters.
 - Water level controller for humidity control system.
 - Drain system for condensate and cleaning water from test space, humidity generator and water reserve tank.
 - Over heating system for humidity generator.
 - Emergency stop on control panel.
 - Common earth point.
 - Alarm for faulty condition.
 - Operating manual of aging chamber should be provided with details of equipment.

Optional Items

14. Calibration
- Temperature and humidity range should be calibrated and provide a certificate.
15. Calibration system
- Temperature and relative humidity calibration system for chamber.