

Maintenance Checklists

Practical inspection and preventive-maintenance checklists for environmental test chambers and associated equipment.

Purpose

A field-ready reference for technicians, facility teams and equipment owners to improve reliability, identify deterioration early, document corrective action and reduce avoidable downtime.

- ✓ Environmental chambers
- ✓ Refrigeration systems
- ✓ Humidity systems
- ✓ Electrical & controls
- ✓ Air circulation
- ✓ Safety systems
- ✓ Utilities & associated equipment

Industrial Equipment Lifecycle & Intelligence

Levito Global Private Limited

How to Use This Checklist

Use the frequency as a practical baseline, then adjust it for chamber type, duty cycle, operating temperature/humidity range, contamination, ambient conditions, manufacturer requirements and criticality of the test process. Record every abnormal observation and close corrective actions through a traceable service record.

Safety first

Preventive maintenance must be performed by competent personnel. Isolate electrical power and other energy sources before opening panels, guards or refrigeration circuits. Refrigerant work, pressure-system work and electrical testing should be carried out only by appropriately qualified personnel.

Recommended maintenance rhythm

Frequency	Primary objective	Typical owner
Before each test / Daily	Basic condition, cleanliness, alarms, utilities	Operator / lab user
Monthly	Early detection of wear, blockage, leaks and loose items	Operator + maintenance
Quarterly	Functional inspection of major subsystems	Maintenance technician
6-monthly	Detailed preventive maintenance and performance review	Qualified service technician
Annually	Comprehensive PM, safety verification and calibration review	Service + calibration team

Service record details

Customer / Site _____

Equipment ID / Asset No. _____

Manufacturer / Model _____

Serial No. _____

Location _____

Technician _____

Date _____

Running hours / cycle count (if available) _____

1. Daily / Pre-Test Operator Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Confirm chamber interior is clean and free from debris, packaging, spilled material or previous test residue.	☐ OK ☐ Attn.	
2	Inspect door gasket for visible damage, contamination, compression loss or ice build-up.	☐ OK ☐ Attn.	
3	Confirm door closes fully and latch/handle operates smoothly without excessive force.	☐ OK ☐ Attn.	
4	Check test specimen placement does not obstruct supply/return airflow or contact chamber sensors.	☐ OK ☐ Attn.	
5	Verify drains are clear and drain trap/water seal is in the correct condition where applicable.	☐ OK ☐ Attn.	
6	Confirm required utilities are available: electrical supply, cooling water/chiller, compressed air, demineralised water or other services as applicable.	☐ OK ☐ Attn.	
7	Check water reservoir / humidity supply level and water quality where applicable.	☐ OK ☐ Attn.	
8	Power on and confirm controller, HMI and display start normally without abnormal messages.	☐ OK ☐ Attn.	
9	Review active alarms and unresolved alarm history before starting a new test.	☐ OK ☐ Attn.	
10	Confirm programmed setpoints, limits, ramps, dwell times and safety cut-outs are appropriate for the test.	☐ OK ☐ Attn.	
11	Observe fan, compressor, pumps and other equipment for unusual noise or vibration after start-up.	☐ OK ☐ Attn.	
12	Check for visible water, oil or refrigerant-related leakage indicators around the chamber and utility connections.	☐ OK ☐ Attn.	
13	Confirm test ports and access holes are sealed when not in use.	☐ OK ☐ Attn.	
14	Verify independent specimen/product safety limits where the test requires them.	☐ OK ☐ Attn.	

2. Monthly General Chamber Inspection

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Clean chamber interior using materials compatible with stainless steel and chamber components.	☐ OK ☐ Attn.	
2	Inspect stainless-steel surfaces for corrosion, chemical attack, deposits or mechanical damage.	☐ OK ☐ Attn.	
3	Inspect shelves, racks and supports for distortion, loose fasteners or excessive loading.	☐ OK ☐ Attn.	
4	Inspect door hinges, latch, handle and alignment; lubricate only where recommended.	☐ OK ☐ Attn.	
5	Inspect gasket continuously around the door perimeter; look for tears, hardening, flattening and leakage paths.	☐ OK ☐ Attn.	
6	Perform a paper-strip or equivalent gasket-contact check at representative points if sealing is suspect.	☐ OK ☐ Attn.	
7	Inspect viewing window, heater and frame for condensation, seal damage or cracks where fitted.	☐ OK ☐ Attn.	
8	Inspect cable ports, plugs and flexible seals for damage and correct closure.	☐ OK ☐ Attn.	
9	Check condensate drain, floor drain and drain hose for blockage, leakage and biological growth.	☐ OK ☐ Attn.	
10	Inspect exterior panels, covers, castors/levelling feet and anchoring for security.	☐ OK ☐ Attn.	
11	Clean external ventilation grilles and ensure required clearance around the equipment is maintained.	☐ OK ☐ Attn.	
12	Review recurring alarms, abnormal test interruptions and operator complaints since the previous inspection.	☐ OK ☐ Attn.	

3. Refrigeration System Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Inspect compressor area for oil stains, abnormal noise, vibration or overheating.	☐ OK ☐ Attn.	
2	Check suction and discharge piping for rubbing, unsupported sections, damaged insulation or signs of leakage.	☐ OK ☐ Attn.	
3	Inspect pipe joints, valves and service ports for oil traces or other leak indicators.	☐ OK ☐ Attn.	
4	Inspect condenser coil / heat exchanger for dust, blocked fins, bent fins or restricted airflow.	☐ OK ☐ Attn.	
5	Clean air-cooled condenser surfaces without damaging fins.	☐ OK ☐ Attn.	
6	Verify condenser fans rotate freely, operate in the correct direction and do not vibrate excessively.	☐ OK ☐ Attn.	
7	For water-cooled systems, inspect water flow, inlet/outlet temperatures, strainers and evidence of scaling or fouling.	☐ OK ☐ Attn.	
8	Inspect evaporator area for abnormal ice formation or airflow restriction.	☐ OK ☐ Attn.	
9	Check refrigeration pipe insulation for deterioration, condensation and exposed cold surfaces.	☐ OK ☐ Attn.	
10	Review compressor operating current and compare with historical/baseline values when measurements are available.	☐ OK ☐ Attn.	
11	Check operating pressures and superheat/subcooling only where required and by qualified refrigeration personnel.	☐ OK ☐ Attn.	
12	Verify solenoid valves, expansion devices and pressure controls operate without abnormal hunting or chatter.	☐ OK ☐ Attn.	
13	Check crankcase heaters where fitted and verify expected operation.	☐ OK ☐ Attn.	
14	Confirm staged/cascade refrigeration transitions occur correctly on low-temperature systems.	☐ OK ☐ Attn.	
15	Investigate any decline in pull-down rate, temperature stability or recovery time rather than compensating only through controller settings.	☐ OK ☐ Attn.	

4. Humidity System Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Use the specified water quality; inspect demineralised/RO water supply and treatment equipment as applicable.	☐ OK ☐ Attn.	
2	Inspect water tank/reservoir for sediment, scale, slime or contamination.	☐ OK ☐ Attn.	
3	Clean reservoir and wetted components at an interval appropriate to water quality and usage.	☐ OK ☐ Attn.	
4	Inspect humidifier/steam generator for scale deposits and clean/descale as required.	☐ OK ☐ Attn.	
5	Check water level controls, float switches, solenoid valves and fill/drain operation.	☐ OK ☐ Attn.	
6	Inspect humidity water lines, fittings and pumps for leaks, kinks or blockage.	☐ OK ☐ Attn.	
7	Check wet-bulb wick and water supply where a wet-bulb system is used; replace contaminated or hardened wick.	☐ OK ☐ Attn.	
8	Inspect humidity sensor/probe for contamination, condensation exposure or physical damage.	☐ OK ☐ Attn.	
9	Verify dehumidification system operates and condensate drains freely.	☐ OK ☐ Attn.	
10	Check for persistent condensation on surfaces where it should not occur.	☐ OK ☐ Attn.	
11	Compare indicated humidity against a calibrated reference at representative conditions when performance is in doubt.	☐ OK ☐ Attn.	
12	Document water-quality issues because mineral content and contamination can significantly shorten humidification-system life.	☐ OK ☐ Attn.	

5. Air Circulation & Chamber Airflow Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Inspect circulation fan/blower for abnormal noise, bearing sound or vibration.	☐ OK ☐ Attn.	
2	Check fan wheel/impeller for contamination, looseness, damage or imbalance.	☐ OK ☐ Attn.	
3	Verify motor mounting and accessible fasteners are secure.	☐ OK ☐ Attn.	
4	Inspect airflow ducts, baffles and plenums for blockage, loose parts or damage.	☐ OK ☐ Attn.	
5	Ensure test specimens do not block supply or return air paths.	☐ OK ☐ Attn.	
6	Check fan motor current against baseline where practical.	☐ OK ☐ Attn.	
7	Inspect belts and pulleys for tension, alignment and wear on belt-driven systems.	☐ OK ☐ Attn.	
8	Confirm airflow direction and fan rotation after any electrical or motor work.	☐ OK ☐ Attn.	
9	Inspect motor cooling path and remove dust accumulation.	☐ OK ☐ Attn.	
10	Investigate deterioration in uniformity or recovery time as a possible airflow problem before adjusting control parameters.	☐ OK ☐ Attn.	

6. Electrical & Control Panel Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Isolate power before internal inspection and follow site lockout/tagout requirements.	☐ OK ☐ Attn.	
2	Inspect panel interior for dust, moisture, corrosion, insects or foreign material.	☐ OK ☐ Attn.	
3	Check for heat discoloration, burnt smell, melted insulation or signs of arcing.	☐ OK ☐ Attn.	
4	Verify terminal tightness using the manufacturer/site torque practice where applicable.	☐ OK ☐ Attn.	
5	Inspect contactors, relays and SSRs for overheating, chatter or worn contacts.	☐ OK ☐ Attn.	
6	Inspect fuses, MCBs/MCCBs, overloads and protective devices for correct rating and condition.	☐ OK ☐ Attn.	
7	Check cable glands, ferrules, lugs, earthing conductors and cable support.	☐ OK ☐ Attn.	
8	Inspect PLC, I/O modules, HMI and communication devices for fault indicators.	☐ OK ☐ Attn.	
9	Confirm control-panel cooling fans, filters and air conditioners operate and filters are clean.	☐ OK ☐ Attn.	
10	Check control transformer / SMPS output and DC supply health where required.	☐ OK ☐ Attn.	
11	Verify emergency stop, door interlocks and safety circuits operate correctly.	☐ OK ☐ Attn.	
12	Review controller event logs and repeated trips for developing faults.	☐ OK ☐ Attn.	
13	Back up PLC/HMI/controller programs and recipes after approved changes.	☐ OK ☐ Attn.	
14	Confirm real-time clock, data logging and network communication are functioning where used.	☐ OK ☐ Attn.	

7. Sensors, Calibration & Measurement Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Inspect temperature and humidity probes for physical damage, contamination and secure mounting.	☐ OK ☐ Attn.	
2	Confirm sensors are positioned in the intended airflow and have not been displaced.	☐ OK ☐ Attn.	
3	Inspect sensor cables, connectors and shielding for damage or loose connections.	☐ OK ☐ Attn.	
4	Compare chamber indication with a traceable calibrated reference at representative setpoints.	☐ OK ☐ Attn.	
5	Review calibration due dates for chamber sensors, independent safety sensors and data-acquisition channels.	☐ OK ☐ Attn.	
6	Check temperature uniformity and fluctuation against the applicable chamber specification or test requirement when due.	☐ OK ☐ Attn.	
7	Check humidity accuracy/stability over the operating points relevant to actual use.	☐ OK ☐ Attn.	
8	Record as-found and as-left values whenever calibration or adjustment is performed.	☐ OK ☐ Attn.	
9	Do not use controller offset adjustments to conceal an unresolved mechanical, airflow or sensor problem.	☐ OK ☐ Attn.	
10	Apply calibration labels/status identification and retain certificates in the equipment record.	☐ OK ☐ Attn.	

8. Safety Systems Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Test over-temperature protection and confirm it is set appropriately above the intended test condition.	☐ OK ☐ Attn.	
2	Test independent specimen/product temperature limiter where fitted.	☐ OK ☐ Attn.	
3	Verify emergency stop function and reset behaviour.	☐ OK ☐ Attn.	
4	Check door interlock and internal safety release on walk-in chambers where applicable.	☐ OK ☐ Attn.	
5	Inspect alarm beacon, buzzer and remote alarm outputs.	☐ OK ☐ Attn.	
6	Verify high/low pressure refrigeration protection and compressor overload protection as applicable.	☐ OK ☐ Attn.	
7	Check phase failure/sequence, under/over-voltage or other electrical protection where fitted.	☐ OK ☐ Attn.	
8	Inspect grounding/earthing continuity visually and test according to the site electrical-safety program.	☐ OK ☐ Attn.	
9	Confirm fire/smoke or gas detection interfaces where integrated with hazardous testing.	☐ OK ☐ Attn.	
10	Verify safety signage and labels remain legible.	☐ OK ☐ Attn.	
11	Confirm no safety interlock has been bypassed or defeated.	☐ OK ☐ Attn.	
12	Record all safety-function tests and corrective actions.	☐ OK ☐ Attn.	

9. Associated Utilities & Equipment Checklist

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Chiller: inspect water level, concentration where glycol is used, leaks, filters/strainers, condenser cleanliness and operating temperature.	☐ OK ☐ Attn.	
2	Cooling-water circuit: verify flow, pressure, inlet temperature and water quality are within equipment requirements.	☐ OK ☐ Attn.	
3	Compressed air: inspect pressure, filtration, dryness and leaks where pneumatic systems are used.	☐ OK ☐ Attn.	
4	Demineralised/RO water: check conductivity/TDS or specified quality indicator and replace consumables as required.	☐ OK ☐ Attn.	
5	Voltage stabiliser/UPS: review alarms, bypass status, battery health and load level where fitted.	☐ OK ☐ Attn.	
6	Exhaust/ventilation: confirm fans, ducts and dampers are clear and functioning.	☐ OK ☐ Attn.	
7	Remote condenser: inspect coil cleanliness, fans, weather exposure, supports and refrigerant piping.	☐ OK ☐ Attn.	
8	Data logger/DAQ: verify channel health, storage capacity, time synchronisation and sensor identification.	☐ OK ☐ Attn.	
9	IoT gateway / remote monitoring: verify connectivity, last data timestamp, alarm delivery and equipment mapping.	☐ OK ☐ Attn.	
10	Room ambient: record excessive ambient temperature, dust or poor ventilation that could reduce chamber performance.	☐ OK ☐ Attn.	

10. Six-Month / Annual Preventive Maintenance

No.	Inspection / Maintenance Item	Status	Remarks / Action
1	Complete all monthly and subsystem inspections in this document.	☐ OK ☐ Attn.	
2	Deep-clean condenser/heat-exchange surfaces and control-panel filters.	☐ OK ☐ Attn.	
3	Inspect and clean evaporator/airflow sections accessible under the approved service procedure.	☐ OK ☐ Attn.	
4	Inspect compressor, fan and pump mounts; check vibration and abnormal bearing noise.	☐ OK ☐ Attn.	
5	Check refrigeration performance against baseline pull-down/pull-up and stability data.	☐ OK ☐ Attn.	
6	Leak-check refrigeration system when indicated by performance, visual evidence or service history.	☐ OK ☐ Attn.	
7	Inspect electrical power connections and major switching components for thermal deterioration.	☐ OK ☐ Attn.	
8	Function-test all safety cut-outs, alarms and interlocks.	☐ OK ☐ Attn.	
9	Verify temperature/humidity measurement performance and calibration status.	☐ OK ☐ Attn.	
10	Review door sealing, insulation condition and evidence of thermal bridging or condensation.	☐ OK ☐ Attn.	
11	Service humidification and water systems; descale and sanitise where appropriate.	☐ OK ☐ Attn.	
12	Review software/firmware, recipes, backups and communications configuration.	☐ OK ☐ Attn.	
13	Review 12-month alarm and breakdown history to identify recurring failure modes.	☐ OK ☐ Attn.	
14	List components approaching end-of-life or obsolescence and recommend planned replacement.	☐ OK ☐ Attn.	
15	Record recommended spares to hold on site based on criticality and lead time.	☐ OK ☐ Attn.	
16	Issue a condition summary with immediate, planned and monitor-only actions.	☐ OK ☐ Attn.	

Condition rating

A - Good: no action required. B - Monitor: deterioration noted; review at next PM. C - Planned action: repair/replacement should be scheduled. D - Critical: immediate corrective action required before continued operation.

Corrective Action & Recommendation Log

No.	Finding / Recommendation	Priority	Owner	Target Date	Closure / Ref.
1		☐ Immediate ☐ Planned ☐ Monitor			
2		☐ Immediate ☐ Planned ☐ Monitor			
3		☐ Immediate ☐ Planned ☐ Monitor			
4		☐ Immediate ☐ Planned ☐ Monitor			
5		☐ Immediate ☐ Planned ☐ Monitor			
6		☐ Immediate ☐ Planned ☐ Monitor			

Service Completion

Overall equipment condition _____

Immediate actions completed _____

Parts required / recommended spares _____

Next preventive-maintenance due _____

Calibration due _____

Technician name & signature _____

Customer representative & signature _____

Good maintenance practice

Trend data is often more valuable than a single reading. Where possible, retain operating current, pull-down time, alarm frequency, calibration results, refrigerant service history and recurring component failures against the equipment asset record. This helps move maintenance from reactive repair toward condition-based and predictive maintenance.

Important Note

This checklist is a general preventive-maintenance guide. It does not replace the equipment manufacturer's service manual, site safety procedures, applicable regulations, test standards or risk assessment. Maintenance frequency and inspection scope should be adapted to the specific chamber, application and operating environment.