

Temperature Humidity Environmental Test Chambers — International Test Standards & Applications

1. IEC 60068-2-78 — Damp Heat, Steady State

Purpose & Application

Evaluate product performance under constant high-humidity conditions (without condensation). Applicable to electronic components, assemblies, and devices.

Test Conditions

Temperature & Humidity Combinations:

30 °C ±2 K / 93 % RH ±3 %

30 °C ±2 K / 85 % RH ±3 %

40 °C ±2 K / 93 % RH ±3 %

40 °C ±2 K / 85 % RH ±3 %

Duration: 12 h, 16 h, 24 h, 2 d, 4 d, 10 d, 21 d, 56 d

Benefits for Customers

Verify long-term stability under constant high humidity

Identify potential material or component vulnerabilities

Ensure compliance with international environmental standards

2. IEC 60068-2-30 — Damp Heat, Cyclic

Purpose & Application

Assess product durability under alternating high-humidity/high-temperature and lower humidity conditions.

Test Conditions

Humid phase: RH ≥95%, temperature per specification

Dry phase: low humidity, temperature adjusted per cycle

Typical cycle duration: 12 h each (adjustable)

Customer Value

Evaluate real-world cyclic humidity impacts

Predict potential performance degradation over repeated environmental cycles

3. MIL-STD-810H — Method 507.6 Humidity

Purpose & Application

Evaluate equipment durability in tropical, humid, and cyclic damp heat environments.

Test Procedures

Procedure I: Natural/induced humidity cycles to simulate real-world conditions

Procedure II: Aggravated conditions for accelerated stress

Customer Benefits

Identify weaknesses under long-term high-humidity exposure

Assess chemical and physical changes in materials and components

4. JEDEC JESD22 Series — Temperature, Humidity & Life

Testing

JESD22- A101 — Steady-State Temp-Humidity Life Test

Purpose: Evaluate long-term reliability of ICs under high temperature and humidity

Conditions: 85 °C / 85 % RH for 1000h (adjustable)

Notes: Pressure chamber avoids condensation during the test

JESD22- A103 — High Temperature Storage Life

Purpose: Assess lifespan under high-temperature storage

Conditions: Expose to specified temperature and measure performance changes

JESD22- A110 — HAST (Highly Accelerated Stress Test)

Purpose: Accelerate potential failure mechanisms under high humidity and temperature

Conditions: High temperature, high humidity, and pressure-controlled environment

Customer Benefits

Predict product lifetime and reliability

Detect early failure mechanisms before market release

Support IC and electronics component qualification

5. ASTM F1980 — Accelerated Aging & Shelf-Life Testing

Purpose & Application

Simulate long-term storage conditions to evaluate product performance over time. Ideal for medical devices, packaging, and consumables.

Core Method

Control temperature (≤ 60 °C) and humidity to simulate aging

Use Arrhenius-based acceleration to convert test duration to real-life shelf life

Support shelf-life labeling and evaluation of time-dependent performance

Customer Benefits

Verify product stability over intended shelf life

Ensure packaging and materials remain effective over storage

Reduce warranty claims by predicting aging-related failures

6. Temperature Humidity Test Chamber Series Advantages

Precise temperature and humidity control ($\pm 0.5\text{ }^{\circ}\text{C}$ / $\pm 2\%$ RH)

Uniform environmental conditions for repeatable results

Programmable cycles for steady-state, cyclic, and accelerated aging tests

Optional pressure control for HAST and shelf-life accelerated tests

Wide application across electronics, automotive modules, medical devices, and R&D labs

7. Summary Table — International Standards for TH Series

Chambers

Standard	Name	Core Purpose / Test Type	Typical Conditions
IEC 60068-2-1	Cold Test	Low-temperature adaptability	Specified low temp for several hours
IEC 60068-2-2	Dry Heat	High-temperature storage & operation	Specified high temp for several hours
IEC 60068-2-14	Thermal Shock	Rapid temperature change stress	$-40\text{ }^{\circ}\text{C}$ ↔ high temp cycles
IEC 60068-2-30	Damp Heat, Cyclic	Humid heat cyclic durability	RH $\geq 95\%$, temp cycles
IEC 60068-2-78	Damp Heat, Steady State	Constant high-humidity reliability	$30\text{--}40\text{ }^{\circ}\text{C}$ / $85\text{--}93\%$ RH
JESD22-A101	Steady-State Temp-Humidity Life	High temp/high humidity life	$85\text{ }^{\circ}\text{C}$ / 85% RH, 1000 h
JESD22-A103	High Temp Storage Life	High-temp storage life	Specified high temp exposure
JESD22-A110	HAST	Highly accelerated humidity stress	High temp + high humidity + pressure
ASTM F1980	Accelerated Aging / Shelf-Life	Product shelf-life evaluation	$\leq 60\text{ }^{\circ}\text{C}$, controlled humidity
MIL-STD-810H	Humidity Lifecycle	Cyclic damp heat	Natural/induced

Standard	Name	Core Purpose / Test Type	Typical Conditions
507.6		durability	humidity cycles

8. Key Takeaways

Comprehensive Reliability Assessment: TH Series chambers combined with IEC, JEDEC, MIL-STD, and ASTM standards cover all aspects of environmental stress, aging, and shelf-life testing.

Predict Product Lifetime: Identify potential failures early and ensure products meet long-term reliability requirements.

Global Compliance: Supports international testing standards, ensuring acceptance in multiple markets.

Flexible Testing: Suitable for R&D, QA, and reliability engineering for electronics, automotive, and medical devices.

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