BATTERY TEST SOLUTIONS

LEADING THE CHARGE

Thermotron has proven solutions to test new battery technology. Whether testing cells, battery packs, or modules, Thermotron has high-performance, high-reliability testing equipment that exceeds industry standard testing specifications. A wide variety of safety features are available to ensure technicians are never in harm's way.

Not all batteries are created equal

To succeed in a competitive, growing industry, you have created unique products. As no two batteries or testing requirements are the same, neither are our chambers.

At Thermotron, one size does not fit all. We believe the best way to support our customers is to personalize our products and our service to fit your needs.

PRODUCT EXAMPLES

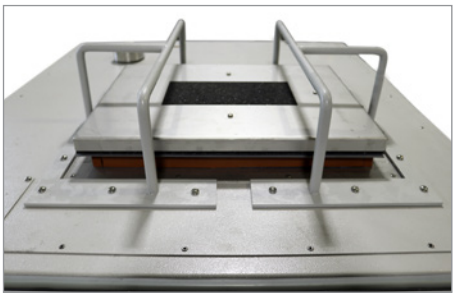
Chamber Model	Workspace Volume	Temperature Range	Humidity Range	Vibration	Special Features
XS-10	10 cu ft. (283 L) 24 in. x 24 in. x 28 in. (61 cm x 61 cm x 71 cm)	+180°C to -70°C +356°F to -94°F	10 to 98% RH (optional)	n/a	▪ Door Chain with Proximity Switch ▪ Sheath Heaters ▪ Explosion Proof Interior Light ▪ Minimal Spark Package
SE-1400	48 cu ft. (1,366 L) 48 in. x 39 in. x 44 in. (122 cm x 100 cm x 112 cm)	+180°C to -70°C +356°F to -94°F	10 to 98% RH	n/a	▪ Sheath Heaters ▪ Dry Air Purge ▪ Fire Suppression System ▪ Intrinsic Barriers ▪ Remote Air-Cooled Condenser
SE-2000	69 cu ft. (1,965 L) 48 in. x 48 in. x 52 in. (122 cm x 122 cm x 132 cm)	+180°C to -70°C +356°F to -94°F	10 to 98% RH	n/a	▪ Blow Off Port ▪ Chamber Relief Vent ▪ Explosion Proof Interior Light ▪ Isolation Barriers
AGREE	12 cu ft. (340L) – 168 cu ft. (4,758L)	+180°C to -70°C +356°F to -94°F	20 to 95% RH	5 to 2,000 Hz Up to 12,000 FLB (53 kN)	▪ Data Acquisition (DAQ) ▪ Dry Air Purge ▪ Remote Refrigeration ▪ Air-Cooled Condenser & much more
Walk-In	Any Size	+180°C to -70°C +356°F to -94°F	10 to 98% RH (optional)	n/a	Per Application

Thermotron's S-Series chambers provide solutions for most standard testing requirements.

A Thermotron AGREE Chamber provides the flexibility to adapt to ever-changing test requirements.

HIGHLIGHTED SAFETY FEATURES

Blow Off Top



Releases when pressures are too great. A metal cage houses the blow-off top to block particulates from escaping the chamber.

Chain Lock Door

Safely catches the door in the event of an accidental explosion. Equipped with a sensor, test will not begin without pin inserted.

Sheath Heaters

Sheath heaters provide high reliability and peace of mind as they safely limit the temperature.

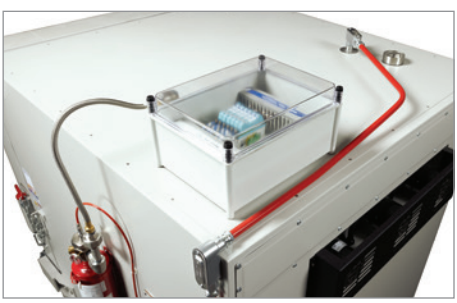
Hand Wheel Latch

A heavy-duty door handle ensures that pressures will not blast the door open.

Automatic Door Locks

Prevents access to the testing chamber during a normal cycle or when an alarm condition has been detected.

Fire Suppression System



This safety option is designed to control a fire by displacing oxygen and applying a cooling effect directly to the product being tested.

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ADDITIONAL SAFETY FEATURES

FEATURE	BENEFIT
Automatic Door Locks	Prevents access to the testing chamber during a normal cycle or when an alarm condition has been detected.
Blow Off Top	Releases when pressures are too great. A metal cage houses the blow off top to block it from escaping.
Chain Lock Door	Safely catches the door in the event of an accidental explosion
Explosion Proof Interior Light	C1D1 heavy duty light assembly for explosive atmospheres.
Exterior Light	A light source mounted on the outside of the chamber that guarantees the bulb will not explode due to extreme conditions.
Gas Detector/Monitor	Monitors/detects any inbalance in hazardous gas levels.
Fire Suppression System	Controls a fire by displacing oxygen and applying a cooling effect directly to the product being tested.
Hand Wheel Door Latch	Heavy-duty door handle to ensure that pressures will not blast door open.
Intrinsic Safety Isolation Barrier	Isolated sensors to prevent an ignition source.
Nitrogen Purge	Reduces oxygen content inside the chamber.
Non-Sparking Fan Blade	Ensures the fan will not act as a starting agent if gas is present.
Reinforced Floor	Ideal for testing heavy or multiple battery modules or packs.
Sheath Heaters	Temperatures cannot increase higher than auto ignition temperature.
Slam Latch	Latch holds door shut while a proximity switch detects whether the door is properly locked, acts as a blow-out option.

Committed to Safety

Safety is always a top concern at Thermotron. Along with a variety of available safety features designed specifically for battery testing, every Thermotron chamber is manufactured to meet or exceed all industry safety regulations, standards, and requirements. Whatever the test, Thermotron is committed to ensuring the operator is never in harm's way.

IEC UL LISTED SAE INTERNATIONAL CE UN38.3

Influences of Temperature

External influences

- External heating
- Overcharging
- Deep discharge
- Excessive charging current
- External short-circuit

Internal events

- Electrode electrolyte reactions
- Electrochemical reactions

HAZARD LEVELS

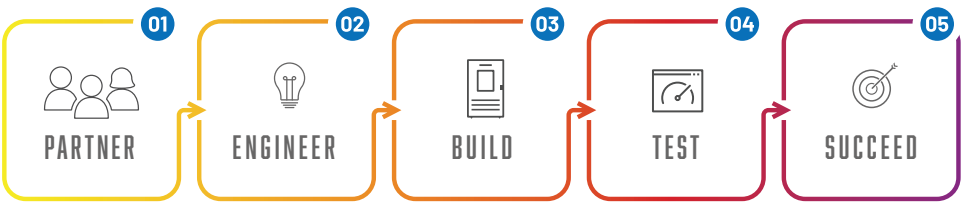
Hazard Level	Description	Classification criteria and effect
0	No effect	No effect. No loss of functionality.
1	Passive protection activated	No defect; no leakage; no venting, fire, or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell reversibly damaged. Repair of protection device needed.
2	Defect/damage	No leakage; no venting, fire, or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell irreversibly damaged. Repair needed.
3	Leakage Δ mass < 50%	No venting, fire, or flame*; no rupture; no explosion. Weight loss < 50% of electrolyte weight (electrolyte = solvent + salt).
4	Venting Δ mass ≥ 50%	No fire or flame*, no rupture; no explosion. Weight loss ≥ 50% of electrolyte weight (electrolyte = solvent + salt).
5	Fire or flame	No rupture; no explosion (i.e. no flying parts).
6	Rupture	No explosion, but flying parts of the active mass.
7	Explosion	Explosion (i.e. disintegration of the cell).

** The presence of flame requires the presence of an ignition source in combination with fuel and oxidizer in concentrations that will support combustion. A fire or flame will not be observed if any of these elements are absent. For this reason, we recommend that a spark source be used during tests that are likely to result in venting of cell(s). We believe that "credible abuse environments" would likely include a spark source. Thus, if a spark source was added to the test configuration and the gas or liquid expelled from the cell was flammable, the test sample would quickly progress from Hazard Level 3 or 4 to Hazard Level 5.*

Source: Own illustration based on EUCAR

Personalized Performance

At Thermotron, every job is unique. Each chamber is fully customized and carefully crafted to match the test requirement for every product. It's the personalized, professional touch you should expect from a supplier. Our customization process also secures your safety and delivers performance tailored to your needs.



Solid Reputation

With nearly 60 years of experience, Thermotron is a premier manufacturer of high-performance environmental test chambers and vibration test systems.

We build equipment to challenge the limits of our clients' products while making unique chambers to test temperature, humidity, altitude, and vibration. Used by many of the world's top brands, our equipment tests products for the automotive, space, defense, electronic, renewable energy, and many other leading industries.

How can we help you?

Worldwide Service & Support

Thermotron's comprehensive service department supports your equipment purchase for years after the sale. Our worldwide service professionals are available and ready to help over the phone or in person.

Technical advisors are available to answer questions and offer advice regarding start-up, service, operation, troubleshooting, and repair of your equipment.

Factory-trained Field Service Engineers are located across the United States and throughout the world to assist with equipment start-up, after-delivery service, preventive maintenance, and calibration contracts. From phone support to overnight parts delivery, Thermotron can support you for the life of your equipment.

Click or Call to Receive a Free Quote

Contact your regional sales rep, visit us online, or call us direct at the numbers listed below for fast, friendly service.

For more than 55 years, Thermotron has provided quality environmental test equipment. We've worked to establish a trusted reputation among our peers, and when people hear the name *Thermotron*, they have confidence in the testing of their own product. We've been building our name since 1962; now it's your turn.

QUALITY. TRUST. CONFIDENCE.
BUILD YOURS WITH A THERMOTRON.

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