

What tests are commonly performed using ESPEC's battery cell chambers?

Battery testing chambers are used in research and development, quality assurance, and battery production across a number of industries including automotive, computer, telecommunications, defence and alternative energy markets.

The [Espec range of temperature test chambers](#) available from Unitemp offers various models to meet test requirements relating to temperature range, climate range, and test area size.

Aging tests:

Battery Aging Test involve testing both battery cell and battery packs at various temperatures without the battery load cycle. They are performed within a designated safe temperature range for the battery or batteries under test. Accelerated aging testing focuses on applying multiple levels of stress in an attempt to predict the batteries behaviour. This testing works by noting that certain chemical reactions can be sped up or slowed down up by increasing and decreasing the temperature at which the reaction occurs.

Performance tests:

Battery Performance Tests are undertaken to test the different limits of a specific battery cell or battery packs, such as the load state, charge, discharge rates and longevity of performance. The batteries are subjected to overlapping temperature ranges and the performance is monitored and recorded. These tests are normally performed within a designated safe temperature range for the battery.

Stress / Abuse tests:

Stress & abuse tests are performed at the limit of the safe temperature range for the battery. This category also includes tests with higher charging and discharging currents overlapping with constant or dynamic temperatures. Abuse tests push electrical energy carriers to the limit of their capability and beyond. Batteries are exposed to extreme stress such as extremely high or low temperatures, mechanical damage such as crushing or electrical loads such as short circuits or overcharging and deep discharge.

In all battery testing, battery failure is a real risk and sometimes also a desired outcome, therefore the environmental chambers need safety systems to protect users from harmful explosions and ensure operator safety. One of the greatest risks is the release of flammable gases from the battery, which may ignite on their own, or from the test chamber's heaters. Consequently, special low-temperature heaters are recommended and sometimes additional precautions may be necessary. By monitoring the battery for thermal runaway, the chamber may be shut off and an alarm made prior to an explosion.

Depending on the application and expected [hazard level](#) there is an extensive list of accessories available; fire detection/suppression systems, gas monitors (H₂, O₂ or CO), custom pressure relief vent that protects chambers from a sudden release of high pressure gas, door safety interlock switches to prevent opening during a test or after an event, a flushing system of N₂ or CO₂ to help minimise a fire and help remove byproducts from the chamber, a reinforced chamber floor to withstand intense heat, and an internal cooling system to help control cell and pack temperatures. In certain extreme "test to failure" applications, a protective enclosure/structure may need to be built to isolate the event. These are just some of the common safety features most commonly utilised.

If you have specific requirements feel free to [contact us](#) to discuss your project.