



SOUTHWEST RESEARCH INSTITUTE



# Battery Testing & Research

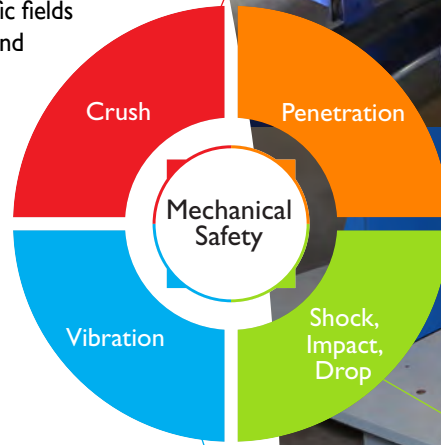
The Energy Storage Technology Center® (ESTC) program at Southwest Research Institute® (SwRI®) is a collaborative effort of technology experts from diverse scientific fields to support industry and government clients in the research, development, and evaluation of energy storage systems.

SwRI conducts high-quality, independent testing across a full range of test standards to determine the battery's safe operating envelope. Testing is performed under an ISO 9001 certified quality management system, with most tests covered under an ISO 17025 testing laboratory accreditation. Disposal of any hazardous waste follows ISO 14001.

## Test & Evaluation

Services offered for battery cell, module, and pack include:

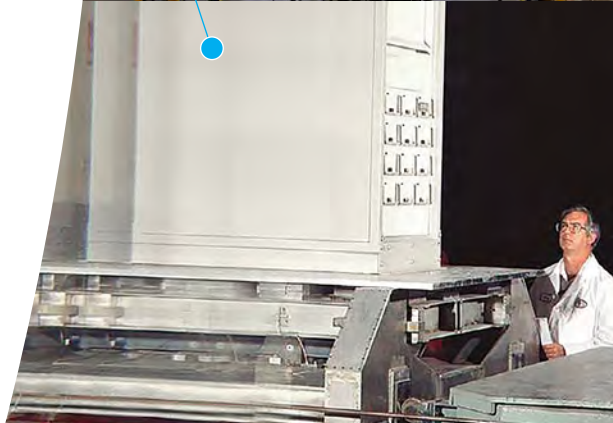
- Electrical testing
  - External short circuit
  - Overcharge and overdischarge up to 1200V + 1333 amps and 2000V + 1000 amps
  - Performance testing – 264 × cell-level, 21 × module-level, and 47 × pack-level cycler channels available, with various current ratings
  - Thermal chambers – 24 units ranging from 8 ft<sup>3</sup> to 64 ft<sup>3</sup>, with walk-in thermal chamber facilities
- Mechanical testing
  - Ballistics
  - Crush
  - Nail penetration
  - Vibration
  - Shock
  - Drop
  - Impact
  - Rotation
- Environmental testing
  - Extreme environmental conditions: -70°C to +175°C
  - Altitude simulation up to 32,000 m
  - Fire resistance and flammability
  - Corrosive atmospheres such as salt, fog and dust
- Thermal testing
  - Thermal stability
  - Overheating
- Additional services
  - Gaseous and particulate emissions measurement and characterization
  - Nondestructive and destructive post-test analysis
  - Teardown analysis



Module and pack mechanical abuse testing



Battery pack high-voltage power cyclers



## ESTC Services

Multidisciplinary services offered by the SwRI Energy Storage Technology Center (ESTC) include:

- Battery safety testing and evaluation
- Battery performance and life testing and evaluation
- Test protocol development
- Fast charge algorithm development
- Lithium plating diagnostics and prognostics
- Battery post-mortem analysis
- Destructive physical analysis (DPA)
- Battery management system development and testing
- Chemistry and material analysis-related services
- Large system development for grid-scale storage
- Manufacturing system development
- Qualification testing
- System integration, design and consulting

## Safety Test Standards

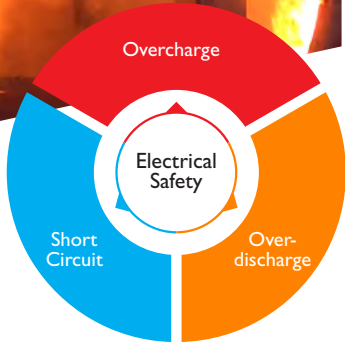
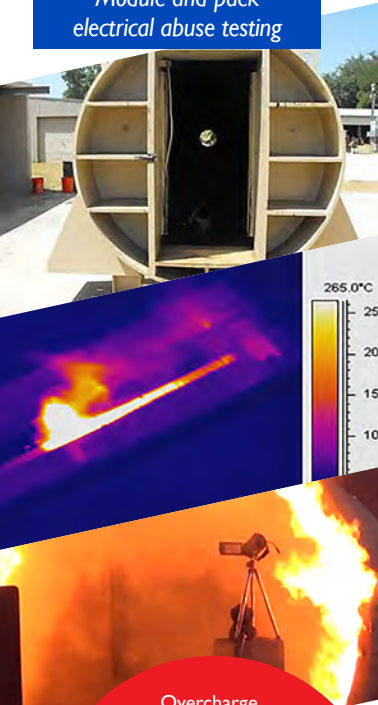
SwRI can conduct testing to a variety of custom or modified test standards procedures, including:

- UL 9540 / UL 9540a
- UL 2580
- UL 1973
- UL 1642
- SAE J2929
- SAE J2464
- UN ECE R100
- UN 38.3
- DO-311A
- NAVSEA S9310
- IEC-62660
- MIL-PRF-32565C GVSC Qualified Lab
- Others



SwRI is a qualified test house for the Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center (GVSC).

Module and pack electrical abuse testing



Environmental abuse testing



We welcome your inquiries.  
For more information, please contact:

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Powertrain Engineering Division



[battery.swri.org](http://battery.swri.org)

## SOUTHWEST RESEARCH INSTITUTE

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