



ENERGY STORAGE FIRE-SAFETY TESTING

An analysis of testing protocols surrounding UL 9540 & UL 9540A

What these tests portend for creating true customer safety in residential and commercial on-grid and off-grid systems

Test results prove that an ESS can be inherently safe, eliminating the risk of thermal runaway.

What is the UL 9540A Test Method?

- A series of tests involving forced thermal runaway, beginning at the cell level and progressing to the module level, unit level, and installation level
- There is no certification listing for UL 9540A Test Standard - Not Pass/Fail
- Helps manufacturers and system integrators evaluate the effects of a thermal event/thermal runaway, the potential for fire propagation, and/or explosion
- Evaluates and determine the inherent safety of the battery chemistry, form factor, manufacturing, design, and materials, as well as various safety mitigation strategies that may be employed



Developed in 2017



UL developed a methodology for conducting battery cell, module, unit & system fire tests



Evaluates thermal runaway, unmitigated propagation, fire and deflagration risk in Energy Storage Systems (ESS)

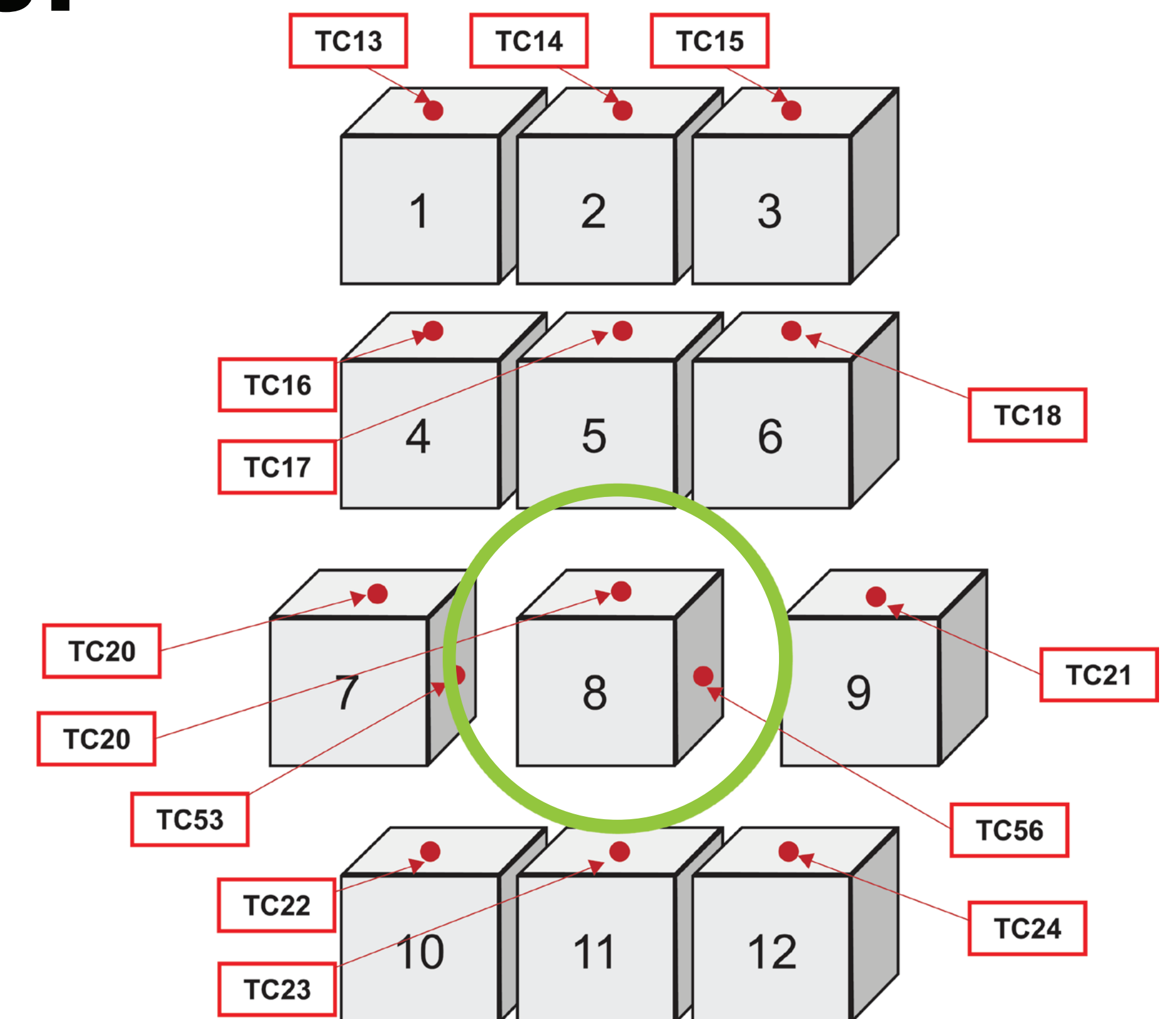


Data determines the relative safety of batteries - Sets potential requirements for protection of installations from thermal runaway events

How do results inform installation requirements?

- Informs ventilation requirements
- Proves protection effectiveness against thermal runaway propagation inherent to the battery chemistry, form factor, manufacturing materials, processes, and overall system
- Informs strategies and tactics that may need to be incorporated to eliminate propagation, fire, and explosion risk
- Informs system safety characteristics and sets a bar for performance comparison across manufacturers
- Encourages safety within the industry based on independent data generated by NRTL

93 total thermocouples used throughout the system



Real world use cases based on UL 9540A fire-safety testing:

These test results are used by Authorities Having Jurisdiction (AHJs), fire departments, code officials, and permitting agencies to ensure high safety in deploying energy storage systems.

Projects like these, supported by the NYC Governor's Office of Storm Recovery, would not be possible without these test results. We call on manufacturers to be more transparent and publish their test reports publicly.

