

**NAATBatt Conference
February 11, 2020**



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Exciting Time for the Battery Industry

UL History – Underwriters Laboratories

- Started with electrical grid 125 years ago
 - Appliances and all thing powered by electricity

Rebuilding Energy Infrastructure

- Batteries - energy storage is a critical component

Dynamic Situation

- New Technology
- New Applications
- New and revised Regulations
 - NFPA 70
 - NFPA 855



Exciting Time for the Battery Industry

Developments:

- Lilon (LFP, NMC) replacing lead acid batteries
 - Ground support vehicles
 - UPS
- Energy Storage
 - Grid
 - solar, wind, thermal, flywheel
 - peak shaving and other efficiencies
 - Microgrid

E-mobility

- Build out of EV Supercharger infrastructure

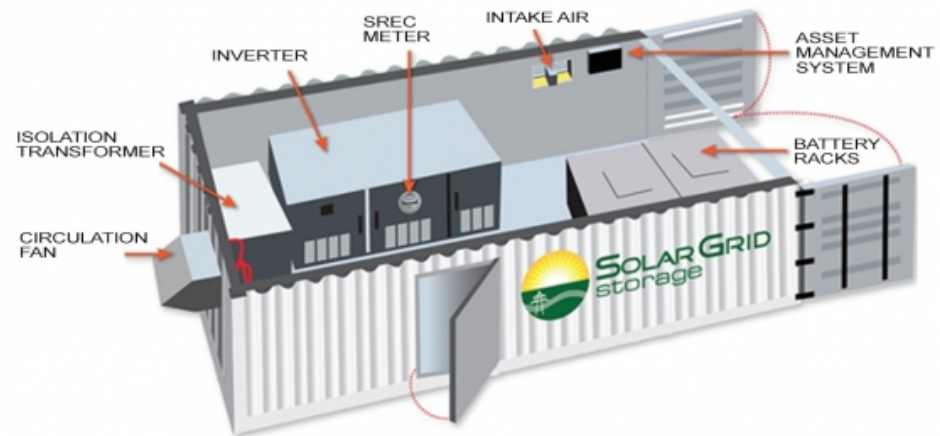


Product Construction & Functionality

UL9540 versus UL9540A

Energy Storage Systems consist of the following:

- Container – houses the unit and provides protection to the elements
- Energy source – gives energy to the remote location
- Controls – takes diagnostics on the system and corrects any parameters out of range to keep it functioning
- Inverter – changes the current from DC to AC (typically)
- HVAC system – keeps the system's temperature within the range it is allowed to operate in



Aspects of Certification

Construction

1. Electrical – will it cause a fire or shock hazard?
2. Enclosure/environmental – can it withstand the environment in which it will be placed? (client decision)
3. Utility interactions – is the connectivity with the grid acceptable?
4. Worker safety – will the people doing maintenance on the system be safe inside the enclosure?



Standards Related to Energy Storage and e-mobility

ESS and e-mobility	
<p>ESS and e-mobility</p> <ul style="list-style-type: none">UL1973UL1974UL2580UL9540UL9540A <p>Related battery and packs:</p> <ul style="list-style-type: none">UL1642UL2054 <p>EV Chargers:</p> <ul style="list-style-type: none">UL2202UL2594UL1236UL1310	<p>Inverters:</p> <ul style="list-style-type: none">UL458UL1741 <p>Drones:</p> <ul style="list-style-type: none">UL3030 <p>Microgrids:</p> <ul style="list-style-type: none">UL3001 <p>Solar:</p> <ul style="list-style-type: none">UI1703UL3703



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Thank You



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