



UL 9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

Unit Level Test Report
Model PHR1293-002A

Prepared by UL LLC for Samsung SDI
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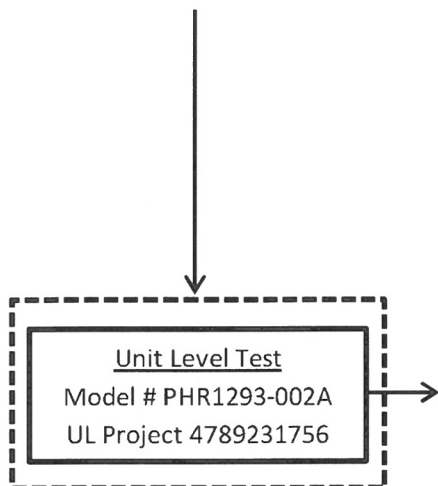
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Unit Design: 16 Modules(EM8091AE002A) per unit, 352S 1P, 1295.36 V , 35.2 kWh

Test Configuration:

- 350 mm between the unit and the front wall
- 80 mm between the unit and the side wall
- 0 mm to the target units

Thermal Runaway Propagation: No propagation was observed.

External Flaming: Flaming occurred and observed outside the unit enclosure (flaming of initiating cell vent gases and combustibles)

Locations of Flame Venting: Flaming occurred from the initiating module

Flying Debris: No flying debris observed

Re-ignitions: No re-ignitions

Maximum Target BESS Temperature: 212°C

Maximum Wall Surface Temperature: 26 °C

Gas Composition Pre-Flaming: CO₂ (Below the detectable limit), CO (Below the detectable limit), THC (68 L);

H₂ : Below the detectable limit

Gas Composition After Flaming: CO₂ (Below the detectable limit) CO (Below the detectable limit) THC (108 L);

H₂ : Below the detectable limit



Summary of UL 9540A Test Results

Module and Unit testing were conducted according to UL 9540A, 4th edition, revised on November 12th, 2019 and the cell level testing was conducted according to UL 9540A, 3rd Edition, revised on June 15, 2018

