UL 9540A Compliance and Installation Guidance for the Franklin Whole Home System

The purpose of this document is to demonstrate how the FranklinWH aPower 2[1] (Model: aPower X-20), the energy storage component of the FranklinWH System, fulfills the standardized testing approach and performance criteria specified in the 4th edition (2019) of UL 9540A and thereby allowed exceptions to otherwise restricted installation.

FranklinWH provides an AC-coupled home energy management and battery storage system compatible with grid-tied PV inverters. The aPower 2 employs the safer Lithium Iron Phosphate (LFP) cell chemistry from Tier 1 manufacturers, ensuring both safety and reliability. The system operates within a normal temperature range of -4° F to 131° F and incorporates superior thermal management for optimal system performance. Its design includes a low-voltage battery bus architecture, coupled with robust management systems for battery, energy conversion, energy safety, as well as cloud monitoring and control[2].

Key takeaways and installation guidance recommendations:

- FranklinWH has met the testing standards of UL 9540A (4th ed.) for residential use indoor and outdoor, wall- or ground-mounted ESS.
- The FranklinWH aPower 2 product passed the UL 9540A unit-level test. The surface and target unit temperatures were below the limits, and no ignition events were observed during and after the completion of the test. Explosion or deflagration hazards of vented gas were not observed.
- The FranklinWH batteries incorporates prismatic Lithium Iron Phosphate-based cell chemistry (LFP)
- The aPower 2 is suitable for indoor (non-habitable) and outdoor residential installations as defined in the 2021 IRC Section R328.4 and NFPA 2020 Chapter 15 (15.6). The aPower 2 shall not be installed in sleeping rooms, or closets or spaces opening directly into sleeping rooms.
- If a battery cell's temperature rises beyond the threshold, the battery management system disconnects the battery from the power electronics and commands it to shut off to prevent continued energy transfer to or from the battery.
- The internal wires are 24 AWG and Teflon coated to meet UL 1332 requirements. They have a 94V-0 flame retardant rating making them high-temperature, flame, corrosion, oil, strong acid and alkali, high pressure, and strong oxidizing agent resistant.

- Based on the test results, along with the standard FranklinWH installation guidance provided in the installation manual, a few additional recommendations include:
  - The aPower 2 qualifies for reduced indoor unit clearances (the exception from code mentioned 36" spacing requirements) to at least 4" for three aPower 2 units, as tested. (Code reference: NFPA 2020 15.5)
  - Automatic sprinkler systems or other methods of automatic fire suppression may not be required for the installation of aPower 2 units per compliance with the UL 9540A unit-level performance criteria. (Code reference: NFPA 2020 4.4.4.3)
  - Ventilation requirements may not be needed since the aPower 2 does not release any toxic gases during charging, discharging or normal use conditions (Code reference: NFPA 2020 15.11)
  - Use of fire cabinets can be excluded for indoor installations (Code reference: NFPA 2020 4.1.4.3)
  - Fire suppression or ventilation systems will not be required for outdoor installations. The aPower 2 is rated for both indoors and outdoors installations. Please refer to the installation guide for more information on installation locations.

Always consult with your local Authority Having Jurisdiction (AHJ), building/fire department and ensure each FranklinWH ESS is installed in compliance with local regulations and fire codes. Please note that installation guidance for lithium energy storage systems may vary from one AHJ to another. Additionally, some installations may require fire detection equipment to be installed alongside the battery, depending on the local AHJ's requirements. Our team is available to collaborate with local AHJs to ensure safety and compliance of FranklinWH installations, as these remain our top priorities.

For further inquiries or UL 9540A test-related information, please do not hesitate to contact the FranklinWH product team at engineering@franklinwh.com.

[1] aPower2 is a marketing name. Product model is aPower X-20 in the aPower family, following the Xyyy format, where "y" in the model name may be A-Z, 0-9, symbol "- " or blank. There is no technical difference between the models.

[2] This tech brief is based on the reports from UL 9540A testing performed by CSA International Certification Co., Ltd. Kunshan Branch (Project: 80226105, Master contract: 301950), UL 9540 (project: 80211057) by CSA Group and UL 1741 by CSA Group (also supplemental SA and SB, project: 80226105).