UL 9540A report summary of IQ Battery 5P

Model number: IQBATTERY-5P-1P-NA

SKU: B05-T02-US00-1-3 (Part No. 892-00024 Rev 93 and higher, 892-00045)

Contents

Result summary

Information in this document is based on reports as defined by ANSI/CAN/UL 9540A, 4th Edition, November 12, 2019. The products were evaluated by UL Solutions.

Test report	Date of issue	Date of revision
Cell-level	2023-02-08	2023-10-19
Module-level	2023-12-06	NA
Unit-level	2023-10-25	2023-12-06

UL Solutions file numbers

- North America: FTBW.E488100
- Canada: FTBW7.E488100

BESS intended installation

Enphase IQ Battery 5P (Model number: IQBATTERY-5P-1P-NA, SKU: B05-T02-US00-1-3) was evaluated by UL Solutions to Standard ANSI/CAN/UL 9540A for outdoor and indoor non-habitable[1] residential spaces.

- Indoor wall-mounted: Spaces including attached, detached, and open garages, which are well-ventilated and non-habitable.
- Outdoor wall-mounted: Spaces that are out of direct sunlight and where the ambient temperature and humidity are within -4°F to 113°F (-20°C to 45°C) and 5% to 95% RH, non-condensing.

Cell-level information

Cell-level information	
Chemistry of the test item	Lithium iron phosphate ($LiFePO_4$)
Was the cell certified?	Yes
Standard test item certified to	UL 1973
Organization that certified the test item	UL (BBGA2.MH62591)
Average cell surface temperature at gas venting under heater	331°F (166°C)
Average cell surface temperature at thermal runaway under heater	468°F (242°C)

[1] Habitable space is defined in the IRC as a space in a building for living, sleeping, eating, or cooking.
Non-habitable space is defined in the IRC as bathrooms, toilet rooms, closets, halls, storage or utility spaces, and similar areas.

Cell-level gas composition

Cell-level gas composition	Measured %
Carbon monoxide	6.9
Carbon dioxide	17.4
Hydrogen	60.9
Hydrocarbons	14.8
Total	**100**

Module-level information

Module-level information	
Ratings	62.4 Ah, 76.8 V
Module cell configuration	24S1P
Module weight (kgs)	35
Module enclosure material	Polycarbonate, SPCC steel sheet, and aluminum
Was the module certified?	Yes
Standard the module was certified to	UL 1973
Organization that certified the test item	UL, File MH62947

Gas composition and volume of each compound

Module-level information		
Gas compound	**Pre-flaming (L)**	**Flaming (L)**
Total hydrocarbons (Propane equivalent)	137.34	No flaming occurred
Carbon dioxide	Below detectable limit	No flaming occurred
Carbon monoxide	Below detectable limit	No flaming occurred
Hydrogen	63.38	No flaming occurred

Unit-level information

Unit testing: No external flaming or hazardous debris

- No external flaming or debris hazards were observed.
- No evidence of flying debris was found in the test room after the conclusion of the test.
- The initiating unit was covered with a single layer of cheesecloth used as an ignition indicator. The cheesecloth did not ignite, and no flame was observed.

No thermal runaway and re-ignitions post-test

No additional thermal runaway behavior or re-ignitions were observed during post-test observation, disassembly, and sample disposal.

No unit-to-unit or module-to-module propagation

Unit-to-unit propagation was not observed because the target unit's temperature did not reach or exceed the cell venting temperature. The target unit temperature was 26°C, far below the cell venting temperature. Therefore, unit-unit propagation is not possible.

Module-to-module propagation does not apply because only one module is within the initiating unit.

Unit-level testing summary

Unit level information	Description
Model number	IQBATTERY-5P-1P-NA (B05-T02-US00-1-3)
Rated AC input/output power, kVA	3.84
BESS module configuration	1P1S (single module in the unit)
BESS intended installation **Residential** Indoor: Wall-mounted and floor-mounted Outdoor: Wall-mounted and ground-mounted **Non-residential** Indoor: Wall-mounted, floor-mounted, rooftop, open garage Outdoor: Wall-mounted and ground-mounted	**Residential** A well-ventilated, non-habitable indoor location **Non-residential** An outdoor location that is out of direct sunlight and where the ambient temperature and humidity are within -4°F to 113°F (-20°C to 45°C) and 5% to 95% RH, non-condensing
Residential indoor use: minimum room size	3 m^3
Was the unit certified?	Yes
Standard the unit was certified to	UL 9540
Organization that certified the unit	UL File FTBW.E488100 and FTBW7.E488100
External flaming from BESS	No external flaming
Location(s) of flame venting	No external flaming
Heat flux measurement	A cheesecloth ignition indicator was used in accordance with CRD. No flaming or charring of the cheesecloth ignition indicator was observed.
Maximum target BESS temperature	79°F (26°C)
Maximum wall surface temperature	102°F (59°F rise above the ambient)
Flying debris	No flying debris
Re-ignition	No re-ignition

External surrounding temperatures

Surrounding temperature	Value
Maximum temperature to target	79°F (26°C)
Maximum wall temperature, absolute	102°F (59°F rise above the ambient)
Maximum wall temperature, delta (75°F ambient)	59°F (15°C)

Unit-level gas composition summary and minimum room size

Gas component	Gas type	During pre-flaming (L)	During flaming (L)
Total hydrocarbons (Propane equivalent)	Hydrocarbons	31.75 L	No flaming
Carbon dioxide	Carbon containing	Below detectable limits	No flaming
Carbon monoxide	Carbon containing	Below detectable limits	No flaming
Hydrogen	Hydrogen	Below detectable limits	No flaming
Minimum room size based on 25% LFL		3 m^3	

Minimum separation distances

The following figure shows spacings between the IQ Battery 5P units as evaluated in the UL 9540A report.

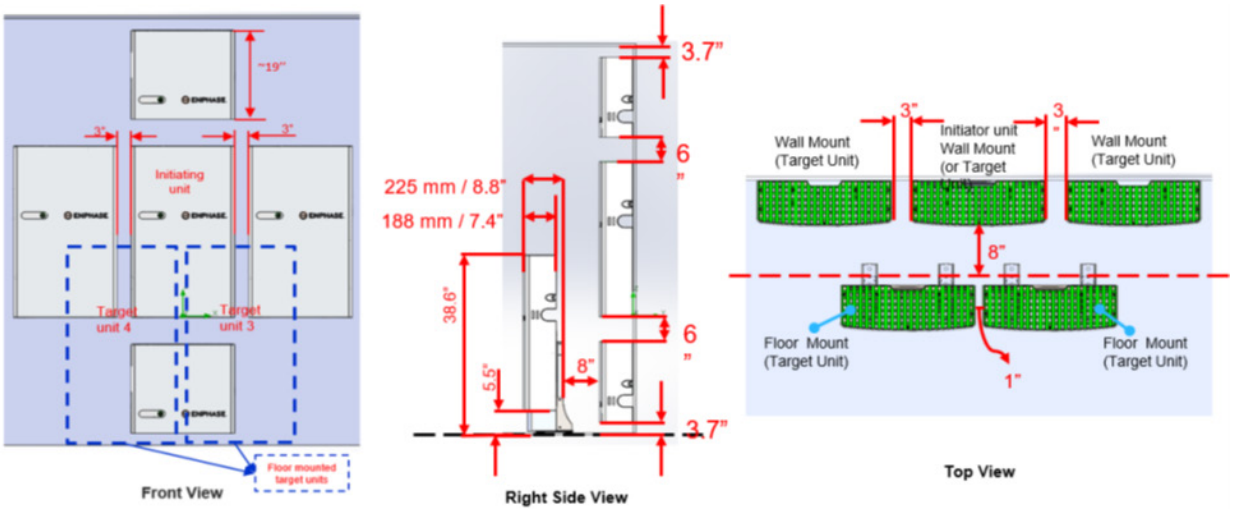

Figure 1: Spacings between the IQ Battery 5P units

The following figure shows the initiating unit in the middle covered with a cheesecloth. Target units are on the sides and floor-mounted in front of the initiating unit.

Figure 2: Initiating unit in the middle covered with cheesecloth together with the target units

Conclusion

The IQ Battery 5P product passed the UL 9540A unit-level test. The peak wall surface and target unit temperatures were below the limits, and no ignition events were observed during and after the completion of the test.

Revision history

Revision	Date	Description
TEB-00155-1.0	March 2024	Initial release.