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TEST REPORT

ANSI/CAN/UL 9540A:2019

Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems on Unit Level

Report Number.....	64.280[6:230b].60401.01
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Name of Testing Laboratory preparing the Report.....	TÜV SÜD New Energy Testing (Guangdong) Co., Ltd.
Applicant's name.....	Huawei Technologies Co., Ltd.
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, [5.1.2e] Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard.....	ANSI/CAN/UL 9540A:2019
Test procedure.....	Test report
Non-standard test method.....	N/A
Test Report Form No.....	ANSI/CAN/UL 9540A:2019 Rev 0
Test Report Form(s) Originator ....:	TUV SUD Product Service
Master TRF	Dated 2021-01-01

This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TUV SUD Product Service.

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Test item description ..... :	Rechargeable Lithium Ion Battery (Energy Storage Battery Rack)
Trade Mark..... :	HUAWEI
Manufacturer ..... :	Same as the applicant
Model/Type reference..... :	LUNA2000
Ratings..... :	1075.2Vd.c., 320Ah

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

Testing Laboratory..... :	TÜV SÜD New Energy Testing (Guangdong) Co., Ltd.	
Testing location/ address ..... :	North-1/F, 2/F & Unit 301-3/F, TÜV SÜD Testing Center, D[redacted] Road, Shilou Town, Panyu District, [redacted] China	
Tested by (name, function, signature)..... :	[redacted] (Project Handler)	
Approved by (name, function, signature)... :	[redacted] (Designated Reviewer)	

Summary of testing:

Summary of unit level testing:	
Unit model name	LUNA2000
Ratings	1075.2Vd.c., 320Ah
Whether UL 1973 compliant	No
Number of modules in the initiating BESS unit	See Attachment 1
The construction of the initiating BESS unit per 5.3	See Attachment 1
Fire protection features/detection/suppression systems within unit	No
Module voltage(s) corresponding to the tested SOC	See Table 1
The thermal runaway initiation method used	Heating the cell with externally applied flexible film heaters that cover two wider side surfaces of the cell
Location of the initiating module within the BESS unit	See Attachment 4
Diagram and dimensions of the test setup including mounting location of the initiating and target BESS units, and the locations of walls, ceilings, and soffits	See Attachment 4
Observation of any flaming outside the initiating BESS enclosure and the maximum flame extension	No flaming outside the initiating BESS enclosure
Chemical and convective heat release rate versus time data	See Attachment 8, 10

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Separation distances from the initiating BESS unit to target walls (e. g. distances A and C in Figure 9.1)	See Attachment 4
Separation distances from the initiating BESS unit to target BESS units (e.g. distances D and H in Figure 9.1);	Attachment 4
The maximum wall surface and target BESS temperatures achieved during the test and the location of the measuring thermocouple	See Table 3 and Attachment 4 and 6
The maximum ceiling or soffit surface temperatures achieved during the indoor or outdoor wall mounted test and the location of the measuring thermocouple	N/A
The maximum incident heat flux on target wall surfaces and target BESS units	0 kW/m²
The maximum incident heat flux on target ceiling or soffit surfaces achieved during the indoor or outdoor wall mounted test	N/A
Gas generation and composition data	See Table 2 and Attachment 7
Peak smoke release rate and total smoke release data	See Attachment 9, 10
Indication of the activation of integral fire protection systems and if activated the time into the test at which activation occurred	No integral fire protection systems
Observation of flying debris or explosive discharge of gases	No
Observation of re-ignition(s) from thermal runaway events	N/A (no fire during test)
Observation(s) of sparks, electrical arcs, or other electrical events	No
Observations of the damage to: 1) The initiating BESS unit; 2) Target BESS units; 3) Adjacent walls, ceilings, or soffits;	1) the initiating cell and another 2 cells thermal runaway in the initiating module; 2) No damage to neighbour modules; 3) No damage to adjacent walls, ceilings, or soffits; see Attachment 5
Performance at unit level testing:	
a) Flaming outside the initiating BESS unit is not observed;	No flaming during test
b) Surface temperatures of modules within the target BESS units adjacent to the initiating BESS unit do not exceed the temperature at which thermally initiated cell venting occurs, as determined in 7.3.1.8;	Yes. The maximum temperature of target modules adjacent to the initiating module is 138.5°C
c) For BESS units intended for installation in locations with combustible constructions, surface temperature measurements on wall surfaces do not exceed 97°C (175°F) of temperature rise above ambient per 9.2.15;	The maximum temperature of wall surface is 23.8°C
d) Explosion hazards are not observed, including deflagration, detonation or accumulation (to within the flammability limits in an amount that can cause a deflagration) of battery vent gases; and	Yes

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e) Heat flux in the center of the accessible means of egress[2)] shall not exceed 1.3 kW/m².	0 kW/m²
Performance - module level test: (please see module level report 64.280.20.60400.01 for more details)	
a) Thermal runaway is contained by module design; and	Yes
b) Cell vent gas is nonflammable as determined by the cell level test.	No
Performance - cell level test: (please see cell level repor	6:230b for more details)
a) Thermal runaway cannot be induced in the cell; and	No
b) The cell vent gas does not present a flammability hazard when mixed with any volume of air, as determined in accordance with ASTM E918 at both ambient and vent temperatures.	No

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Legenda toegepaste uitzonderingsgrondslagen

In dit document zijn gegevens definitief geanonimiseerd op grond van:

Wet	Artikel	Omschrijving	Pagina's
Wet open overheid	Art. 5.1 lid 2 sub e	De eerbiediging van de persoonlijke levenssfeer	1, 2
Burgerlijk wetboek 6	Art. 6:230b BW	Dit gegeven hoeft volgens art. 6:230b BW alleen verstrekt te worden aan de afnemer van de verleende diensten.	1, 2, 3, 4