

TEST REPORT

On Behalf of

Inti Photovoltaics S.L.

Lithium battery pack

**Model: ILFP-2560, ILFP-3072, ILFP-3840,
ILFP-5120, ILFP-512024, ILFP-1536**



Prepared For : Inti Photovoltaics S.L.
Calle Provenza 275, Barcelona, 08037, Spain

Prepared By : Beide (Shenzhen) Product Service Limited
6F, Bldg E, Hourui 3rd Ind Zone, Xixiang, Bao'an
Dist, Shenzhen, China

Date of Test : Jan. 25-Feb. 03, 2021
Date of Report : Feb. 03, 2021
Report Number : B-S210234901

Test Report IEC 62133-2 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems	
Testing laboratory	Beide (Shenzhen) Product Service Limited
Address	6F, Bldg E, Hourui 3rd Ind Zone, Xixiang, Bao'an Dist, Shenzhen, China
Report body.....	Beide (Shenzhen) Product Service Limited
Address.....	6F, Bldg E, Hourui 3rd Ind Zone, Xixiang, Bao'an Dist, Shenzhen, China
Applicant	Inti Photovoltaics S.L.
Address	Calle Provenza 275, Barcelona, 08037, Spain
Client No.....	0803B482
Standard	IEC 62133-2:2017
Test Result	Compliance with IEC 62133-2:2017
Procedure deviation	N.A.
Non-standard test method	N.A.
Type of test object	Lithium battery pack
Trademark	N.A.
Model/type reference	ILFP-3072
Rating	25.6VDC, 120AH
Manufacturer	Inti Photovoltaics S.L.
Address	Calle Provenza 275, Barcelona, 08037, Spain

General remarks

This report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item(s) tested.

"(see appended table)" refers to a table appended to the report.

"(see remark #)" refers to a remark appended to the report.

"(see Annex #)" refers to an annex appended to the report.

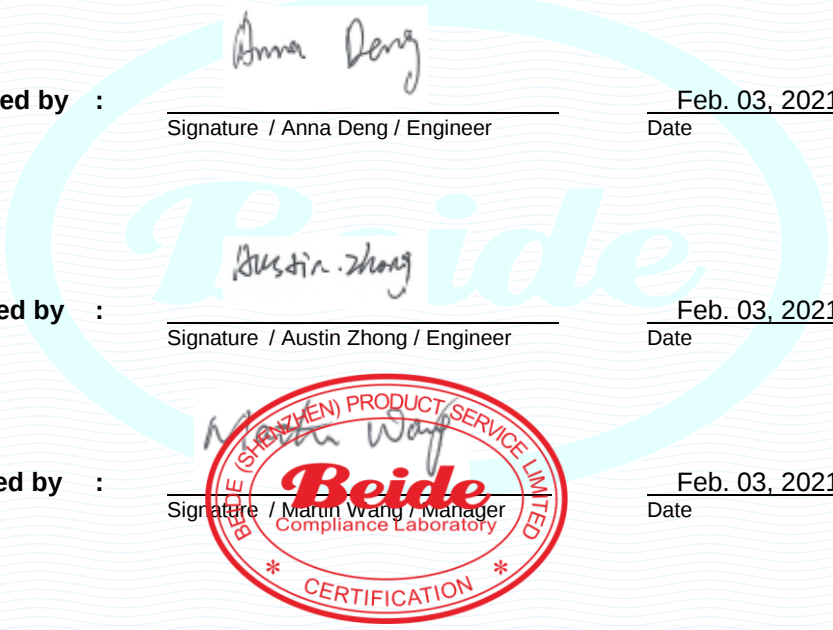
Throughout this report a comma (point) is used as the decimal separator.

Photo view:

(See appendix 1)

Copy of marking plate:

(See appendix 2)

Possible test case verdicts :	
test case does not apply to the test object	: N(.A.)
test object does meet the requirement	: P(ass)
test object does not meet the requirement	: F(ail)
Name and address of the testing laboratory: Beide (Shenzhen) Product Service Limited 6F, Bldg E, Hourui 3rd Ind Zone, Xixiang, <u>Bao'An Dist, Shenzhen, China</u>	
	
Reported by : <u>Anna Deng</u> Signature / Anna Deng / Engineer	<u>Feb. 03, 2021</u> Date
Checked by : <u>Austin Zhong</u> Signature / Austin Zhong / Engineer	<u>Feb. 03, 2021</u> Date
Approved by : <u>Marin Wang</u> Signature / Marin Wang / Manager	<u>Feb. 03, 2021</u> Date

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
5	General safety considerations		P
5.1	General		--
5.2	Insulation and wiring		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery excluding electrical contact surfaces shall be not less than 5 MΩ at 500 V DC when measured 60 s after applying the voltage.	Terminal and surfaces >5 MΩ	P
5.3	Venting		P
	Battery cases and cells shall incorporate a pressure relief mechanism or shall be so constructed that they will relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition. If encapsulation is used to support cells within an outer case, the type of encapsulant and the method of encapsulation shall neither cause the battery to overheat during normal operation nor inhibit pressure relief.		P
5.4	Temperature, voltage and current management		P
	The design of batteries shall be such that abnormal temperature-rise conditions are prevented. Batteries shall be designed to be within temperature, voltage and current limits as specified by the cell manufacturer. Batteries shall be provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified.		P
5.5	Terminal contacts		P
	The size and shape of the terminal contacts shall ensure that they can carry the maximum anticipated current. External terminal contact surfaces shall be formed from conductive materials with good mechanical strength and corrosion resistance. Terminal contacts shall be arranged so as to minimize the risk of short-circuit.		P
5.6	Assembly of cells into batteries		N
5.6.1	General		--
5.6.2	Design recommendation		N

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
5.6.3	Mechanical protection for cells and components of batteries		N
5.7	Quality plan		N
5.8	Battery safety components		N

6	Type test and sample size		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old. The internal resistance of coin cells shall be measured in accordance with Annex D. Coin cells with internal resistance less than or equal to 3 Ω shall be tested in accordance with Table 1. Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C $\pm$ 5 °C.		P

7	Specific requirements and tests		P
7.1	Charging procedures for test purposes		P
7.1.1	First procedure		P
7.1.2	Second procedure		P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)		N
	a) Requirement A continuous charge at constant voltage shall not cause leakage, fire or explosion. b) Test Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer. c) Acceptance criteria No fire, no explosion, no leakage.		N
7.2.2	Case stress at high ambient temperature (battery)		P
	a) Requirement Internal components of batteries shall not be	After test, no physical distortion of the battery case resulting in exposure of internal protective	P

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
	exposed during use at high temperature. This requirement only applies to batteries with a moulded case. b) Test Fully charged batteries, according to the first procedure in 7.1.1, are exposed to a moderately high temperature to evaluate case integrity. The battery is placed in an air circulating oven at a temperature of $70\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. The batteries remain in the oven for 7 h, after which they are removed and allowed to return to room temperature. c) Acceptance criteria No physical distortion of the battery case resulting in exposure of internal protective components and cells.	components and cells.	
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)		N
	a) Requirements Short-circuiting of the positive and negative terminals of the cell at high temperature shall not cause fire or explosion. b) Test Fully charge each cell according to the second procedure in 7.1.2. Store in an ambient temperature of $55\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. After stabilization for 1 h to 4 h and while still in an ambient temperature of $55\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, the cell is short-circuited by connecting the positive and negative terminals with a total external resistance of $80\text{ m}\Omega \pm 20\text{ m}\Omega$. The cell remains on test for 24 h or until the surface temperature declines by 20 % of the maximum temperature rise, whichever is the sooner. c) Acceptance criteria No fire, no explosion.		N
7.3.2	External short-circuit (battery)		P
	a) Requirements Short-circuiting of the positive and negative terminals of the battery shall not cause fire or explosion.	After test, no fire, no explosion.	P

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
	b) Test A fully charged battery according to the procedure in 7.1.1 is stored in an ambient temperature of 20 °C ± 5 °C. The battery is then short-circuited by connecting the positive and negative terminals with a total external resistance of 80 mΩ ± 20 mΩ. The battery remains on test for 24 h or until the case temperature of battery declines by 20 % of the maximum temperature rise, whichever is the sooner. However, in case of a rapid decline in the short-circuit current, the battery should remain on test for an additional one hour after the current reaches a low end steady state condition. This typically refers to a condition where the per cell voltage (series cells only) of the battery is below 0,8 V and is decreasing by less than 0,1 V in a 30-min period. A single fault in the discharge protection circuit should be conducted on one to four (depending upon the protection circuit) of the five samples before conducting the shortcircuit test. A single fault applies to protective component parts such as MOSFET (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor. c) Acceptance criteria No fire, no explosion.		
7.3.3	Free fall		P
	a) Requirements Dropping a cell or battery (for example, from a bench top) shall not cause fire or explosion. b) Test Free fall test is conducted at an ambient temperature of 20 °C ± 5 °C, by using cells or batteries that are charged to a fully charged state, in accordance with the first procedure in 7.1.1. Each cell or battery is dropped three times from a height of 1,0 m onto a flat concrete floor or metal floor. The cells or batteries are dropped so as to obtain impacts in random orientations. After the test, the cell or battery shall be put on rest for a minimum of 1 h and then a visual inspection shall be performed. c) Acceptance criteria No fire, no explosion.	After test, No fire, no explosion, no leakage.	P

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
7.3.4	Thermal abuse (cells)		N
	a) Requirements An extremely high temperature shall not cause fire or explosion. b) Test Each fully charged cell, according to the second procedure in 7.1.2, is placed in a gravity or circulating air-convection oven, in an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, for 1 h. The oven temperature is raised at a rate of $5\text{ }^{\circ}\text{C}/\text{min} \pm 2\text{ }^{\circ}\text{C}/\text{min}$ to a temperature of $130\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. The cell remains at this temperature for 30 min before the test is terminated. c) Acceptance criteria No fire, no explosion.		N
7.3.5	Crush (cells)		N
	a) Requirements Severe crushing of a cell shall not cause fire or explosion. b) Test Each fully charged cell, charged according to the second procedure at the upper limit charging temperature in 7.1.2, is immediately transferred and crushed between two flat surfaces in an ambient temperature. The force for the crushing is applied by a device exerting a force of $13\text{ kN} \pm 0,78\text{ kN}$. Once the maximum force has been applied, or an abrupt voltage drop of one-third of the original voltage has been obtained, the force is released. A cylindrical or prismatic cell is crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus. Test only the wide side of prismatic cells. A coin cell shall be crushed by applying the force on its flat surface. c) Acceptance criteria No fire, no explosion.		N
7.3.6	Over-charging of battery		P
	a) Requirements Charging for longer periods than specified by the manufacturer shall not cause fire or explosion.	After test ,No fire, no explosion	P

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
	b) Test The test shall be carried out in an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. Each test battery shall be discharged at a constant current of $0,2\text{ It}$ A, to a final discharge voltage specified by the manufacturer. Sample batteries shall then be charged at a constant current of $2,0\text{ It}$ A, using a supply voltage which is: • 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed $6,0\text{ V}$) for single cell/cell block batteries or • 1,2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and • sufficient to maintain a current of $2,0\text{ It}$ A throughout the duration of the test or until the supply voltage is reached. A thermocouple shall be attached to each test battery. For batteries with a case, the temperature shall be measured on the battery case. The test shall be continued until the temperature of the outer case reaches steady state conditions (less than $10\text{ }^{\circ}\text{C}$ change in a 30-min period) or returns to ambient. c) Acceptance criteria No fire, no explosion.		
7.3.7	Forced discharge (cells)		N
	a) Requirements A cell shall withstand polarity reversal without causing fire or explosion. A protective device in a battery or system can be adopted. b) Test Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer. The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage. The total duration for the forced discharge testing is 90 min. c) Acceptance criteria No fire, no explosion.		N
7.3.8	Mechanical tests (batteries)		P
7.3.8.1	Vibration		P

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
	a) Requirements Vibration encountered during transportation and use shall not cause leakage, fire or explosion. b) Test Test batteries, fully charged in accordance with the charging procedure of 7.1.1, shall be firmly secured to the platform of the vibration machine without distorting them in such a manner as to faithfully transmit the vibration. Test batteries shall be subjected to sinusoidal vibration according to Table 3. This cycle shall be repeated 12 times for a total of approximately 3 h for each of three mutually perpendicular mounting positions. One of the directions shall be perpendicular to the terminal face. c) Acceptance criteria No fire, no explosion, no rupture, no leakage or venting.	After test, no fire, no explosion, no rupture, no leakage or venting.	P
7.3.8.2	Mechanical shock		P
	a) Requirements Shock encountered during transportation and use shall not cause leakage, fire or explosion. This test simulates rough handling during transport and use. b) Test procedure Test batteries, fully charged in accordance with the charging procedure of 7.1.1, shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each test battery shall be subjected to three shocks in each direction of three mutually perpendicular mounting positions of the battery for a total of 18 shocks. For each shock, the parameters given in Table 4 shall be applied. c) Acceptance criteria There shall be no leakage, no venting, no rupture, no explosion and no fire during this test.	After test, no leakage, no venting, no rupture, no explosion and no fire during this test.	P
7.3.9	Design evaluation – Forced internal short-circuit (cells)		N
	a) Requirements A forced internal short-circuit test for cylindrical		N

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
	cells and prismatic cells shall not cause a fire. Cell manufacturers shall keep a record to meet the requirements. A new design evaluation shall be conducted by the cell manufacturer or a third party test house. b) Test The forced internal short-circuit test is performed in a chamber according to the following procedure. 1) Number of samples This test shall be carried out on five lithium ion cells per test temperature. 2) Charging procedure i) Conditioning charge and discharge The sample shall be charged at $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ according to the manufacturer's recommendation. The sample is then discharged at $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, at a constant current of 0,2 It A, down to the final voltage specified by the manufacturer. ii) Storage procedure The test cell shall be stored for 1 h to 4 h at an ambient temperature as specified in Table 5. iii) Ambient temperature c) Acceptance criteria No fire. Record the force when an internal short-circuit occurs if there was no fire.		

8	Information for safety		P
8.1	General		--
8.2	Small cell and battery safety information		P

9	Marking		P
9.1	Cell marking		N
	Cells shall be marked as specified in IEC 61960, except coin cells. Coin cells whose external surface area is too small to accommodate the markings on the cells shall show the designation		N

IEC 62133-2			
Clause	Requirement – Test	Result - Remark	Verdict
	and polarity.		
9.2	Battery marking		P
	Batteries shall be marked as specified in IEC 61960, except for coin batteries. Coin batteries whose external surface area is too small to accommodate the markings on the batteries shall show the designation and polarity. Batteries shall also be marked with an appropriate caution statement.		P
9.3	Caution for ingestion of small cells and batteries		P
	Coin cells and batteries identified as small batteries according to 8.2 shall include a caution statement regarding the hazards of ingestion in accordance with 8.2.		P
9.4	Other information		P
	The following information shall be marked on or supplied with the battery: • storage and disposal instructions; • recommended charging instructions.		P
10	Packaging and transport		P

Appendix 1
Photo-Document of EUT

Photo 1

View:



Photo 2

View:



Appendix 2
Product Marking of EUT

Lithium battery pack

Model: ILFP-3072

Rating: 25.6VDC, 120AH

Inti Photovoltaics S.L.

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