Safety certification

2026 April

Safety certification

- UN 38.3 for maintaining the safety of the Lithium Ion Battery during shipping ⇒ Certified
- IEC62133 for the standard safety testing ⇒ Certified

	Test items	Test contents	Criteria	Results
UN 38.3 【Transportation Safety Certification】	Reduced Pressure	Simulate low pressure condition during air transportation	No damage Open Circuit Voltage (OCV) to be more than 90% of initial value	OK
	Temperature	Simulate extreme temperature change	No damage Open Circuit Voltage (OCV) to be more than 90% of initial value	OK
	Vibration	Simulate vibration during transport	No damage Open Circuit Voltage (OCV) to be more than 90% of initial value	OK
	Impact	Simulate impact during transport	No damage Open Circuit Voltage (OCV) to be more than 90% of initial value	OK
	External short-circuit	Test for external short circuit	Not to exceed 170°C No damage during or 6 hours after the testing	OK
	Crush	Simulate collision with heavy item	Not to exceed 170°C No damage during or 6 hours after the testing	OK
	Forced discharge	Simulate forced discharge condition	No damage during or after 7 days of testing	OK

	Test items	Test contents	Criteria	Results
IEC 62133 【International Safety Standards】	Constant voltage charging	Constant charging with design value for 28 consecutive days to confirm abnormality, ex. Fire etc.	No rupture or ignition	OK
	External short-circuit	Check for possible ignition with external short circuit under 100mΩ	No rupture or ignition	OK
	Free fall	Drop from height of 1m	No rupture or ignition	OK
	Heating	Check for possible ignition after 10 min. heating at 130℃	No rupture or ignition	OK
	Impact	Check for possible ignition with the impact of peak acceleration rate of 175g	No rupture or ignition	OK
	Forced discharge	Check for possible ignition after charging at 1C for 90 minutes (forced discharge condition)	No rupture or ignition	OK

Safety of EnerCera is confirmed.

※This data is for reference only and is not guaranteed by the Company.

Safety bullying test items and results_EnerCera Pouch

	Expected usage	What to expect	Test items	Test contents	Pass/Fail Judgment	progress
Electrical factors	Simulate charging due to miscontrol when charging externally	Ignition, explosion	**Overcharge**	Charging at 30mA at 60℃	No ignition or explosion	**Passed : No fire**
	Simulate leaving with external circuits formed Simulate charging due to built-in mistake (positive/negative electrode reverse) Simulate discharging due to charging by control error	Rupture due to gas generation, Electrolyte scattering	**Overdischarge**	Discharging at 30mA at 60℃	No rupture or liquid scattering	**Passed : No fire**
	Simulate external circuit (low resistance) formed	Ignition, explosion	**External short-circuit**	Cell voltage 4.3V, Temperature: 60℃ Connect the terminals to each other	No ignition or explosion	**Passed : No fire**
	Simulate internal short circuit by Li electrolytic precipitation (low temperature, high rate and large ⊿Soc)	Ignition and explosion due to internal shorts	**Charge/discharge cycle → internal short circuit**	Continue the charge-discharge cycle at 30mA at -20℃	No ignition or explosion	**Passed : No fire**
	When external charging, large voltage application is assumed due to control error	Ignition, explosion	**Overvoltage**	Apply to 24V and continue charging at 60℃	No ignition or explosion	**Passed : No fire**
Mechanical factors	Foreign matter is assumed to penetrate	Ignition, explosion	**Nail penetration**	Nail penetration Cell voltage: 4.15V, Temperature: 60℃	No ignition or explosion	**Passed : No fire**
	Trampling, stepping on with high heels, etc., assuming destruction in garbage trucks	Ignition, explosion	**Crush**	Collapse in the thickness direction Cell voltage: 4.3V, Temperature: 60℃	No ignition or explosion	**Passed : No fire**
	Simulate falling of item on battery Simulate falling of heavy item on item on battery	Ignition, explosion	**Impact**	Iron 9.6 kg weight is dropped from a height of 100 mm. Cell voltage: 4.3V, Temperature: room temperature	No ignition or explosion	**Passed : No fire**
	Simulate folding	Ignition, explosion	**Folding**	Folding Cell voltage: 4.3V, Temperature: 60℃	No ignition or explosion	**Passed : No fire**
	Simulate cutting with scissors, etc.	Ignition, explosion	**Cutting**	Voltage: 4.3V, Temperature: 60°C	No ignition or explosion	**Passed : No fire**
Environmental factors	Simulate airplane boarding Simulate use in low-pressure environments	Leaks, explosion	**Under reduced pressure**	0.6 kPa or less 12 Hr or more	No leakage or explosion	**Passed : No fire (UN Tested)**
	Simulate submerged seawater, bath, washroom, hand washing, toilet	Ignition, explosion	**Immersion in water**	Immerse in 3.5wt.%NaCl solution at 4.3V and pulled out of the solution and kept at 3.0V	No ignition or explosion	**Passed : No fire**
	Simulate submerged in hot water and oil	Ignition, explosion	**Hot oil**	Put in heated oil at 4.3V	No ignition or explosion	**Passed : No fire**
	Simulate heating with kotatsu, heater or stove	Ignition, explosion	**Heating**	Heating on a hot plate . Cell voltage:4.15V （Confirm by increasing the temperature gradually）	No ignition or explosion	**Passed : No fire**
	Simulate thermal shock	Ignition, explosion	**Thermal shock**	-20℃ ⇔ 50℃ ×30cycle (Each temperature held for 10 min.） Cell voltage 4.15V	No ignition or explosion	**Passed : No fire**
	Simulate a flame on a stove, burner, etc.	explosion	**Burning**	Put in a flame. Cell voltage:4.3V	No explosions or scattering	**Passed : No fire**
	Simulate heating in a microwave	Ignition, explosion	**Microwave heating**	Heating in a microwave . Cell voltage:4.3V	No explosions	**Passed : No fire**

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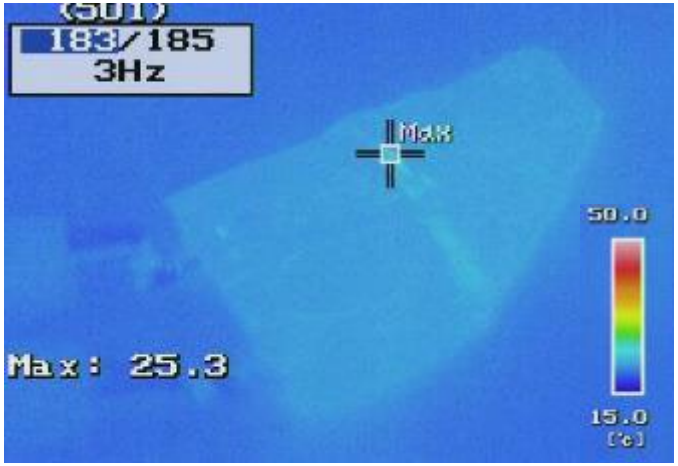
Safety of EnerCera Pouch

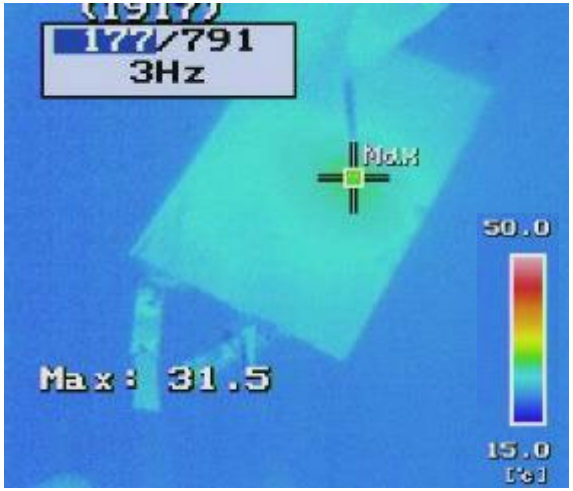
Examples for Abuse Tests

■ Folding Test



Almost no temperature rise

■ Penetration Test



Temperature rise approx. 6°C

(Without ignition)

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Safety bullying test items and results _EnerCera Coin

■ Possible accidents and corresponding test items

	Expected usage	What to expect	Test items	Test contents	Pass/Fail Judgment	progress
Electrical factors	Assumed to continue charging due to miscontrol when charging externally	Ignition, explosion	Overcharge	Temperature: Continue charging at 100mA in an 85°C environment until an event is confirmed	No ignition or explosion	Passed : No fire
	Assume leaving with external circuits formed Assumed to continue discharging due to charging control error	Rupture due to gas generation, Electrolyte scattering	Overdischarge	Temperature: Continue to discharge at 50mA in an environment of 85°C until the event is confirmed	No rupture or liquid scattering	Passed : No fire
	Assuming that an external circuit (low resistance) has been formed	Ignition, explosion	External short-circuit	Voltage: 2.7V, Temperature: Connecting poles with conductors in an environment of 85°C	No ignition or explosion	Passed : No fire
	When external charging, large voltage application is assumed due to control error	Ignition, explosion	Overvoltage	Temperature: Apply to 24V in an environment of 85°C and continue charging until the event is confirmed	No ignition or explosion	Passed : No fire
Mechanical factors	Foreign matter is assumed to penetrate	Ignition, explosion	Nail biting	Voltage: 2.7V, Temperature: Nailing in 85°C environment	No ignition or explosion	Passed : No fire
	Trampling, stepping on with high heels, etc., assuming destruction in garbage trucks	Ignition, explosion	Crushing	Voltage: 2.7V, Temperature: under 85°C environment Thick direction crushing	No ignition or explosion	Passed : No fire
	Assuming objects fall on batteries Assumption of heavy objects falling with objects on top assuming you're hitting something	Ignition, explosion	Impact	Voltage: 2.7V, Temperature: Under room temperature environment Iron 9.1kg weight dropped from 610±25mm height	No ignition or explosion	Passed : No fire
Environmental factors	Assuming airplane boarding Intended for use in low-pressure environments	Leaks, explosions	Low pressure	Low pressure: 11.3 kPa or less 6Hr or more	No leakage or explosion	Passed : No fire
	Assuming heating with kotatsu, heater, or stove	Ignition, explosion	Heating	Voltage: Heating in hot plate at 2.7V (Check by raising the temperature step by step)	No ignition or explosion	Passed : No fire
	Assuming a low-temperature and high-temperature environment	Ignition, explosion	Thermal shock	Voltage: Put in thermal shock tank at 2.7V -40°C ⇔ 72°C × 10 cycles (temperature holding 6Hr)	No ignition or explosion	Passed : No fire
	Assume an open fire on a stove, burner, etc.	explosion	Fire broiling	Voltage: Put in flames at 2.7V	No explosions or scattering	Passed : No fire
	Assuming heating in a microwave oven	Ignition, explosion	Microwave heating	Voltage: Microwave at 2.7V	No explosions	Passed : No fire

Pass all items

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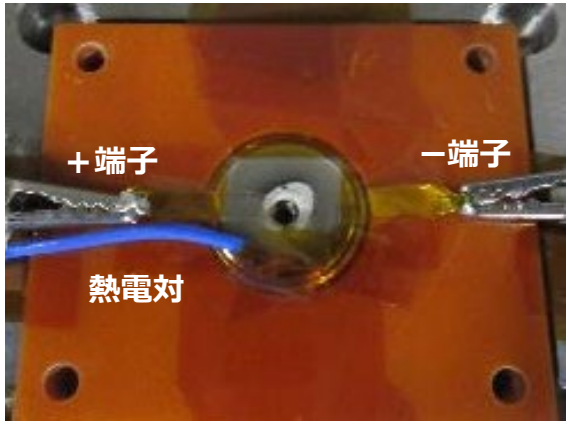
Safety of EnerCera Coin

■ Nail biting test

After the test

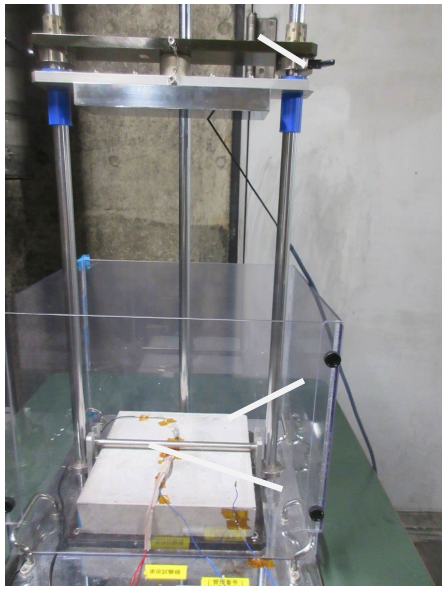


Fully charged, nailed in a high temperature environment of 85°C

⇒ Temperature rise is 1.3°C, no ignition

■ Impact test

During the test



After the test

Drop a weight of 9 Kg from a height of 60 cm with a stainless steel round bar on top※

⇒Temperature rise is 0.6°C, no ignition

※JIS C 8715-2

Industrial Lithium Secondary Battery Single Battery and Battery Systems: Safety Requirements

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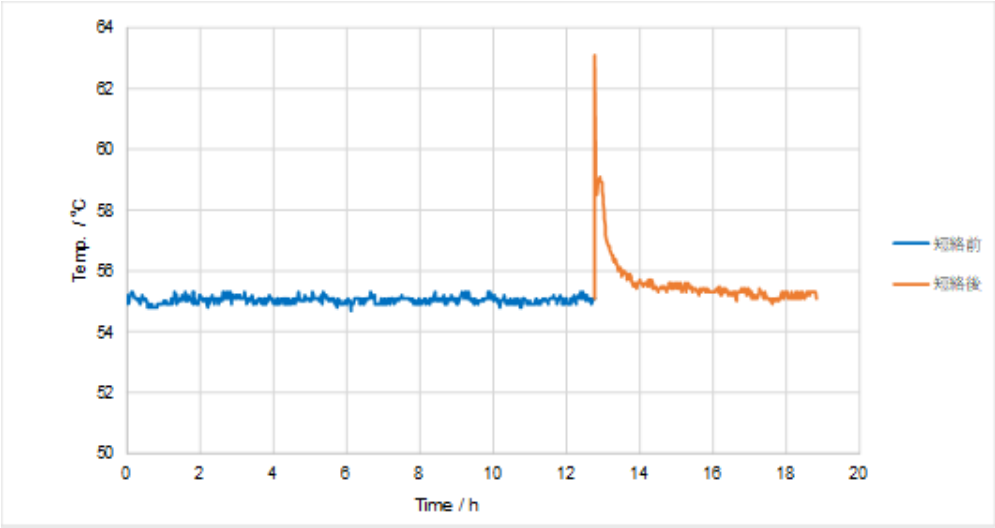
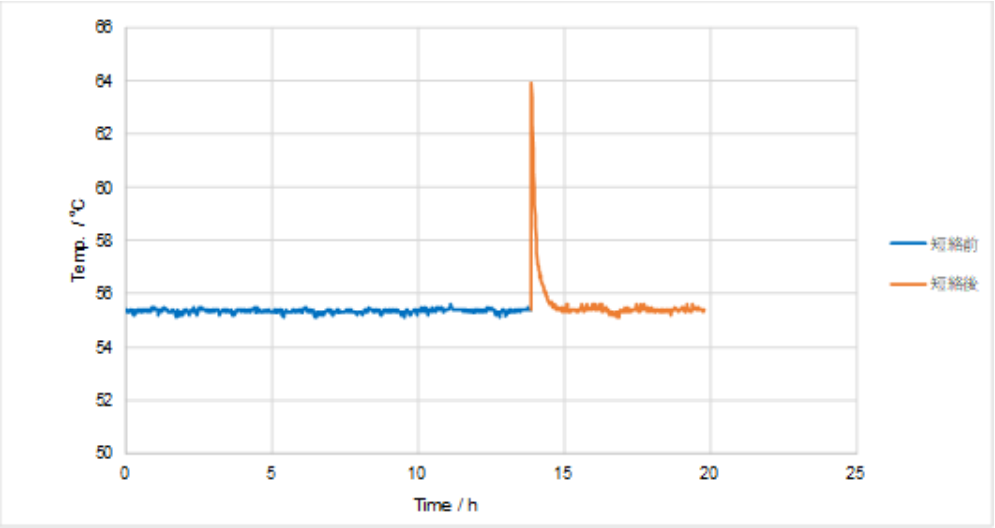
Example of safety test　External short-circuit

【Test condition】

Heat the battery to 57 ± 4°C and hold for at least 6 hours. Then the total external resistance is shorted to less than 0.1Ω, the short-circuit condition continues for more than 1 hour after the temperature returns to 57±4℃. (Sample is fully charged, after T1~T4 test)

Pouch	Coin
EC382704P-C*	ET1210C-H





Short circuit when fully charged at high temperature (55℃)

→Temperature rise is approximately 8℃, no ignition

*Although it is a discontinued number, the capacity, voltage, and energy are equivalent to the largest current number, EC382704P-T, so we assume that the current part number will not be a problem.

Short circuit when fully charged at high temperature (55℃)

→Temperature rise is approximately 9℃, no ignition

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