Safety Data Sheets (SDSs)

Product Name: Energy Storage Module

Commissioner: Huawei Digital Power Technologies Co., Ltd.

CVC Testing Technology Co., Ltd.

Safety Data Sheets (SDSs)

Name of Product	Energy Storage Module
Type/Mode	LUNA2000-7-E1 450V/600V 6.9kWh
Commissioned by	Huawei Digital Power Technologies Co., Ltd.
Commissioner address	Office 01, 39th Floor, Block A, Antuoshan Headquarters Towers, 33 Antuoshan 6th Road, Futian District, Shenzhen, 518043, P.R.C.
Supplier	Huizhou Sunwoda Energy Technology Co., Ltd.
Supplier address	"Jiweidu" (local name) section of Zhenxing Avenue, Lixi Economic Union, Yuanzhou Town, Boluo County，Huizhou City，Guangdong，P.R.China
Inspection according to	GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS, Rev.9)
Emergency telephone number	19978967533
Remarks	-
Seal of CVC Date of issue：2023-09-15	

Approved by: Huang Kun Reviewed by: Zhang Siyao Tested by: Zhang Jinzhen

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Identifier:

Product name: Energy Storage Module

Model: LUNA2000-7-E1

Other means of identification:

Synonyms: None

Relevant identified use of Product and uses advised against:

Recommended Use: The ESS supports three working modes: Max. self-consumption, TOU, and Fully fed to grid

Uses advised against: Don't disassemble, impact, crush, put into fire or water, don't use in high temperature environment.

Details of the Supplier of the safety data sheet:

Name: Huizhou Sunwoda Energy Technology Co., Ltd.

Address: "Jiweidu" (local name) section of Zhenxing Avenue, Lixi Economic Union, Yuanzhou Town, Boluo County，Huizhou City，Guangdong，P.R.China

Telephone: 19978967533

Fax: -

Postcode: 518129

E-mail address: zengyongqing@sunwoda.com

Emergency telephone number:

Company Emergency Phone Number: 19978967533

SECTION 2: HAZARDS IDENTIFICATION

Classification:

The watt-hour rate of the product is 6.9 kWh, it is belong to the class 9 dangerous goods.

The product is tested according to Section 38.3 of the Manual of Tests and Criteria, the test report number is: RZUN2023-4239

Other information

Caution! Avoid short circuit place in high temperature environment, put into water, or damage the shell.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical characterization: Mixtures

Description: Chemical power supply based on nonaqueous electrolyte. Composed by positive electrode, negative electrode, diaphragm, electrolyte and shell.

Hazardous ingredients:

Common Chemical Name	Chemical Formula	Concentration (%)	CAS No.	EC No.
Lithium iron phosphate	$LiFePO_4$	37	15365-14-7	604-917-2
Phosphatc(1-),hexafluoro,lithium	$LiPF_6$	3.2	21324-40-3	244-334-7
graphite	C	19.1	7782-42-5	231-955-3
Aluminum	Al	4.6	7429-90-5	231-072-3
Copper	Cu	7.5	7440-50-8	231-159-6
Polypropylene	$(C_3H_6)n$	4.8	9003-07-0	618-352-4

Note: N/A=Not apply.

SECTION 4: FIRST-AID MEASURES

First aid measures:

Eye Contact: Rinse thoroughly with plenty of water, also under the eyelids. If symptoms persist, call a physician.

Skin Contact: Remove contaminated clothing and shoes. Wash skin with soap and water. In the case of skin irritation or allergic reactions see a physician.

Inhalation: Move to fresh air. If symptoms persist, call a physician.

Ingestion: Do NOT induce vomiting. Drink plenty of water. If symptoms persist, call a physician.

Swallowing: Do not induce vomiting. Get medical attention.

Most Important Symptoms/Effects:

No information available.

Indication of any immediate medical attention and special treatment needed:

Inform physician. Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:

CO_2, dry chemical powder, wet sand, plenty of water (for cooling).

Unsuitable Extinguishing Media: No information available.

Protective Equipment and Precautions for Firefighters:

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. For example: Wear self-contained respiratory protective device. Wear suitable protective clothing and eye/face protection.

Special hazards arising from the substance or mixture:

Battery may burst and release hazardous decomposition products when exposed to a fire situation. Lithium batteries contain flammable ingredients that may vent, ignite and produce sparks when subjected to high temperature (>150℃), When damaged or abused (e.g. mechanical damage or electrical overcharging); may burn rapidly with flare-burning effect; may ignite other batteries in

close proximity.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:

Personal Precautions Avoid contact with eyes.

Refer to section 8 for personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.

Evacuate personnel to safe areas.

Environmental precautions:

Environmental PrecautionsRefer to protective measures listed in Sections 7 and 8.

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Dispose contaminated material as waste according to item 13.

Methods and material for containment and cleaning up:

Methods for Containment Prevent further leakage or spillage if safe to do so.

Methods for Cleaning up Use personal protective equipment. Dam up. Cover liquid spill with sand, earth or other Non-combustible absorbent material. Pick up and transfer to properly labeled containers. Clean contaminated surface thoroughly.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling:

Keep away from ignition sources， heat and flame. Such batteries must be packed in inner packages in such a manner as to effectively prevent short circuits and to prevent movement which could lead to short circuits. Avoid mechanical or electrical abuse.

More than a momentary short circuit will generally reduce the battery service life. Avoid reversing battery polarity within the battery assembly. In case of a battery unintentionally be crushed, rubber gloves must be used to handle all battery components. Avoid contact with eyes, skin. Avoid inhalation. No smoking at working site. Materials to Avoid: Strong oxidizing agents， Corrosives.

Conditions for safe storage, including any incompatibilities:

Store in a cool， well-ventilated area. Keep away from ignition sources， heat and flame. Such batteries must be packed in inner packages in such a manner as to effectively prevent short circuits and to prevent movement which could lead to short-circuits. Materials to Avoid: Strong oxidizing agents，Corrosives.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls:

Use ventilation equipment if available. Safety shower and eye bath.

Personal Protective Equipment:

Respiratory System: Not necessary under conditions of normal use.

Eyes: Not necessary under conditions of normal use.

Clothing: Wear appropriate protective clothing. ，

Hand: Safety gloves.

Other Protect:

No smoking，drinking and eating at working site. Wash thoroughly after handling.

SECTION 9: Physical and chemical properties

PhysicalState	Form: Irregular shape
	Color: White
	Odour: Odourless
	Odor Threshold: No information available

Change in condition:	
pH, with indication of the concentration	Not determined.
Melting point/freezing point	Not determined.
Initial boiling point and Boiling range:	Not determined.
Flash Point	Not determined.
Flammability (solid, gas)	Not determined.
Upper/lower flammability or explosive limits	Not determined.
Auto-ignition temperature	Product is not self-igniting.
Decomposition temperature	Not determined.
Other Information	No further relevant information available.

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Stable under recommended storage and handling conditions (see section 7).

Chemical stability: Stable under normal conditions of use, storage and transport.

Thermal decomposition/conditions to be avoided: No decomposition if used according to specifications.

Possibility of Hazardous Reactions: None under normal processing.

Hazardous Polymerization: Hazardous polymerization does not occur.

Conditions to avoid: Strong heating, fire, Incompatible materials.

Incompatible materials: Strong oxidizing agents. Strong acids.

Hazardous Decomposition Products: Carbon oxides, other irritating and toxic gases.

SECTION 11: TOXICOLOGICAL INFORMATION

Acute toxicity: No data available.

Skin corrosion/irritation: No irritant effect.

Serious eye damage/irritation: Cause serious eye irritation.

Respiratory or skin sensitization: No sensitizing effects known.

Specific target organ system toxicity: No information available.

Note: The internal battery materials may cause irritation to eyes and skin.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity: No further relevant information available.

Persistence and degradability: No further relevant information available.

Bioaccumulative potential: No further relevant information available.

Mobility in soil: No further relevant information available.

Results of PBT and vPvB assessment:

PBT: Not applicable.

vPvB: Not applicable.

Other adverse effects: No information available.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods:

Recommendation: Lithium batteries are best disposed of as a non-hazardous waste when fully or mostly discharged. Contact a licensed professional waste disposal service to dispose of large quantities materials.

Other disposal recommendations:

Recommendation: Disposal must be made according to official regulations.

SECTION 14: TRANSPORT INFORMATION

The product had been tested according to the requirements of the UN manual of tests and Criteria, Part III, subsection 38.3 (see section 2)

EmS No: F-A ,S-I

Marine pollutant: No

Environmental hazards: Not applicable.

Special precautions for user: Not applicable.

Proper Shipping name: Lithium ion batteries (Including lithium ion polymer batteries)

Hazard Class: Class 9

UN/ID Number: UN3480

Packaging instruction: P903

Maritime transport:

Label for conveyance: Class 9 lithium battery hazard label

The goods are complied with the requirements of Packing Instruction P903 of IMDG CODE (Amdt. 40-20) (2020 Edition)

Land transport:

Label for conveyance: Class 9 lithium battery hazard label

The goods are complied with the requirements of Packing Instruction P903 of Agreement concerning the International Carriage of Dangerous Goods by Road (ADR 2023)；The goods are complied with the requirements of Packing Instruction P903 of 《Recommendations on the TRANSPORT OF DANGEROUS GOODS Model Regulations》(Rev.22).

SECTION 15: REGULATORY INFORMATION

International Regulation:

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)

Recommendations on the TRANSPORT OF DANGEROUS GOODS Model Regulations

IATA Dangerous Goods Regulations（DGR）

INTERNATIONAL MARITIME DANGEROUS GOODS CODE（IMDG CODE）

EU Regulation:

Regulation (EU) 2020/878: Revised Requirements for EU Safety Data Sheets

EU regulation (EC) 1272/2008 on "Classification, Labeling and Packaging of Substances and Mixtures" (CLP)

Registration，Evaluation and Authorization of Chemicals（REACH）

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

US Regulation:

American National Standard for Hazardous Workplace Chemicals – Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation

US DOT， Code of Federal Regulations, Title 49, Transportation, PT. 100-185

SECTION 16: OTHER INFORMATION

This file is only effective to the batteries（LUNA2000-7-E1） provided by commissioner Huawei Digital Power Technologies Co., Ltd.. The commissioner provides the composition information of batteries, and promises its integrity and accuracy. Users should read this file carefully, and use the batteries in correct method. CVC Testing Technology Co., Ltd. (CVC) doesn't assume responsibility for any damage or loss because of misuse of batteries.

Important

1. The test report is invalid without the official seal of CVC.
2. Nobody is allowed to photocopy or partly photocopy this test report without written permission of CVC.
3. The test report is invalid without the signatures of Ratifier, Reviewer and Testing engineer.
4. The test report is invalid if altered,
5. Objections to the test report must be submitted to CVC within 15 days,
6. This report is valid for the samples provided by commissioner only.

**The test data and test results given in this test report should only be used for purposes of scientific research, teaching and internal quality control when the CMA symbol is not presented. **

Address: No.3, Tiantai 1st Road, Kaitai Avenue, Science City, Guangzhou, Guangdong, China.
Tel：020 32293888
FAX：020 32293889
Post Code：510663
E-mail： office@cvc.org.cn
http://www.cvc.org.cn

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中国认可
国际互认
检测
TESTING
CNAS L0095

No.: RZUN2023-4239

检 测 报 告
TEST REPORT

UN38.3

NAME OF SAMPLE: 产品名称：	Energy Storage Module 储能系统（内含锂离子蓄电池）
CLIENT: 委托单位：	Huawei Digital Power Technologies Co., Ltd. 华为数字能源技术有限公司
CLASSIFICATION OF TEST: 检测类别：	Commission Test 委托测试

威凯检测技术有限公司
CVC Testing Technology Co., Ltd.

检 测 报 告
TEST REPORT

Name of samples: Energy Storage Module 样品名称:储能系统（内含锂离子蓄电池）	Type/Model: 型号规格: LUNA2000-7-E1 450V/600V 6,9kWh
Color: White 样品颜色:白色	Physical shape: Irregular shape 样品形状：不规则形状
Commissioned by: Huawei Digital Power Technologies Co., Ltd. 委托单位: 华为数字能源技术有限公司	Commissioner address: Office 01, 39th Floor, Block A, Antuoshan Headquarters Towers, 33 Antuoshan 6th Road, Futian District, Shenzhen, 518043, P.R.C. 委托单位地址:深圳市福田区香蜜湖街道香安社区安托山六路 33 号安托山总部大厦 A 座研发 39 层 01 号
Manufacturer: Huawei Digital Power Technologies Co., Ltd. 制造商: 华为数字能源技术有限公司	Manufacturer address: Office 01, 39th Floor, Block A, Antuoshan Headquarters Towers, 33 Antuoshan 6th Road, Futian District, Shenzhen, 518043, P.R.C. 制造商地址: 深圳市福田区香蜜湖街道香安社区安托山六路 33 号安托山总部大厦 A 座研发 39 层 01 号
Factory: Huizhou Sunwoda Energy Technology Co., Ltd. 生产厂: 惠州市欣旺达能源科技有限公司	Factory address: "Jiweidu" (local name) section of Zhenxing Avenue, Lixi Economic Union, Yuanzhou Town, Boluo County，Huizhou City，Guangdong，P.R.China 生产厂地址: 博罗县园洲镇沥西经济联合社振兴大道“基围笃”（土名）地段
Classification of test: Commission Test 检测类别: 委托测试	Quantity of sample: 4 battery packs, 30 cells 样品数量: 4 个电池组, 30 个电芯
Tested according to: 测试标准：ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3	Sample identification: 样品标识序号:b1#~b4#, c1#~c30#
Receiving date: 接样日期：2023-06-19	Means of receiving: Submitted by commissioner 接样方式：委托单位送样
Completing date: 完成日期：2023-09-08	Test item: 8 items 测试项目：8 项

Test conclusion:
检测结论:

The Energy Storage Module submitted by Huawei Digital Power Technologies Co., Ltd. are tested according to Section 38.3 of the Seventh revised edition Amendment 1 of the Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3). The test items are full items. The test results comply with the relevant requirements of the standard.

由华为数字能源技术有限公司送检的储能系统（内含锂离子蓄电池），依据联合国《试验和标准手册》第七修订版修正 1 第 38.3 节进行检测，试验为全项目，试验结果符合标准相关要求。

Seal of CVC
CVC 盖章
Date of issue:
签发日期: 2023-09-15

Title: Manager
批准人职务： 经理

Approved by: Huang Kun Reviewed by: Zhang Siyao Tested by: Zhang Jinzhen

批 准： 审 核： 检 测：

Description and illustration of the sample:
样品说明及描述:

The sample's status is good / 样品状况良好。

The battery (LUNA2000-7-E1) is composed of cells (LF280K), and the connection mode is: 8S1P
电池组（LUNA2000-7-E1）由电芯（LF280K）组成，连接方式为：8S1P

Cell Dimensions/电芯尺寸: 72,0mm*172mm*204mm

Watt-hour rating of each battery/ 单个电池组的瓦时率: 6,9kWh

The specification parameter of the internal battery pack of the sample in this report is 25,6V 280Ah. Due to the internal boost circuit, the actual output energy is 6,9kWh.
本报告中样品内部电池组的规格参数为 25,6V 280Ah,由于内部升压电路原因，所以实际输出能量为 6,9kWh。

Test item 测试项目	Sample No. 样品编号	State 状态	Remark 备注
T.1~T.5	b1#~b2#	at first cycle, in fully charged states 第一个交替充电放电周期完全充电状态	-
	b3#~b4#	after 25 cycles ending in fully charged states 第 25 个交替充电放电周期完全充电状态	
T.6	c1#~c5#	at first cycle at 50% of the design rated capacity 第一个交替充电放电周期充电到设计额定容量的 50%	-
	c6#~c10#	after 25 cycles ending at 50% of the design rated capacity 第 25 个交替充电放电周期充电到设计额定容量的 50%	
T.7	b1#~b2#	at first cycle, in fully charged states 第一个交替充电放电周期完全充电状态	using undamaged samples previously used in tests T.1 to T.5 使用试验 T.1 至 T.5 未损坏的样品
	b3#~b4#	after 25 cycles ending in fully charged states 第 25 个交替充电放电周期完全充电状态	
T.8	c11#~c20#	at first cycle, in fully discharged states 第一个交替充电放电周期完全放电状态	-
	c21#~c30#	after 25 cycles ending in fully discharged states 第 25 个交替充电放电周期完全放电状态	-

The test objects of T.1~T.5 and T.7 are battery packs, and the sample numbers are b1#~b4#
T.1~T.5、T.7 的测试对象为电池组，样品编号为 b1#~b4#。

The test objects of T.6 and T.8 are component cells, and the sample numbers are c1#~c30#
T.6、T.8 的测试对象为组成电芯，样品编号为 c1#~c30#。

Description of the sampling procedure:
取样程序的说明:

/

Description of the deviation from the standard, if any:
测试结果不符合标准项的说明:

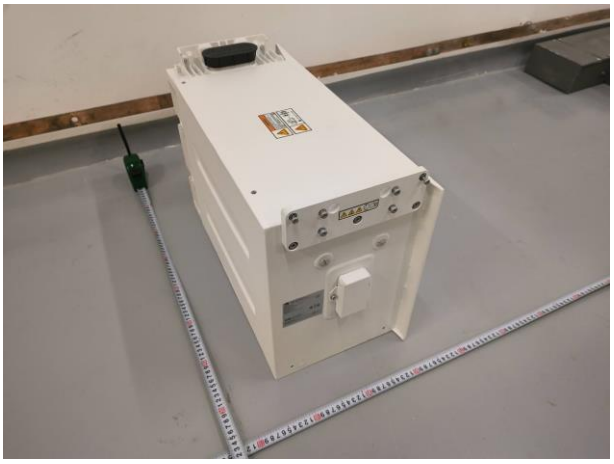
/

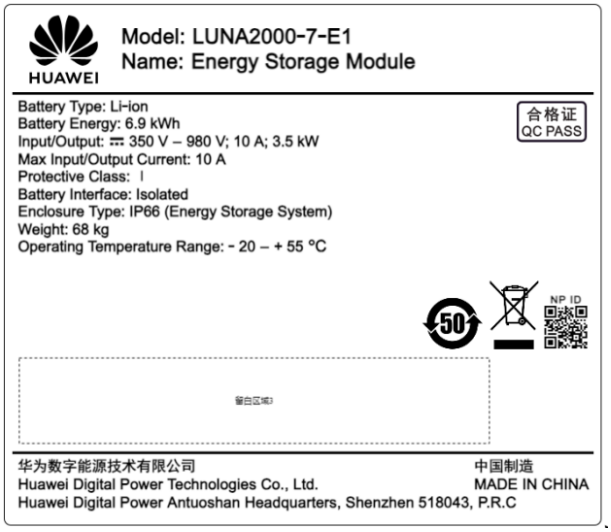
Remarks:
备注：

Throughout this report a comma is used as the decimal separator.
本报告中以逗号代替小数点。

Photos of Samples and Labels/样品照片及标识

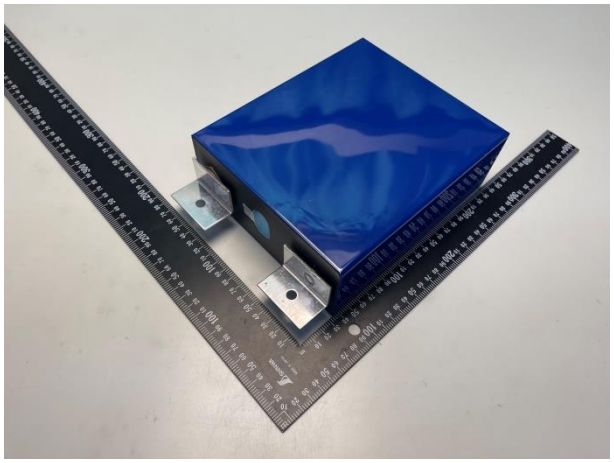
Battery/电池 （LUNA2000-7-E1 450V/600V 6,9kWh）

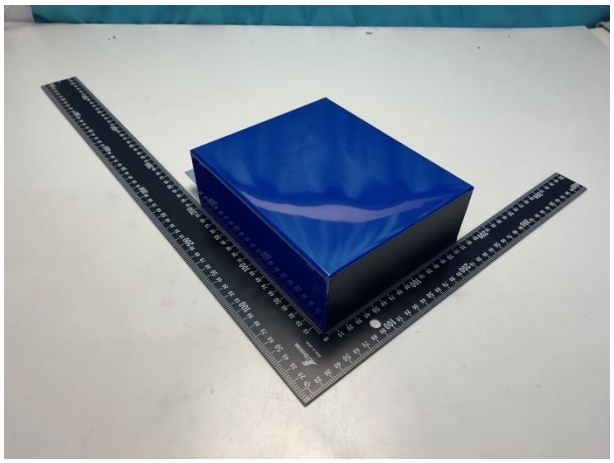


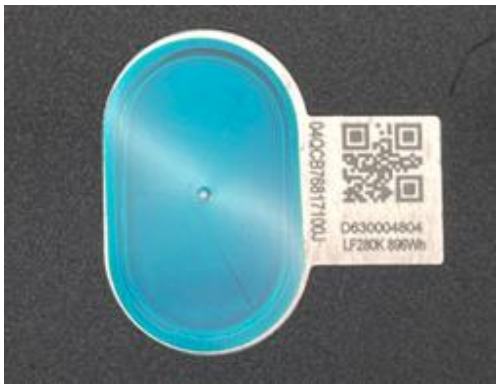


Photos of Samples and Labels/样品照片及标识

Component Cell/内部电芯（LF280K 3,2V 280Ah 896Wh ）







ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4	**Procedure/测试步骤**		—
38.3.4.1	**Test T.1: Altitude simulation/测试 1：高度模拟**		**P**
	Test cells and batteries shall be stored at a pressure of 11,6kPa or less for at least six hour at ambient temperature (20±5℃)/ 将电芯和电池在温度为 20±5℃，大气压力为不大于 11,6kpa 的环境中贮存不少于 6 个小时		
	Requirement/标准要求： 1 Cells and batteries Mass loss limit: ≤0,1% /样品质量损失≤0,1% 2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90％,此要求不适用于完全放完电的电池和电芯。 3 No leakage, no venting, no disassembly, no rupture and no fire 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生	The samples b1#~b4# : No leakage, no venting, no disassembly, no rupture and no fire/编号为 b1#~b4#的样品：无漏液、无排气、无解体、无破裂以及无着火现象 The data is shown in Table 1./数据见表 1	
38.3.4.2	**Test T.2: Thermal test/测试 2: 温度试验**		**P**
	Test cells and batteries are to be stored for/电池存储条件如下： 1 For small cells and batteries: one temperature cycle: 72±2℃(6h) —-40±2℃(6h) /对于小型电芯和电池：一次温度循环为 72±2℃(6h) —-40±2℃(6h) For large cells and batteries: one temperature cycle: 72±2℃(12h) —-40±2℃(12h) /对于大型电芯和电池：一次温度循环为 72±2℃(12h) —-40±2℃(12h) 2 The maximum time interval between test temperature extremes is 30 minutes/温度转换最大间隔时间为 30min 3 This procedure is to be repeated 10 times/重复 10 次循环 4 after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5℃)/循环结束后，电池在 20±5℃的条件下 搁置 24 小时		
	Requirements/标准要求 1 Cells and batteries Mass loss limit: ≤0,1% /样品质量损失≤0,1% 2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90％,此要求不适用于完全放完电的电池和电芯。 3 No leakage, no venting, no disassembly, no rupture and no fire 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生	The samples b1#~b4# : No leakage, no venting, no disassembly, no rupture and no fire/编号为 b1#~b4#的样品：无漏液、无排气、无解体、无破裂以及无着火现象 The data is shown in Table 1./数据见表 1	

ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.3	**Test T.3: Vibration/测试 3: 振动** 1 Cells and batteries are firmly secured to the platform of the vibration machine /电芯和电池牢固地安装在振动台（的台面）上 2 The vibration: a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes/振动以正弦波形式，以 7Hz 增加至 200Hz，然后在减少回到 7Hz 为一个循环，一个循环持续 15 分钟的对数前移传送。 3 For cells and small batteries: from 7 Hz a peak acceleration of 1gn is maintained until 18Hz is reached. The amplitude is then maintained at 0,8mm (1,6mm total excursion) and the frequency increased until a peak acceleration of $8g_n$ occurs (approximately 50Hz). A peak acceleration of $8g_n$ is then maintained until the frequency is increased to 200Hz. / 对于电芯和小型电池：从 7Hz 开始，以 $1g_n$ 的峰值加速度保持不变，直到达到 18Hz。然后将振幅保持在 0,8mm（总偏移 1,6mm）并且频率增加直到出现 $8g_n$ 的峰值加速度（大约 50Hz）。然后保持 $8g_n$ 的峰值加速度，直到频率增加到 200Hz。 For large batteries: from 7Hz a peak acceleration of $1g_n$ is maintained until 18Hz is reached. The amplitude is then maintained at 0,8mm (1,6mm total excursion) and the frequency increased until a peak acceleration of $2g_n$ occurs (approximately 25Hz). A peak acceleration of $2g_n$ is then maintained until the frequency is increased to 200Hz. / 对于大型电池：从 7Hz 开始，以 $1g_n$ 的峰值加速度保持不变，直到达到 18Hz。然后将振幅保持在 0,8mm（总偏移 1,6mm）并且频率增加直到出现 $2g_n$ 的峰值加速度（大约 25Hz）。然后保持 $2g_n$ 的峰值加速度，直到频率增加到 200Hz。 4 This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell. One of the directions of vibration must be perpendicular to the terminal face. /以振动的其中一个方向必须是垂直样品极性，对每个电芯从三个互相垂直的方向上循环 12 次，每个方向 3 个小时，共 9 小时。		**P**
	Requirements/标准要求 1 Cells and batteries Mass loss limit: ≤0,1% /样品质量损失≤0,1% 2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90%,此要求不适用于完全放完电的电池和电芯。 3 No leakage, no venting, no disassembly, no rupture and no fire 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生	The samples b1#~b4#: No leakage, no venting, no disassembly, no rupture and no fire/编号为 b1#~b4#的样品：无漏液、无排气、无解体、无破裂以及无着火现象 The data is shown in Table 1./数据见表 1	

ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.4	**Test T.4: Shock/测试 4: 冲击** 1 Test cells and batteries shall be secured to the testing machine/以稳固的托架固定住每个电芯和电池样品的全部配件表面。 2 Each cell shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Large cells may be subjected to a half-sine shock of peak acceleration of 50 gn and pulse duration of 11 milliseconds. / 对每个电芯以峰值为 150g_n 的半正弦的加速度撞击，脉冲持续 6 毫秒，大型电芯须经受最大加速度 50g_n 和脉冲持续时间 11 毫秒的半正弦波冲击。 Small batteries shall be subjected to a half-sine shock of peak acceleration of 150 g_n (or Acceleration(g_n)= $\sqrt{\left(\frac{100850}{mass}\right)}$, which is smaller) and pulse duration of 6 milliseconds, large batteries shall be subjected to a half-sine of peak acceleration of 50 g_n (or Acceleration(g_n)= $\sqrt{\left(\frac{30000}{mass}\right)}$, which is smaller) and pulse duration of 11 milliseconds/对每个电池以峰值为 150g_n（或与 $\sqrt{\left(\frac{100850}{mass}\right)}$ 中的较小值）的半正弦的加速度撞击，脉冲持续 6 毫秒，大型电池须经受最大加速度 50g_n（或与 $\sqrt{\left(\frac{30000}{mass}\right)}$ 中的较小值）和脉冲持续时间 11 毫秒的半正弦波冲击。 3 Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks/每个电池或电池组须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受 18 次冲击。		**P**
	Requirements/标准要求： 1 Cells and batteries Mass loss limit: ≤0,1% /样品质量损失≤0,1% 2 Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90％,此要求不适用于完全放完电的电池和电芯。 3 No leakage, no venting, no disassembly, no rupture and no fire 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生	The samples b1#~b4# : Acceleration= 20,8g_n No leakage, no venting, no disassembly, no rupture and no fire/编号为 b1#~b4#的样品： 峰值加速度= 20,8g_n 无漏液、无排气、无解体、无破裂以及无着火现象 The data is shown in Table 1./数据见表 1	

ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.5	**Test T.5: External Short Circuit/测试 5 外部短路**		**P**
	1The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57±4℃/保持试验环境温度稳定在 57±4℃，以使电芯或电池样品外表温度达到 57±4℃ 2 the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0,1 ohm at 57±4℃, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4℃, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value. /将样品正负极用小于 0,1Ω 的总电阻回路进行短路，样品的外表温度恢复到 57±4℃之后保持短路状态 1 小时以上；对于大电池，电池温度降低至最高温升值的一半时实验结束。 3 the cell or battery must be observed for a further six hour for the test to be concluded, /对电芯或电池必须进一步观察 6 个小时才能下结论。		
	Requirements/标准要求： During the test and within six hours after test ,the cells or batteries 在测试过程中以及之后 6 个小时内，电芯或电池样品 1. External temperature not exceed 170℃ 外表温度不超过 170℃ 2. No disassembly, no rupture and no fire. 无解体、无破裂和无着火现象发生。	The samples b1#~b4# ： no disassembly, no rupture and no fire/编号为 b1#~b4# 的样品：无解体、无破裂以及无着火现象 The data is shown in Table 1./数据见表 1	

ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
	Test T.6: Impact / Crush / 测试 6: 撞击/挤压		**P**
	Impact (applicable to cylindrical cells not less than 18mm in diameter) / 撞击（适用于直径不小于 18 毫米的圆柱形电池）		**N/A**
	1 This test sample cell or component cell is to be placed on a flat smooth surface/ 将试验样品用的电芯或聚合物电芯放在一个平坦光滑的平面上 2 A 15,8 mm diameter bar is to be placed across the centre of the sample, A 9,1kg mass is to be dropped from a height of 61±2,5cm onto the sample./将一直径为 15,8mm 的不锈钢圆棒横过电池中部放置后，将一质量为 9,1kg 的物体从 61±2,5cm 的高度落向样品。 3 The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15,8 mm ± 0,1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact./ 接受撞击的试样，纵轴应与平坦的表面平行并与横放在试样中心的直径 15,8±0,1 毫米弯曲表面的纵轴垂直。每一个试样只经受一次撞击。		
	Requirements/标准要求： 1 Cells external temperature not exceed 170℃.电芯或电池的最高表面温度应不超过 170℃ 2 No disassembly, no fire within six hours of this test 试验结束后 6 个小时之内，电芯和聚合物电芯应无解体和无着火现象发生	-	
38.3.4.6	Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18mm in diameter) / 挤压（适用于棱柱形、袋装、硬币/纽扣电池和直径小于 18 毫米的圆柱形电池）		**P**
	1 A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1,5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. / 将电池或元件电池放在两个平面之间挤压，挤压力度逐渐加大，在第一个接触点上的速度大约为 1,5 厘米/秒。挤压持续进行，直到出现以下三种情况之一： (a) The applied force reaches 13 kN ± 0,78 kN. / 施加的力达到 13 千牛±0,78 千牛 (b) The voltage of the cell drops by at least 100 mV,/电池的电压下降至少 100 毫伏 (c) The cell is deformed by 50% or more of its original thickness./电池变形达原始厚度的 50%以上。 2. A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. /棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。		
	Requirements/标准要求： 1 Cells external temperature not exceed 170℃.电芯或电池的最高表面温度应不超过 170℃ 2 No disassembly, no fire within six hours of this test 试验结束后 6 个小时之内，电芯和聚合物电芯应无解体和无着火现象发生	The samples c1#~c10#: no disassembly and no fire/ 编号为 c1#~c10#的样品：无解体、无着火现象 The data is shown in Table 2./数据见表 2	

ST/SG/AC.10/11/Rev.7/Amend.1/Section 38.3			
Clause 章节	**Requirements 标准要求**	**Result 测试结果**	**Verdict 判定**
38.3.4.7	**Test T.7: Overcharge/测试 7: 过度充电**		**P**
	1 The charge current shall be twice the manufacturer's recommended maximum continuous charge current/以 2 倍制造厂推荐的最大持续充电电流对样品充电 2 The minimum voltage of the test shall be as follows/本测试最小电压为:		
	a) When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V/ 如果厂家推荐的充电电压不超过 18V，本测试的最小充电电压应是厂家标定最大充电电压的两倍或者是 22V 之中的较小者。 b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1,2 times the maximum charge voltage/ 如果厂家推荐的充电电压超过 18V，本测试的最小充电电压应是厂家标定最大充电电压的 1,2 倍。 3 Tests are to be conducted at ambient temperature 20±5℃, The duration of the test shall be 24 hours/20±5℃的环境温度下，试验持续 24 小时。	The voltage of the test is 672V, and the current is 20A 测试的电压为 672V，电流为 20A	
	Requirements/标准要求: No disassembly and no fire within seven days of this test 试验样品在试验中和试验后 7 天内，应无解体和无着火现象发生。	The samples b1#~b4# : no disassembly and no fire/编号为 b1#~b4#的样品：无解体、无着火现象 For voltage data before test, see table 3. / 试验前电压见表 3	
38.3.4.8	**Test T.8: Forced discharge/测试 8: 强制放电**		**P**
	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer, 20±5℃的环境温度下，将单个电芯连接在 12V 的直流电源上进行强制放电，此直流电源提供给每个电芯初始电流为制造厂指定的最大放电电流。		
	The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere) 指定的放电电流通过串联在测试电芯上的合适大小和功率的负载来获得，每个电芯的强制放电时间（小时）为额定容量除以初始电流（安培）。		
	Requirements/标准要求: No disassembly and no fire within seven days of this test 试验样品在试验中和试验后 7 天内，应无解体和无着火现象发生。	The samples c11#~c30#: no disassembly and no fire/编号为 c11#~c30#的样品：无解体、无着火现象 The data is shown in Table 4./数据见表 4	

Table1：T1~T5 / 表 1. 试验 1~试验 5											
Sample No. 样品号	**Mass prior to test / 试验前质量 (kg)**	**OCV prior to test /试验前电压(V)**	**Test T.1: Altitude simulation/ 试验 T.1：高度模拟**		**Test T.2: Thermal test/ 试验 T.2: 温度试验**		**Test T.3: Vibration/ 试验 T.3: 振动**		**Test T.4: Shock/ 试验 T.4: 冲击**		**Test T.5: External Short Circuit/试验 T.5 外部短路**
			Mass Loss(%) 质量损失(%)	OCV Retention Ratio(%) 电压保留比(%)	Mass Loss(%) 质量损失(%)	OCV Retention Ratio(%) 电压保留比(%)	Mass Loss(%) 质量损失(%)	OCV Retention Ratio(%) 电压保留比(%)	Mass Loss(%) 质量损失(%)	OCV Retention Ratio(%) 电压保留比(%)	Temp. (℃) 温度 (℃)
b1#	69,65	27,056	0,000	99,98	0,000	99,90	0,000	100,00	0,000	100,00	57,4
b2#	69,48	27,055	0,000	99,98	0,000	99,90	0,000	100,00	0,000	100,00	57,7
b3#	69,65	27,055	0,000	99,98	0,000	99,92	0,000	100,00	0,000	100,00	57,8
b4#	69,45	27,054	0,000	99,97	0,000	99,91	0,000	100,00	0,000	100,00	57,6

Table2: Crush /表 2:挤压											
Test T.6: Crush/测试 6:挤压	Sample No. 样品号	c1#	c2#	c3#	c4#	c5#	c6#	c7#	c8#	c9#	c10#
	OCV prior to test / 试验前电压（V）	3,296	3,295	3,295	3,296	3,295	3,295	3,295	3,295	3,296	3,295
	Temp. (℃) 温度 (℃)	24,2	24,8	24,3	24,5	24,3	24,6	24,4	24,5	24,2	24,7

Table3：Overcharge Test of batteries/ 表 3 过度充电					
Test T.7: Overcharge / 测试 7: 过度充电	Sample No. 样品号	b1#	b2#	b3#	b4#
	OCV prior to test /试验前电压（V）	26,666	26,665	26,667	26,665

Table 4：Forced discharge / 表 4. 强制放电											
Test T.8: Forced discharge **/ 测试 8: 强制放电**	Sample No. 样品号	c11#	c12#	c13#	c14#	c15#	c16#	c17#	c18#	c19#	c20#
	OCV prior to test / 试验前电压(V)	2,847	2,847	2,846	2,846	2,847	2,846	2,848	2,846	2,844	2,846
	Sample No. 样品号	c21#	c22#	c23#	c24#	c25#	c26#	c27#	c28#	c29#	c30#
	OCV prior to test / 试验前电压(V)	2,847	2,847	2,846	2,847	2,845	2,847	2,847	2,847	2,847	2,847

注 意 事 项
Important

1. 报告无检测单位印章无效。
   The test report is invalid without the seal of CVC.
2. 未经本试验室书面同意，不得部分地复制本报告。
   Nobody is allowed to photocopy or partly photocopy this test report without written permission of CVC.
3. 本报告无批准人、审核人及检测人签名无效。
   The test report is invalid without the signatures of Ratifier, Reviewer and Testing engineer.
4. 本报告涂改无效。
   The test report is invalid if altered,
5. 对检测报告若有异议，应于收到报告之日起十五天内向检测单位提出。
   Objections to the test report must be submitted to CVC within 15 days.
6. 本报告仅对送检样品负责。
   The test report is valid for the tested samples only.
7. 判定栏中“-”表示“不需要判定”，“P”表示“通过”，“F”表示“不通过”，“N/A”表示“不适用”。
   As for the Verdict, “-” means “no need for judgement”, “P” means “pass”， “F” means “fail” and “N/A” means “not applicable”.

报告中未加 CMA 标志时，检测数据和结果仅供科研、教学或内部质量控制之用。
The test data and test results given in this test report should only be used for purposes of scientific research, teaching and internal quality control when the CMA symbol is not presented.

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