



Material Safety Data Sheet (MSDS)

Product picture and name:



T7LTE



T7RHTP



T7*

EN: This material safety data sheet refers to the batteries encapsulated in **all Trusted data loggers/trackers in the 7-series***. Standard products are pictured.

Trusted A/S declares that these products contain **XL-060F/1S3P/Wire+XLC1325** battery packs as documented on the following pages.

DE: Dieses Sicherheitsdatenblatt bezieht sich auf die Batterien, die in **allen Trusted Datenloggern/Trackern der 7er-Serie*** verkapselt sind. Standardprodukte sind abgebildet.

Trusted A/S erklärt, dass diese Produkte **XL-060F/1S3P/Wire+XLC1325** enthalten Akkupacks, wie auf den folgenden Seiten dokumentiert.

FR: Cette fiche de données de sécurité fait référence aux batteries encapsulées dans tous **les enregistreurs de données/traqueurs Trusted de la série 7***. Les produits standard sont illustrés.

Trusted A/S déclare que ces produits contiennent **XL-060F/1S3P/Wire+XLC1325** batteries comme documenté dans les pages suivantes.

ES: Esta hoja de datos de seguridad del material se refiere a las baterías encapsuladas en **todos los registradores/rastreadores de datos Trusted de la serie 7***. Los productos estándar se muestran en la imagen.

Trusted A/S declara que estos productos contienen **XL-060F/1S3P/Wire+XLC1325** baterías como se documenta en las siguientes páginas.

IT: Questa scheda di sicurezza dei materiali si riferisce alle batterie incapsulate in **tutti i data logger/tracker Trusted della serie 7***. I prodotti standard sono illustrati.

Trusted A/S dichiara che questi prodotti contengono **XL-060F/1S3P/Wire+XLC1325** batterie come documentato nelle pagine seguenti.

PT: Esta ficha de dados de segurança do material refere-se às baterias encapsuladas em **todos os registradores/rastreadores de dados Trusted da série 7***. Os produtos padrão são retratados.

Trusted A/S declara que estes produtos contêm **XL-060F/1S3P/Wire+XLC1325** baterias conforme documentado nas páginas a seguir.

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- Safety Data Sheet, XenoEnergy Co., Ltd.
- Specifications, XL-060F, XenoEnergy Co., Ltd.
- UN 38.3 Test Summary, XenoEnergy Co., Ltd.
- Test Report (UN 38.3), XenoEnergy Co., Ltd.
- Declaration of Conformity to EU REACH, XenoEnergy Co., Ltd.
- Declaration of Conformity to RoHS3, XenoEnergy Co., Ltd.

* All other relevant editions are marked with "Type: T7.xxx" on the label



XenoEnergy Lithium Battery



Revision: 2023-01A

Safety Data Sheet

1. Product Identification

1) Product Name

Lithium Thionyl Chloride Battery (Li-SOCl₂, Non-Rechargeable, 3.6V)

Single Cells or Multi Packs of following models

Small Size Battery

XL-050F, XLP-050F, XL-050H,
XL-055F, XLP-055F, XL-060F, XLP-060F, XL-060H, XL-100F,
XL-060F/1S3P/Wire+XLC1325(Total lithium contents of this battery pack is less 2g)

Big Size Battery XL-140F, XL-145F, XL-200F, XL-205F, XL-1459F, XL-2059F

2) Manufacturer: XenoEnergy Co., Ltd.

70-7, Mooha-ro, Hwaseong-shi, Gyeonggi-do, Korea, 18279

3) Emergency Contact

International: +82-70-8277-6331
70-7, Mooha-ro, Hwaseong-shi, Gyeonggi-do, Korea, 18279

2. Hazard Identification

The Lithium Thionyl Chloride Batteries have hermetically sealed structure, so they are not hazardous when they are used in the recommendations of the manufacturer.

Do not short circuit, recharge, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion.

Under normal usage conditions, the electrode materials and liquid electrolyte cannot be leaked to the outside. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the rupture of the battery container.

Electrolyte is toxic and corrosive and causes irritation, skin burn, lung injuries, asthma and other respiratory disorders

3. Composition and Information on Ingredients

Substance	CAS No.	Approximate percent of total weight (%)	Hazard Symbol	R-phrases
Lithium Metal	7439-93-2	3-5	F, C	14/15-34
Thionyl Chloride	7719-09-7	33-45	C	14-34-37
Aluminum Chloride	7446-70-0	2-5		
Lithium Chloride	7447-41-8	1-2		
Carbon	1333-86-4	3-5		
Stainless	65997-19-5	38-58		

Hazard Symbols: C Corrosive / F Highly flammable

R-Phrases: R 14 Reacts violently with water

R 14/15 Reacts violently with water liberating extremely flammable gases

R 34 Causes burns

R 37 Irritating to respiratory system

4. First Aid Measures

Eye Contact - Immediately flush eye with plenty of water for at least 15 minutes.
Seek medical attention.

Skin Contact - Immediately flush skin with plenty of running water for at least 15 minutes.
Seek medical attention.

Inhalation - Immediately remove to fresh air. If necessary, administer oxygen and seek medical attention.

Ingestion - Immediately wash mouth with plenty of water and drink plenty of water.
Seek medical attention

5. Fire Fighting Measures

Lith-X (Class D extinguishing media) and Dried Sand are effective extinguishing media on fires involving a few lithium batteries. If cells are already catching a fire, do not use Water, CO₂, Halon and Dry Powder or Soda Ash Extinguishers.

If the fire is in adjacent area and the fire is not progressed, CO₂ Extinguishers or copious amounts of cold water can be effective extinguishing media to cool down burning Li-SOCl₂ cells and batteries.

6. Accidental Release Measures

Under abusive conditions, the battery contained materials may leak.

Put the leaked batteries into small container or plastic bag adding the neutralizing agents of Sodium carbonate (Na_2CO_3), chalk (CaCO_3) or lime (CaO) powder.

7. Handling and Storage

Handling – Do not crush, puncture or short circuit. Do not directly heat or solder, over charge the battery or forced discharge. Do not throw into fire.

Storage - Store in a cool (below 30°C) and ventilated area with less temperature and moisture effect. Do not place near heating equipment or direct sunlight for a long time. Keep the batteries in original battery package.

Others - Lithium Thionyl Chloride batteries are not rechargeable batteries and should not be charged. Avoid the deformation of batteries by pressure. Keep the recommended usage conditions and temperatures by the manufacturer.

8. Exposure Controls and Personal Protection

Respiratory Protection - As any fire situation is happened, use self-contained breathing apparatus.

Eye Protection - Safety glasses are recommended.

Protective Gloves - In case of leakage, wear gloves.

Other Protective Clothing: In the event of leakage, wear chemical apron.

9. Physical and Chemical Properties

Melting Point	N/A	Boiling Point	N/A
Vapor Pressure	N/A	Specific Gravity	N/A
Vapor Density	N/A	Physical State	Solid
Solubility in Water	N/A	PH	N/A
Appearance	Geometric Solid Object		
Odor	If leaked, giving off pungent corrosive odor		

10. Stability and Reactivity

Stability - Stable (hermetically sealed type, used in recommended conditions)

Condition to Avoid - Give too much force, drop, crush & disassemble, short-circuit, recharge, fire & heat above 100°C (212°F), incinerate and etc.

Material to Avoid - Alkali, water, mineral acid

Hazardous Decomposition Products -

* Reaction of lithium metal with water: Hydrogen (H₂) / Lithium oxide (Li₂O) and Lithium hydroxide (LiOH)

* Thermal decomposition over 150°C: Hydrochloric acid (HCl) and Sulfur dioxide (SO₂)

* Electrolyte (Lithium tetrachloroaluminate, LiAlCl₄) with water: Hydrochloric acid (HCl) fumes, Lithium oxide (Li₂O), Lithium hydroxide (LiOH) and Aluminum hydroxide (Al(OH)₃)

11. Toxicological Information

Not Applicable

In the event of rupture or leakage, corrosive fumes from the battery can cause

Inhalation - Burn or irritation of the respiratory system

Eye Contact - Redness, tearing, burns

Skin - Skin irritation and burns

Ingestion - Tissue damage to throat and gastro-respiratory track

Medical conditions generally aggravated by exposure - eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

12. Ecological Information

1) Lithium Thionyl Chloride batteries do not have environmental hazard under normal usage and proper disposal.

2) Lithium Thionyl Chloride batteries do not contain mercury, cadmium or other heavy metals.

13. Disposal

1) Dispose under the regulation in each country.

2) Dispose by incineration or burial at permitted waste treatment and disposal sites

14. Transportation

1) Product Category: Lithium Metal Batteries (with All UN Test Approval)

2) UN ID No. UN3090 or UN3091

UN 3090: LITHIUM METAL BATTERIES

UN 3091: LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT, or
LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT

- Lithium metal cells and batteries are considered as Dangerous Goods with UN3090 and UN3091.

- Depending on their lithium metal contents, some cells or batteries may be regarded as non-dangerous goods without Class 9 nomination.

3) Regulation

A. Air Transportation: IATA 64th Edition 2023, Dangerous Goods Regulations

- All cells and batteries must be tested in accordance with the UN Manual of Tests and Criteria Part III Subsection 38.3 (DGR 3.9.2.6).

(1) UN3090

Small Size Battery : Lithium Contents Cells \leq 1g / Batteries \leq 2g

➔ Packing Instruction 968 Section IB

- No Passenger Cargo, Cargo Aircraft Only
- Package \leq Net 2.5kg
- Label: Lithium Battery Mark, Class 9 label, Cargo Aircraft Only label
- DG Declaration

Big Size Battery : Lithium Contents Cells $>$ 1g / Batteries $>$ 2g

➔ Package instruction 968 Section IA

- No Passenger Cargo, Cargo Aircraft Only
- Package \leq 35kg
- Label: Lithium battery Class 9 Label, Cargo Aircraft Only label
- DG Declaration & Certification

(2) UN3091

LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT

- Packing Instruction 970 Section II - Lithium Contents Cells \leq 1g / Batteries \leq 2g
- Packing Instruction 970 Section I - Lithium Contents Cells $>$ 1g / Batteries $>$ 2g

LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT

- Packing Instruction 969 Section II - Lithium Contents Cells \leq 1g / Batteries \leq 2g
- Packing Instruction 969 Section I - Lithium Contents Cells $>$ 1g / Batteries $>$ 2g

B. Sea Transportation: IMDG – Code 2023

Small Size Battery: Lithium Contents Cells $\leq 1g$

➔ Special Provision 188 (Exception)

- Lithium Metal cells $< 1g$, batteries $< 2g$ – Not subject to Class 9 (Non-DG)
- Packing Group I
- Each cell or battery is of the type proved to meet the requirements of each test of the Manual Tests and Criteria Part III, sub section 38.3. Cells and batteries manufactured.

Big Size Battery: Lithium Contents Cells $> 1g$

➔ Class 9 / Packing Group II

C. Road or Rail Transportation: ADR / RID 2023

Small Size Battery: Lithium Contents Cells $\leq 1g$

➔ Special Provision 188 (Exception)

- Lithium Metal cells $< 1g$, batteries $< 2g$ – Not subject to Class 9 (Non-DG)
- Packing Group I
- Each cell or battery is of the type proved to meet the requirements of each test of the Manual Tests and Criteria Part III, sub section 38.3. Cells and batteries manufactured.

Big Size Battery: Lithium Contents Cells $> 1g$

➔ Class 9 / Packing Group II

15. Regulatory Information

N/A

16. Other Information

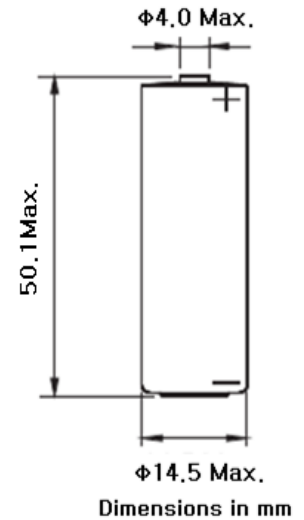
For further information, please contact to XenoEnergy Co., Ltd.

SPECIFICATIONS

(Typical values stored at 20°C for one year)

◆ Nominal capacity	2.6Ah
(at 1mA/20°C/68°F/2.0V cut-off)	
◆ Nominal voltage	3.6V
◆ Max. recommended continuous current	60mA
(Higher current can be available upon consulting)	
◆ Max. pulse current capability ★	120mA
◆ Operating temperature range	-55 ~+85°C
◆ Lithium metal content	approx. 0.7g
◆ Weight	17g
◆ Volume	8.0cm ³
◆ UL Approval	MH28122

Max Pulse Capability: Maximum Pulse capability reading over 3.0V at 120mA/0.1sec. every 2 min. at +20°C, 10μA/cm² base current with fresh batteries. The pulse capability can be different to the cell status, environment. For max. pulse coverage, capacitor support is recommended.

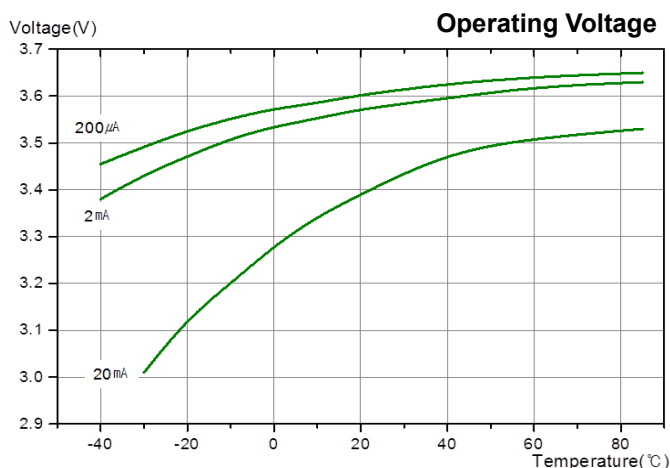
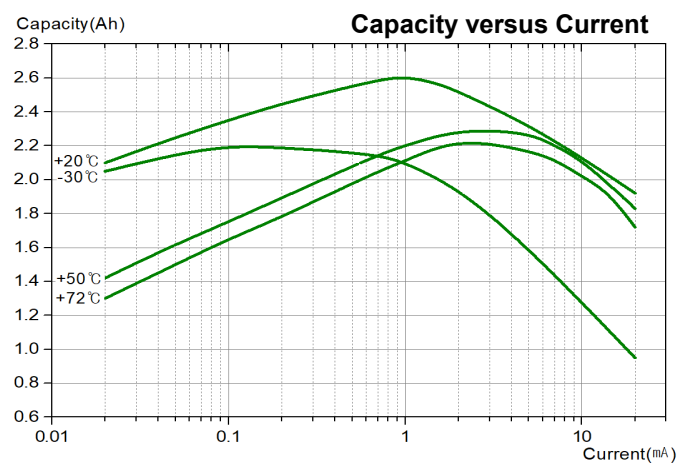
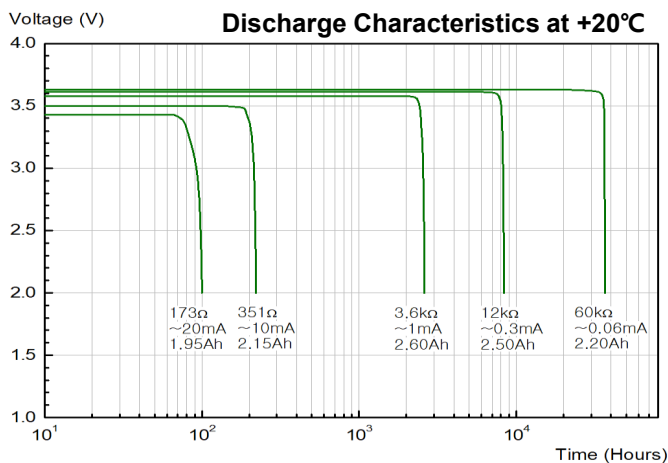


Available Terminal Type


STD, T1, T2, T3, T3/R, T3EU, T3EU/R, AX, Wire, Connector

Storage Condition

Please store batteries at clean, cool (not over +30°C), dry and ventilated condition



UN 38.3 Test Summary Report

<p>[a] Name of cell, battery or product manufacturer, as applicable</p> <p>Item Number : XL-060F/1S3P/Wire+XLC1325 Item Name : Pack Item Description : 3.6V / 7.8Ah Harness and cable : Wire, C&W</p>	<p>[b] Cell, battery, or product manufacturer's contact information to include address, phone number, email address and website for more information;</p> <p><u>XENOENERGY Co., Ltd.</u> 70-7, Muha-ro, Hwaseong-city, Kyonggi-do Republic of Korea, 18729 T. +82 31 355 3511 global@xenoenergy.com www.xenoenergy.com</p>																	
<p>[c] Name of the test laboratory to include address, phone number, email address and website for more information;</p> <p><u>XENOENERGY Co., Ltd.</u> 70-7, Muha-ro, Hwaseong-city, Kyonggi-do Republic of Korea, 18729 T. +82 31 355 3511 rnd@xenoenergy.com www.xenoenergy.com</p>	<p>[d] A unique test report identification number;</p> <p>Xeno Q110422</p>	<p>[e] Date of test report;</p> <p>April. 22, 2011</p>																
<p>[f] Description of cell or battery to include at a minimum: Lithium ion or lithium metal cell or battery; Mass; Watt-hour rating, or lithium content; Physical description of the cell/battery; and Model numbers.</p> <p>Cell used in implantable medical devices, such as : Pacemaker(IPG), Neuro-Stimulators or Implantable Defibrillators(ICD)</p> <p>(i) Lithium metal (ii) Mass : max. 65g (iii) Lithium content : less 2.0g (iv) ELC or W/h rating : 3.6V / 7.8Ah (v) Model number: XL-060F/1S3P/Wire+XLC1325</p>	<p>[g] List of tests conducted and results (i.e., pass/fail);</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/> Test T.1 : Altitude simulation</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.2 : Thermal test</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.3 : Vibration</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.4 : Shock</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.5 : External short circuit</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.6 : Impact/Crush</td> <td>N/A</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.7 : Overcharge</td> <td>N/A</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.8 : Forced discharge</td> <td>N/A</td> </tr> </table> <p>Testing additional comments : No additional information</p>		<input checked="" type="checkbox"/> Test T.1 : Altitude simulation	Pass	<input checked="" type="checkbox"/> Test T.2 : Thermal test	Pass	<input checked="" type="checkbox"/> Test T.3 : Vibration	Pass	<input checked="" type="checkbox"/> Test T.4 : Shock	Pass	<input checked="" type="checkbox"/> Test T.5 : External short circuit	Pass	<input checked="" type="checkbox"/> Test T.6 : Impact/Crush	N/A	<input checked="" type="checkbox"/> Test T.7 : Overcharge	N/A	<input checked="" type="checkbox"/> Test T.8 : Forced discharge	N/A
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<input checked="" type="checkbox"/> Test T.5 : External short circuit	Pass																	
<input checked="" type="checkbox"/> Test T.6 : Impact/Crush	N/A																	
<input checked="" type="checkbox"/> Test T.7 : Overcharge	N/A																	
<input checked="" type="checkbox"/> Test T.8 : Forced discharge	N/A																	
<p>[h] Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g));</p> <p>Not Applicable.</p>	<p>[i] Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any;</p> <p>UN Manual of Tests and Criteria, Part III, sub-section 38.3. <i>sixth revised edition</i></p>																	
<p>[j] Signature with name and title of signatory as an indication of the validity of information provided.</p> <p>Name(Signed by) : JR Kim Title : Director of R&D</p> 	<p>Date this document was generated.</p> <p>Oct. 21, 2019</p>																	
<p>Important! The above signatory / signatories affirm that this document is a true and correct summary of the original individual tests and test data. The original test data is confidential information available to competent State Authorities with valid identification and only upon their formal request. Disclosure of the original test data to any other entity upon its request will be considered by XENOENERGY and, should XENOENERGY consider this request is with merit, may be subject to the prior execution of a nondisclosure agreement.</p>																		



TEST - REPORT

UN manual of tests and criteria,
part III, sub-section 38.3,
Lithium metal and lithium ion batteries

**XL – 060F + XLC1325
(1S3P, Wire)**

Test Report Number : Xeno Q110422

Apr. 22, 2011






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Reliability Test Report

1. General information

- ◆ Apparatus - - - - - Lithium Primary Battery, Lithium ion capacitor
- ◆ Type Reference - - - - XL-060F(1S3P, Wire)+XLC1325
- ◆ Ratings - - - - - 3.6V, 7.8Ah
- ◆ Test Standards - - - - ST/SG/AC. 10/11/Rev.5
Recommendations on the Transport of Dangerous Goods :
Manual of Tests and Criteria, Part III, Sub-Section 38.3
Lithium metal and lithium ion batteries
UNITED NATIONS
- ◆ Manufacturer - - - - XenoEnergy Co., Ltd
470-20, Moosong-Dong, Hwaseong-City, Kyonggi-Do, Korea
- ◆ Date of Tests - - - - - Mar. 02, 2011 ~ Apr. 15, 2011
- ◆ Date of Issue - - - - - Apr. 22, 2011

Tested	Do-hyeong Kim (Project Engineer)	
Verified	In-woo Seong (Technical General Manager)	
Approved	Jong-ryoul Kim (Technical Director)	

2. Technical information

2-1. Summary of test results

No.	Test items	Criteria	Results
1	Test T.1 : Altitude Simulation	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
2	Test T.2 : : Thermal Test	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
3	Test T.3 : : Vibration	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
4	Test T.4 : Shock	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
5	Test T.5 : External Short Circuit	- Their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.	PASS
6	Test T.6 : Impact	- Their external temperature does not exceed 170 °C and there is no disassembly and no fire within six hours of this test.	N/A
7	Test T.7 : Over Charge	- There is no disassembly and no fire within seven days of the test.	N/A
8	Test T.8 : Forced Discharge	- There is no disassembly and no fire within seven days of the test.	N/A

2-2. Test environment

** Unless specified otherwise in the individual tests shall be conducted under the following ambient conditions.*

Temperature - - - - - $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 Relative Humidity - - - - - Not specified
 Air Pressure - - - - - Not specified
 Altitude of test laboratory - - - - - 51m

2-3. Test instrument list

No.	Measurement Equipment
1	VO-10X Jeio Tech. (Vacuum Oven), Jisico(KOR)
2	Low & Constant Temp. Humidity Chamber, Jisico(KOR)
3	SJTA-2000S. (Vibration Tester), Sejin Technology(KOR)
4	SJTC-300. (Shock Tester), Sejin Technology(KOR)
5	Q-BloxxA 108/104 & Qterm-CJC-A104, (Short Circuit Tester) (KOR)
6	DX-2040(Recorder), Yokogawa(JPN)
7	732(01) Digital Multimeter, Yokogawa(JPN)
8	CAS MWP(KOR)
9	mΩ Hitester 3540, Hioki(JPN)

3. Test results

3-1. Possible test case verdicts

- * Test case does not apply to the test object - - - - - N/A
- * Test object does meet the requirement - - - - - P (Pass)
- * Test object does not meet the requirement - - - - - F (Fail)

3-2. Test purpose/procedure/requirements

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	When a cell or battery type is to be tested under this sub-section, the number and condition of cells and batteries of each type to be tested are as follows:	
	(a) When testing primary cells and batteries under tests 1 to 5 the following shall be tested in the quantity indicated :	P
	(i) ten cells in undischarged states,	N/A
	(ii) ten cells in fully discharged states,	N/A
	(iii) four small batteries in undischarged states,	P
38.3.3	(iv) four small batteries in fully discharged states.	N/A
	(v) four large batteries in undischarged states,	N/A
	(vi) four large batteries in fully discharged states.	N/A
	(b) When testing rechargeable cells and batteries under tests 1 to 5 the following shall be tested in the quantity indicated :	N/A
	(i) ten cells at first cycle, in fully charged states,	N/A
38.3.3	(ii) four small batteries at first cycle, in fully charged states,	N/A
	(iii) four small batteries after 50cycle ending in fully charged states,	N/A
	(iv) two large batteries at first cycle, in fully charged states, and	N/A
	(v) two large batteries after 25cycle ending in fully charged states,	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	(c) When testing primary and rechargeable cells under test 6, the following shall be tested in the quantity indicated :	N/A
	(i) for primary cells, five cells in undischarged states and five cells in fully discharged states,	N/A
	(ii) for component cells of primary batteries, five cells in undischarged states and five cells in fully discharged states,	N/A
	(iii) for rechargeable cells, five cells at first cycle at 50% of the design rated capacity, and	N/A
	(iv) for component cells of rechargeable batteries, five cells at first cycle at 50% of the design rated	N/A
	For prismatic cells, ten test cells are required for each of the states of charge being tested, instead of the five described above, so that the procedure can be carried out on five cells along the longitudinal axes and, separately, five cells along the other axes. In every case, the test cell is only subjected to one impact.	N/A
	(d) When testing rechargeable batteries under test 7, the following shall be tested in the quantity indicated :	N/A
	(ii) four small batteries at first cycle, in fully charged states,	N/A
	(iii) four small batteries after 50cycle ending in fully charged states,	N/A
	(iv) two large batteries at first cycle, in fully charged states, and	N/A
	(v) two large batteries after 25cycle ending in fully charged states,	N/A
	Batteries not equipped with overcharge protection that are designed for use only in a battery assembly, which affords such protection, are not subject to the requirements of this test.	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	(e) When testing primary and rechargeable cells under test 8, the following shall be tested in the quantity indicated: (i) ten primary cells in fully discharged states, (ii) ten rechargeable cells, at first cycle in fully discharged states, and (iii) ten rechargeable cells after 50 cycles ending in fully discharged states.	N/A N/A N/A
	(f) When testing a battery assembly in which the aggregate lithium content of all anodes, when fully charged, is not more than 500g, or in the case of a lithium ion battery, with a Watt-hour rating of not more than 6,200Watt-hours, that is assembled from cells or batteries that have passed all applicable tests, one battery assembly in a fully charged state shall be tested under tests 3,4 and 5, and, in addition, test 7 in the case of a rechargeable battery assembly. For a rechargeable battery assembly, the assembly shall have been cycled at least 25cycle	N/A
Clause	Procedure	Verdict
38.3.4	Each cell and battery type must be subjected to tests 1 to 8. Tests 1 to 5 must be conducted in sequence on the same cell or battery. Tests 6 and 8 should be conducted using not otherwise tested cells or batteries. Test 7 may be conducted using undamaged batteries previously used in Tests 1 to 5 for purposes of testing on cycled batteries.	P

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.1	<i>Test T.1 : Altitude simulation</i>	P
38.3.4.1.1	<i>Purpose :</i> This test simulates air transport under low-pressure conditions.	
38.3.4.1.2	<i>Test Procedure :</i> Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hours at ambient temperature($20\pm5^{\circ}\text{C}$).	P
38.3.4.1.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.1)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.2	<i>Test T.2 : Thermal test</i>	P
38.3.4.2.1	<p><i>Purpose :</i></p> <p>This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.</p>	
38.3.4.2.2	<p><i>Test Procedure :</i></p> <p>Test cells and batteries are to be stored for at least six hours at a test temperature equal to $75\pm 2^{\circ}\text{C}$, followed by storage for at least six hours at a test temperature equal to $(-40\pm 2^{\circ}\text{C})$. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature ($20\pm 5^{\circ}\text{C}$). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.</p>	P
38.3.4.2.3	<p><i>Requirement :</i></p> <p>Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.</p>	P

* See appended 3-4.Test results(table T.2)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.3	<i>Test T.3 : Vibration</i>	P
38.3.4.3.1	<i>Purpose :</i> This test simulates vibration during transport.	
38.3.4.3.2	<i>Test Procedure :</i> Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3hrs for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep is as follows : from 7Hz a peak acceleration of 1G 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 occurs (approximately 50Hz). A peak acceleration of 8G is then maintained until the frequency is increased to 200 Hz.	P
38.3.4.3.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.3)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.4	<i>Test T.4: Shock</i>	P
38.3.4.4.1	<i>Purpose :</i> This test simulates possible impacts during transport.	
38.3.4.4.2	<p><i>Test Procedure :</i> Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a halfsine shock of peak acceleration of 150G and pulse duration of 6ms. 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.</p> <p>However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50G and pulse duration of 11ms. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.</p>	P
38.3.4.4.3	<p><i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.</p>	P

* See appended 3-4.Test results(table T.4)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.5	<i>Test T.5: External short circuit</i>	P
38.3.4.5.1	<i>Purpose :</i> This test simulates an external short circuit.	
38.3.4.5.2	<i>Test Procedure :</i> The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $55\pm 2^{\circ}\text{C}$ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1Ω at $55\pm 2^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $55\pm 2^{\circ}\text{C}$. The cell or battery must be observed for a further six hours for the test to be concluded.	P
38.3.4.5.3	<i>Requirement :</i> Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire within six hours of this test.	P

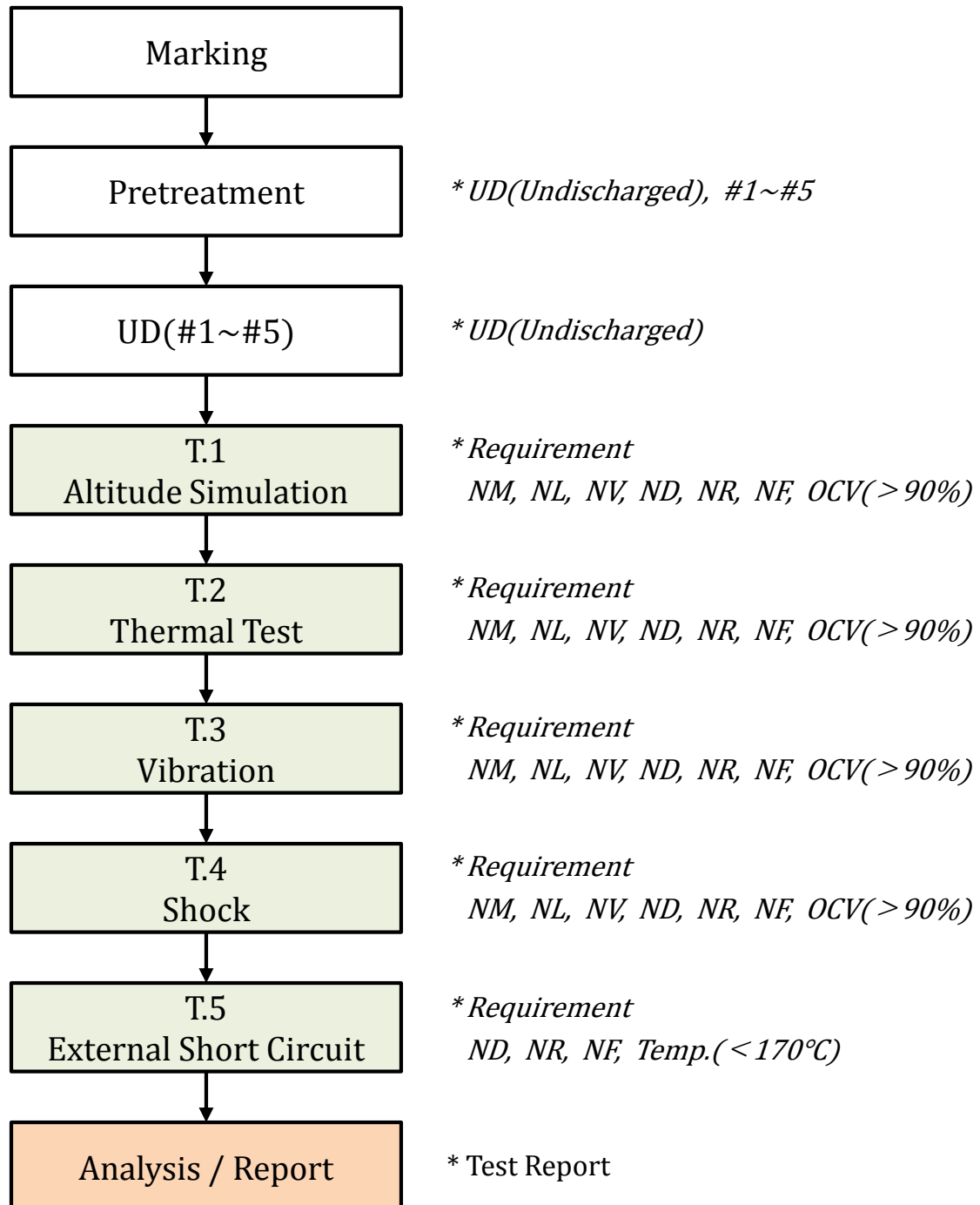
* See appended 3-4.Test results(table T.5)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.6	<i>Test T.6 : Impact</i>	N/A
38.3.4.6.1	<i>Purpose :</i> This test simulates an impact.	
38.3.4.6.2	<p><i>Test Procedure :</i></p> <p>The test sample cell or component cell is to be placed on a flat surface. A 15.8mm diameter bar is to be placed across the center of the sample. A 9.1kg mass is to be dropped from a height of 61 ± 2.5cm onto the sample.</p> <p>A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter curved surface lying across the center of the test sample. A prismatic cell is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each impact.</p> <p>A coin or button cell is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8mm diameter curved surface lying across its center.</p>	N/A
38.3.4.6.3	<p><i>Requirement :</i></p> <p>Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire within six hours of this test.</p>	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.7	<i>Test T.7: Overcharge</i>	N/A
38.3.4.7.1	<i>Purpose :</i> This test evaluates the ability of a rechargeable battery to withstand an overcharge condition.	
38.3.4.7.2	<i>Test Procedure :</i> The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows: (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. (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. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.	N/A
38.3.4.7.3	<i>Requirement :</i> Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven days of the test.	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.8	<i>Test T.8 : Forced discharge</i>	N/A
38.3.4.8.1	<p><i>Purpose :</i> This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.</p>	
38.3.4.8.2	<p><i>Test Procedure :</i> Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.</p> <p>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).</p>	N/A
38.3.4.8.3	<p><i>Requirement :</i> Primary or rechargeable cells meet this requirement if there is no disassembly and no fire within seven days of the test..</p>	N/A

3-3. Test procedure



3-4. Test results

Test T.1 : Altitude simulation					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-Discharged	T 1-1	65.6	3.66	65.6	3.66
	T 1-2	65.8	3.66	65.8	3.66
	T 1-3	65.8	3.66	65.8	3.66
	T 1-4	65.7	3.67	65.7	3.67
	T 1-5	65.8	3.66	65.8	3.66

Test T.1 : Altitude simulation					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 1-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 1-2	0	100		
	T 1-3	0	100		
	T 1-4	0	100		
	T 1-5	0	100		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

Test T.2 : Thermal Test					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 2-1	65.6	3.66	65.6	3.68
	T 2-2	65.8	3.66	65.8	3.67
	T 2-3	65.8	3.66	65.8	3.68
	T 2-4	65.7	3.67	65.7	3.68
	T 2-5	65.8	3.66	65.8	3.68

Test T.2 : Thermal Test					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 2-1	0	100.6	NM, NL, NV ND, NR, NF	PASS
	T 2-2	0	100.3		
	T 2-3	0	100.6		
	T 2-4	0	100.3		
	T 2-5	0	100.6		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

Test T.3 : Vibration					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 3-1	65.6	3.68	65.6	3.68
	T 3-2	65.8	3.67	65.8	3.67
	T 3-3	65.8	3.68	65.8	3.68
	T 3-4	65.7	3.68	65.7	3.68
	T 3-5	65.8	3.68	65.8	3.67

Test T.3 : Vibration					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 3-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 3-2	0	100		
	T 3-3	0	100		
	T 3-4	0	100		
	T 3-5	0	99.7		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

Test T.4 : Shock					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 4-1	65.6	3.68	65.6	3.68
	T 4-2	65.8	3.67	65.8	3.67
	T 4-3	65.8	3.68	65.8	3.68
	T 4-4	65.7	3.68	65.7	3.67
	T 4-5	65.8	3.67	65.8	3.67

Test T.4 : Shock					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 4-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 4-2	0	100		
	T 4-3	0	100		
	T 4-4	0	99.7		
	T 4-5	0	100		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

<i>Test T.5 : External short circuit</i>			
Sample No.		Open circuit voltage (V)	Measured maximum Temperature(°C)
Un-Discharged	T 5-1	3.68	95.4
	T 5-2	3.67	103.9
	T 5-3	3.68	108.1
	T 5-4	3.67	97.8
	T 5-5	3.67	96.1

<i>Test T.5 : External short circuit</i>				
Sample No.		Allowed	Result	
		Maximum Temperature(°C)		
Un-discharged	T 5-1	95.4	ND, NR, NF	PASS
	T 5-2	103.9		
	T 5-3	108.1		
	T 5-4	97.8		
	T 5-5	96.1		

* Supplementary information :

Their external temperature does not exceed 170°C and there is ND(No disassembly), NR(No rupture) and NF(No fire)



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Declaration of Conformity to EU REACH

2022. 01. 17

Products listed below that are manufactured by XenoEnergy are in compliance to Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Specifically, products manufactured do not contain the substances listed in the following sections of this directive:

- XenoEnergy products do not contain any of the Substances of Very High Concern (SVHC) as defined in Article 57 and Annex XIV with amendments dated:
 - 9 October 2008
 - 13 January 2010
 - 30 March 2010
 - 18 June 2010
 - 15 December 2010
 - 20 June 2011
 - 19 December 2011
 - 18 June 2012
 - 19 December 2012
 - 20 June 2013
 - 16 December 2013
 - 16 June 2014
 - 17 December 2014
 - 15 June 2015
 - 17 December 2015
 - 20 June 2016
 - 12 January 2017
 - 7 July 2017
 - 15 January 2018
 - 27 June 2018
 - 14 February 2018
 - 16 July 2019
 - 16 January 2020
 - 25 June 2020
 - 19 January 2021
 - 08 July 2021 / 17 Jan 2022 (Number of substances on the candidate list: Total 223)

XenoEnergy Products do not contain any of the substances as described in Article 67 and Annex XVII.

Product Identification: Lithium Thionyl Chloride (Li-SOCl₂) & Sulfuryl Chloride (Li-SO₂Cl₂) Battery

XL-050F / XLP-050F / XL-050H / XL-055F / XLP-055F / XL-060F / XLP-060F / XL-060H
XL-100F / XL-145F / XL-205F / XL-1459F / XL-2059F / XL-060F/1S3P/Wire+XLC1325

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Declaration of Conformity to EU RoHS 3

January 07, 2022

Products listed below that are manufactured by XenoEnergy Co.,Ltd. are in compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (also known as "RoHS Recast") and Directive 2015/863 published in 2015 by the EU, and adds four additional restricted substances (phthalates) to the original list of six. In addition, this declaration of conformity is issued under the sole responsibility of XenoEnergy Co., Ltd. Specifically, products manufactured do not contain the substances listed in the table below in concentrations greater than the listed maximum value.

Substance	Maximum Limit (ppm)	Results
Lead (Pb)	5	N.D.
Cadmium (Cd)	0.5	N.D.
Mercury (Hg)	2	N.D.
Hexavalent Chromium (Cr6+)	8	N.D.
Poly Brominated Biphenyls (PBB)	5	N.D.
Poly Brominated Diphenyl ethers (PBDE)	5	N.D.
Di-(2-ethylhexyl) phthalate (DEHP)	50	N.D.
Di-butyl phthalate (DBP)	50	N.D.
Benzyl butyl phthalate (BBP)	50	N.D.
Di-isobutyl phthalate (DIBP)	50	N.D.

* N.D. = Not Detected.

Product Identification: Lithium Thionyl Chloride (Li-SOCl₂) Battery

- XL-050F / XLP-050F / XL-050H
- XL-055F / XLP-055F
- XL-060F / XLP-060F / XL-060H / XL-060F/1S3P/Wire+XLC1325
- XL-100F
- XL-140F / XL-145F / XL-1459F
- XL-200F / XL-205F / XL-2059F

XENOENERGY CO., LTD.

M.C.KIM / MANAGING DIRECTOR

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Email: global@xenoenergy.com



XenoEnergy Lithium Battery



Revision: 2023-01A

Safety Data Sheet

1. Product Identification

1) Product Name

Lithium Thionyl Chloride Battery (Li-SOCl₂, Non-Rechargeable, 3.6V)

Single Cells or Multi Packs of following models

Small Size Battery

XL-050F, XLP-050F, XL-050H,
XL-055F, XLP-055F, XL-060F, XLP-060F, XL-060H, XL-100F,
XL-060F/1S3P/Wire+XLC1325(Total lithium contents of this battery pack is less 2g)

Big Size Battery XL-140F, XL-145F, XL-200F, XL-205F, XL-1459F, XL-2059F

2) Manufacturer: XenoEnergy Co., Ltd.

70-7, Mooha-ro, Hwaseong-shi, Gyeonggi-do, Korea, 18279

3) Emergency Contact

International: +82-70-8277-6331
70-7, Mooha-ro, Hwaseong-shi, Gyeonggi-do, Korea, 18279

2. Hazard Identification

The Lithium Thionyl Chloride Batteries have hermetically sealed structure, so they are not hazardous when they are used in the recommendations of the manufacturer.

Do not short circuit, recharge, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion.

Under normal usage conditions, the electrode materials and liquid electrolyte cannot be leaked to the outside. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the rupture of the battery container.

Electrolyte is toxic and corrosive and causes irritation, skin burn, lung injuries, asthma and other respiratory disorders

3. Composition and Information on Ingredients

Substance	CAS No.	Approximate percent of total weight (%)	Hazard Symbol	R-phrases
Lithium Metal	7439-93-2	3-5	F, C	14/15-34
Thionyl Chloride	7719-09-7	33-45	C	14-34-37
Aluminum Chloride	7446-70-0	2-5		
Lithium Chloride	7447-41-8	1-2		
Carbon	1333-86-4	3-5		
Stainless	65997-19-5	38-58		

Hazard Symbols: C Corrosive / F Highly flammable

R-Phrases: R 14 Reacts violently with water

R 14/15 Reacts violently with water liberating extremely flammable gases

R 34 Causes burns

R 37 Irritating to respiratory system

4. First Aid Measures

Eye Contact - Immediately flush eye with plenty of water for at least 15 minutes.
Seek medical attention.

Skin Contact - Immediately flush skin with plenty of running water for at least 15 minutes.
Seek medical attention.

Inhalation - Immediately remove to fresh air. If necessary, administer oxygen and seek medical attention.

Ingestion - Immediately wash mouth with plenty of water and drink plenty of water.
Seek medical attention

5. Fire Fighting Measures

Lith-X (Class D extinguishing media) and Dried Sand are effective extinguishing media on fires involving a few lithium batteries. If cells are already catching a fire, do not use Water, CO₂, Halon and Dry Powder or Soda Ash Extinguishers.

If the fire is in adjacent area and the fire is not progressed, CO₂ Extinguishers or copious amounts of cold water can be effective extinguishing media to cool down burning Li-SOCl₂ cells and batteries.

6. Accidental Release Measures

Under abusive conditions, the battery contained materials may leak.

Put the leaked batteries into small container or plastic bag adding the neutralizing agents of Sodium carbonate (Na_2CO_3), chalk (CaCO_3) or lime (CaO) powder.

7. Handling and Storage

Handling – Do not crush, puncture or short circuit. Do not directly heat or solder, over charge the battery or forced discharge. Do not throw into fire.

Storage - Store in a cool (below 30°C) and ventilated area with less temperature and moisture effect. Do not place near heating equipment or direct sunlight for a long time. Keep the batteries in original battery package.

Others - Lithium Thionyl Chloride batteries are not rechargeable batteries and should not be charged. Avoid the deformation of batteries by pressure. Keep the recommended usage conditions and temperatures by the manufacturer.

8. Exposure Controls and Personal Protection

Respiratory Protection - As any fire situation is happened, use self-contained breathing apparatus.

Eye Protection - Safety glasses are recommended.

Protective Gloves - In case of leakage, wear gloves.

Other Protective Clothing: In the event of leakage, wear chemical apron.

9. Physical and Chemical Properties

Melting Point	N/A	Boiling Point	N/A
Vapor Pressure	N/A	Specific Gravity	N/A
Vapor Density	N/A	Physical State	Solid
Solubility in Water	N/A	PH	N/A
Appearance	Geometric Solid Object		
Odor	If leaked, giving off pungent corrosive odor		

10. Stability and Reactivity

Stability - Stable (hermetically sealed type, used in recommended conditions)

Condition to Avoid - Give too much force, drop, crush & disassemble, short-circuit, recharge, fire & heat above 100°C (212°F), incinerate and etc.

Material to Avoid - Alkali, water, mineral acid

Hazardous Decomposition Products -

* Reaction of lithium metal with water: Hydrogen (H₂) / Lithium oxide (Li₂O) and Lithium hydroxide (LiOH)

* Thermal decomposition over 150°C: Hydrochloric acid (HCl) and Sulfur dioxide (SO₂)

* Electrolyte (Lithium tetrachloroaluminate, LiAlCl₄) with water: Hydrochloric acid (HCl) fumes, Lithium oxide (Li₂O), Lithium hydroxide (LiOH) and Aluminum hydroxide (Al(OH)₃)

11. Toxicological Information

Not Applicable

In the event of rupture or leakage, corrosive fumes from the battery can cause

Inhalation - Burn or irritation of the respiratory system

Eye Contact - Redness, tearing, burns

Skin - Skin irritation and burns

Ingestion - Tissue damage to throat and gastro-respiratory track

Medical conditions generally aggravated by exposure - eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

12. Ecological Information

1) Lithium Thionyl Chloride batteries do not have environmental hazard under normal usage and proper disposal.

2) Lithium Thionyl Chloride batteries do not contain mercury, cadmium or other heavy metals.

13. Disposal

1) Dispose under the regulation in each country.

2) Dispose by incineration or burial at permitted waste treatment and disposal sites

14. Transportation

1) Product Category: Lithium Metal Batteries (with All UN Test Approval)

2) UN ID No. UN3090 or UN3091

UN 3090: LITHIUM METAL BATTERIES

UN 3091: LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT, or
LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT

- Lithium metal cells and batteries are considered as Dangerous Goods with UN3090 and UN3091.

- Depending on their lithium metal contents, some cells or batteries may be regarded as non-dangerous goods without Class 9 nomination.

3) Regulation

A. Air Transportation: IATA 64th Edition 2023, Dangerous Goods Regulations

- All cells and batteries must be tested in accordance with the UN Manual of Tests and Criteria Part III Subsection 38.3 (DGR 3.9.2.6).

(1) UN3090

Small Size Battery : Lithium Contents Cells \leq 1g / Batteries \leq 2g

➔ Packing Instruction 968 Section IB

- No Passenger Cargo, Cargo Aircraft Only
- Package \leq Net 2.5kg
- Label: Lithium Battery Mark, Class 9 label, Cargo Aircraft Only label
- DG Declaration

Big Size Battery : Lithium Contents Cells $>$ 1g / Batteries $>$ 2g

➔ Package instruction 968 Section IA

- No Passenger Cargo, Cargo Aircraft Only
- Package \leq 35kg
- Label: Lithium battery Class 9 Label, Cargo Aircraft Only label
- DG Declaration & Certification

(2) UN3091

LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT

- Packing Instruction 970 Section II - Lithium Contents Cells \leq 1g / Batteries \leq 2g
- Packing Instruction 970 Section I - Lithium Contents Cells $>$ 1g / Batteries $>$ 2g

LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT

- Packing Instruction 969 Section II - Lithium Contents Cells \leq 1g / Batteries \leq 2g
- Packing Instruction 969 Section I - Lithium Contents Cells $>$ 1g / Batteries $>$ 2g

B. Sea Transportation: IMDG – Code 2023

Small Size Battery: Lithium Contents Cells $\leq 1g$

➔ Special Provision 188 (Exception)

- Lithium Metal cells $< 1g$, batteries $< 2g$ – Not subject to Class 9 (Non-DG)
- Packing Group I
- Each cell or battery is of the type proved to meet the requirements of each test of the Manual Tests and Criteria Part III, sub section 38.3. Cells and batteries manufactured.

Big Size Battery: Lithium Contents Cells $> 1g$

➔ Class 9 / Packing Group II

C. Road or Rail Transportation: ADR / RID 2023

Small Size Battery: Lithium Contents Cells $\leq 1g$

➔ Special Provision 188 (Exception)

- Lithium Metal cells $< 1g$, batteries $< 2g$ – Not subject to Class 9 (Non-DG)
- Packing Group I
- Each cell or battery is of the type proved to meet the requirements of each test of the Manual Tests and Criteria Part III, sub section 38.3. Cells and batteries manufactured.

Big Size Battery: Lithium Contents Cells $> 1g$

➔ Class 9 / Packing Group II

15. Regulatory Information

N/A

16. Other Information

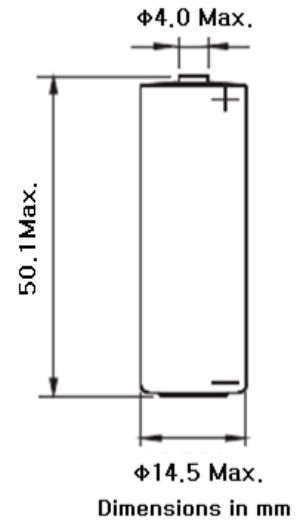
For further information, please contact to XenoEnergy Co., Ltd.

SPECIFICATIONS

(Typical values stored at 20°C for one year)

◆ Nominal capacity	2.6Ah
(at 1mA/20°C/68°F/2.0V cut-off)	
◆ Nominal voltage	3.6V
◆ Max. recommended continuous current	60mA
(Higher current can be available upon consulting)	
◆ Max. pulse current capability ★	120mA
◆ Operating temperature range	-55 ~+85°C
◆ Lithium metal content	approx. 0.7g
◆ Weight	17g
◆ Volume	8.0cm ³
◆ UL Approval	MH28122

Max Pulse Capability: Maximum Pulse capability reading over 3.0V at 120mA/0.1sec. every 2 min. at +20°C, 10μA/cm² base current with fresh batteries. The pulse capability can be different to the cell status, environment. For max. pulse coverage, capacitor support is recommended.

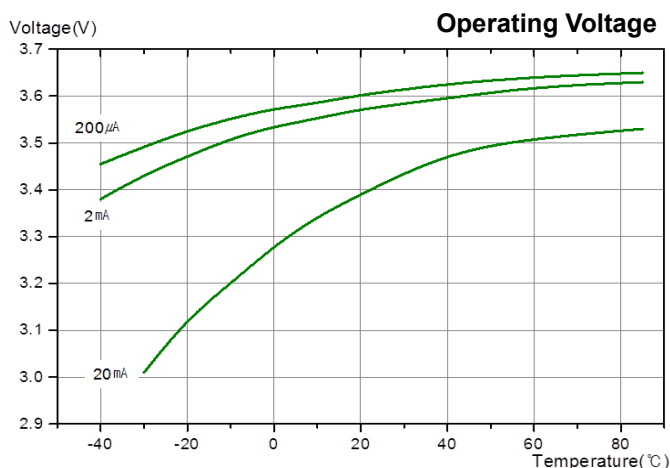
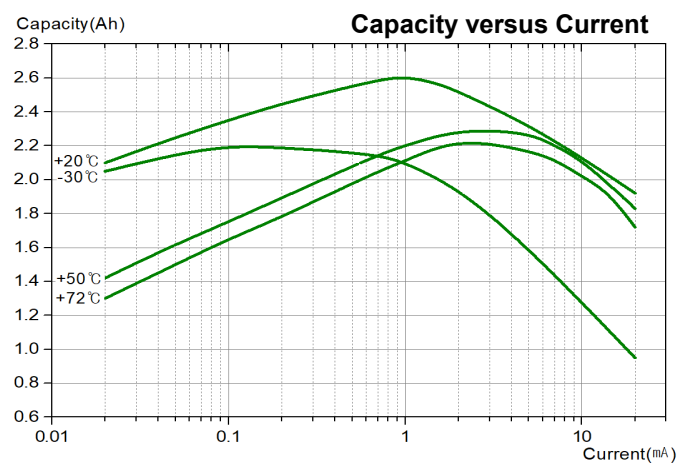
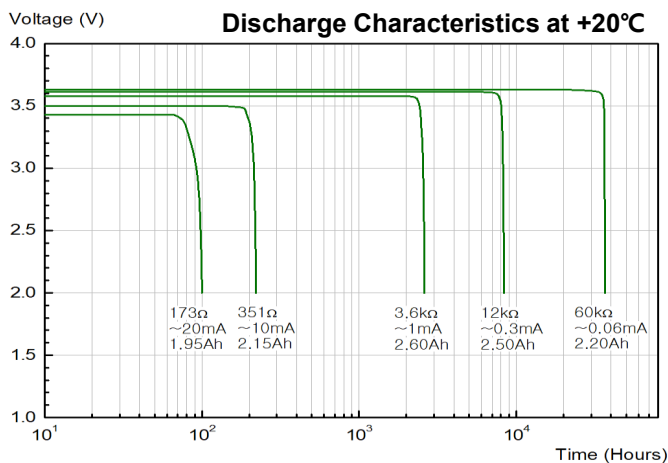


Available Terminal Type


STD, T1, T2, T3, T3/R, T3EU, T3EU/R, AX, Wire, Connector

Storage Condition

Please store batteries at clean, cool (not over +30°C), dry and ventilated condition



UN 38.3 Test Summary Report

<p>[a] Name of cell, battery or product manufacturer, as applicable</p> <p>Item Number : XL-060F/1S3P/Wire+XLC1325 Item Name : Pack Item Description : 3.6V / 7.8Ah Harness and cable : Wire, C&W</p>	<p>[b] Cell, battery, or product manufacturer's contact information to include address, phone number, email address and website for more information;</p> <p><u>XENOENERGY Co., Ltd.</u> 70-7, Muha-ro, Hwaseong-city, Kyonggi-do Republic of Korea, 18729 T. +82 31 355 3511 global@xenoenergy.com www.xenoenergy.com</p>																	
<p>[c] Name of the test laboratory to include address, phone number, email address and website for more information;</p> <p><u>XENOENERGY Co., Ltd.</u> 70-7, Muha-ro, Hwaseong-city, Kyonggi-do Republic of Korea, 18729 T. +82 31 355 3511 rnd@xenoenergy.com www.xenoenergy.com</p>	<p>[d] A unique test report identification number;</p> <p>Xeno Q110422</p>	<p>[e] Date of test report;</p> <p>April. 22, 2011</p>																
<p>[f] Description of cell or battery to include at a minimum: Lithium ion or lithium metal cell or battery; Mass; Watt-hour rating, or lithium content; Physical description of the cell/battery; and Model numbers.</p> <p>Cell used in implantable medical devices, such as : Pacemaker(IPG), Neuro-Stimulators or Implantable Defibrillators(ICD)</p> <p>(i) Lithium metal (ii) Mass : max. 65g (iii) Lithium content : less 2.0g (iv) ELC or W/h rating : 3.6V / 7.8Ah (v) Model number: XL-060F/1S3P/Wire+XLC1325</p>	<p>[g] List of tests conducted and results (i.e., pass/fail);</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/> Test T.1 : Altitude simulation</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.2 : Thermal test</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.3 : Vibration</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.4 : Shock</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.5 : External short circuit</td> <td>Pass</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.6 : Impact/Crush</td> <td>N/A</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.7 : Overcharge</td> <td>N/A</td> </tr> <tr> <td><input checked="" type="checkbox"/> Test T.8 : Forced discharge</td> <td>N/A</td> </tr> </table> <p>Testing additional comments : No additional information</p>		<input checked="" type="checkbox"/> Test T.1 : Altitude simulation	Pass	<input checked="" type="checkbox"/> Test T.2 : Thermal test	Pass	<input checked="" type="checkbox"/> Test T.3 : Vibration	Pass	<input checked="" type="checkbox"/> Test T.4 : Shock	Pass	<input checked="" type="checkbox"/> Test T.5 : External short circuit	Pass	<input checked="" type="checkbox"/> Test T.6 : Impact/Crush	N/A	<input checked="" type="checkbox"/> Test T.7 : Overcharge	N/A	<input checked="" type="checkbox"/> Test T.8 : Forced discharge	N/A
<input checked="" type="checkbox"/> Test T.1 : Altitude simulation	Pass																	
<input checked="" type="checkbox"/> Test T.2 : Thermal test	Pass																	
<input checked="" type="checkbox"/> Test T.3 : Vibration	Pass																	
<input checked="" type="checkbox"/> Test T.4 : Shock	Pass																	
<input checked="" type="checkbox"/> Test T.5 : External short circuit	Pass																	
<input checked="" type="checkbox"/> Test T.6 : Impact/Crush	N/A																	
<input checked="" type="checkbox"/> Test T.7 : Overcharge	N/A																	
<input checked="" type="checkbox"/> Test T.8 : Forced discharge	N/A																	
<p>[h] Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g));</p> <p>Not Applicable.</p>	<p>[i] Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any;</p> <p>UN Manual of Tests and Criteria, Part III, sub-section 38.3. <i>sixth revised edition</i></p>																	
<p>[j] Signature with name and title of signatory as an indication of the validity of information provided.</p> <p>Name(Signed by) : JR Kim Title : Director of R&D</p> 	<p>Date this document was generated.</p> <p>Oct. 21, 2019</p>																	
<p>Important! The above signatory / signatories affirm that this document is a true and correct summary of the original individual tests and test data. The original test data is confidential information available to competent State Authorities with valid identification and only upon their formal request. Disclosure of the original test data to any other entity upon its request will be considered by XENOENERGY and, should XENOENERGY consider this request is with merit, may be subject to the prior execution of a nondisclosure agreement.</p>																		



TEST - REPORT

UN manual of tests and criteria,
part III, sub-section 38.3,
Lithium metal and lithium ion batteries

**XL – 060F + XLC1325
(1S3P, Wire)**

Test Report Number : Xeno Q110422

Apr. 22, 2011






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Reliability Test Report

1. General information

- ◆ Apparatus - - - - - Lithium Primary Battery, Lithium ion capacitor
- ◆ Type Reference - - - - XL-060F(1S3P, Wire)+XLC1325
- ◆ Ratings - - - - - 3.6V, 7.8Ah
- ◆ Test Standards - - - - ST/SG/AC. 10/11/Rev.5
Recommendations on the Transport of Dangerous Goods :
Manual of Tests and Criteria, Part III, Sub-Section 38.3
Lithium metal and lithium ion batteries
UNITED NATIONS
- ◆ Manufacturer - - - - XenoEnergy Co., Ltd
470-20, Moosong-Dong, Hwaseong-City, Kyonggi-Do, Korea
- ◆ Date of Tests - - - - - Mar. 02, 2011 ~ Apr. 15, 2011
- ◆ Date of Issue - - - - - Apr. 22, 2011

Tested	Do-hyeong Kim (Project Engineer)	
Verified	In-woo Seong (Technical General Manager)	
Approved	Jong-ryoul Kim (Technical Director)	

2. Technical information

2-1. Summary of test results

No.	Test items	Criteria	Results
1	Test T.1 : Altitude Simulation	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
2	Test T.2 : : Thermal Test	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
3	Test T.3 : : Vibration	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
4	Test T.4 : Shock	<ul style="list-style-type: none"> - No mass loss, no leakage, no venting, no disassembly, no rupture and no fire. - The open circuit voltage of each cells after testing is not less than 90% of its voltage immediately prior to the procedure 	PASS
5	Test T.5 : External Short Circuit	- Their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.	PASS
6	Test T.6 : Impact	- Their external temperature does not exceed 170 °C and there is no disassembly and no fire within six hours of this test.	N/A
7	Test T.7 : Over Charge	- There is no disassembly and no fire within seven days of the test.	N/A
8	Test T.8 : Forced Discharge	- There is no disassembly and no fire within seven days of the test.	N/A

2-2. Test environment

** Unless specified otherwise in the individual tests shall be conducted under the following ambient conditions.*

Temperature - - - - - $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 Relative Humidity - - - - - Not specified
 Air Pressure - - - - - Not specified
 Altitude of test laboratory - - - - - 51m

2-3. Test instrument list

No.	Measurement Equipment
1	VO-10X Jeio Tech. (Vacuum Oven), Jisico(KOR)
2	Low & Constant Temp. Humidity Chamber, Jisico(KOR)
3	SJTA-2000S. (Vibration Tester), Sejin Technology(KOR)
4	SJTC-300. (Shock Tester), Sejin Technology(KOR)
5	Q-BloxxA 108/104 & Qterm-CJC-A104, (Short Circuit Tester) (KOR)
6	DX-2040(Recorder), Yokogawa(JPN)
7	732(01) Digital Multimeter, Yokogawa(JPN)
8	CAS MWP(KOR)
9	m Ω Hitester 3540, Hioki(JPN)

3. Test results

3-1. Possible test case verdicts

- * Test case does not apply to the test object - - - - - N/A
- * Test object does meet the requirement - - - - - P (Pass)
- * Test object does not meet the requirement - - - - - F (Fail)

3-2. Test purpose/procedure/requirements

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	When a cell or battery type is to be tested under this sub-section, the number and condition of cells and batteries of each type to be tested are as follows:	
	(a) When testing primary cells and batteries under tests 1 to 5 the following shall be tested in the quantity indicated :	P
	(i) ten cells in undischarged states,	N/A
	(ii) ten cells in fully discharged states,	N/A
	(iii) four small batteries in undischarged states,	P
38.3.3	(iv) four small batteries in fully discharged states.	N/A
	(v) four large batteries in undischarged states,	N/A
	(vi) four large batteries in fully discharged states.	N/A
	(b) When testing rechargeable cells and batteries under tests 1 to 5 the following shall be tested in the quantity indicated :	N/A
	(i) ten cells at first cycle, in fully charged states,	N/A
38.3.3	(ii) four small batteries at first cycle, in fully charged states,	N/A
	(iii) four small batteries after 50cycle ending in fully charged states,	N/A
	(iv) two large batteries at first cycle, in fully charged states, and	N/A
	(v) two large batteries after 25cycle ending in fully charged states,	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	(c) When testing primary and rechargeable cells under test 6, the following shall be tested in the quantity indicated :	N/A
	(i) for primary cells, five cells in undischarged states and five cells in fully discharged states,	N/A
	(ii) for component cells of primary batteries, five cells in undischarged states and five cells in fully discharged states,	N/A
	(iii) for rechargeable cells, five cells at first cycle at 50% of the design rated capacity, and	N/A
	(iv) for component cells of rechargeable batteries, five cells at first cycle at 50% of the design rated	N/A
	For prismatic cells, ten test cells are required for each of the states of charge being tested, instead of the five described above, so that the procedure can be carried out on five cells along the longitudinal axes and, separately, five cells along the other axes. In every case, the test cell is only subjected to one impact.	N/A
	(d) When testing rechargeable batteries under test 7, the following shall be tested in the quantity indicated :	N/A
	(ii) four small batteries at first cycle, in fully charged states,	N/A
	(iii) four small batteries after 50cycle ending in fully charged states,	N/A
	(iv) two large batteries at first cycle, in fully charged states, and	N/A
	(v) two large batteries after 25cycle ending in fully charged states,	N/A
	Batteries not equipped with overcharge protection that are designed for use only in a battery assembly, which affords such protection, are not subject to the requirements of this test.	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.3	(e) When testing primary and rechargeable cells under test 8, the following shall be tested in the quantity indicated: (i) ten primary cells in fully discharged states, (ii) ten rechargeable cells, at first cycle in fully discharged states, and (iii) ten rechargeable cells after 50 cycles ending in fully discharged states.	N/A N/A N/A
	(f) When testing a battery assembly in which the aggregate lithium content of all anodes, when fully charged, is not more than 500g, or in the case of a lithium ion battery, with a Watt-hour rating of not more than 6,200Watt-hours, that is assembled from cells or batteries that have passed all applicable tests, one battery assembly in a fully charged state shall be tested under tests 3,4 and 5, and, in addition, test 7 in the case of a rechargeable battery assembly. For a rechargeable battery assembly, the assembly shall have been cycled at least 25cycle	N/A
Clause	Procedure	Verdict
38.3.4	Each cell and battery type must be subjected to tests 1 to 8. Tests 1 to 5 must be conducted in sequence on the same cell or battery. Tests 6 and 8 should be conducted using not otherwise tested cells or batteries. Test 7 may be conducted using undamaged batteries previously used in Tests 1 to 5 for purposes of testing on cycled batteries.	P

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.1	<i>Test T.1 : Altitude simulation</i>	P
38.3.4.1.1	<i>Purpose :</i> This test simulates air transport under low-pressure conditions.	
38.3.4.1.2	<i>Test Procedure :</i> Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hours at ambient temperature($20\pm5^{\circ}\text{C}$).	P
38.3.4.1.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.1)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.2	<i>Test T.2 : Thermal test</i>	P
38.3.4.2.1	<p><i>Purpose :</i></p> <p>This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.</p>	
38.3.4.2.2	<p><i>Test Procedure :</i></p> <p>Test cells and batteries are to be stored for at least six hours at a test temperature equal to $75\pm 2^{\circ}\text{C}$, followed by storage for at least six hours at a test temperature equal to $(-40\pm 2^{\circ}\text{C})$. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature $(20\pm 5^{\circ}\text{C})$. For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.</p>	P
38.3.4.2.3	<p><i>Requirement :</i></p> <p>Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.</p>	P

* See appended 3-4.Test results(table T.2)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.3	<i>Test T.3 : Vibration</i>	P
38.3.4.3.1	<i>Purpose :</i> This test simulates vibration during transport.	
38.3.4.3.2	<i>Test Procedure :</i> Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3hrs for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep is as follows : from 7Hz a peak acceleration of 1G 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 occurs (approximately 50Hz). A peak acceleration of 8G is then maintained until the frequency is increased to 200 Hz.	P
38.3.4.3.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.3)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.4	<i>Test T.4: Shock</i>	P
38.3.4.4.1	<i>Purpose :</i> This test simulates possible impacts during transport.	
38.3.4.4.2	<i>Test Procedure :</i> Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a halfsine shock of peak acceleration of 150G and pulse duration of 6ms. 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. However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50G and pulse duration of 11ms. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.	P
38.3.4.4.3	<i>Requirement :</i> Cells and batteries meet this requirement if there is no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.	P

* See appended 3-4.Test results(table T.4)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.5	<i>Test T.5: External short circuit</i>	P
38.3.4.5.1	<i>Purpose :</i> This test simulates an external short circuit.	
38.3.4.5.2	<i>Test Procedure :</i> The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $55\pm 2^{\circ}\text{C}$ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1Ω at $55\pm 2^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $55\pm 2^{\circ}\text{C}$. The cell or battery must be observed for a further six hours for the test to be concluded.	P
38.3.4.5.3	<i>Requirement :</i> Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire within six hours of this test.	P

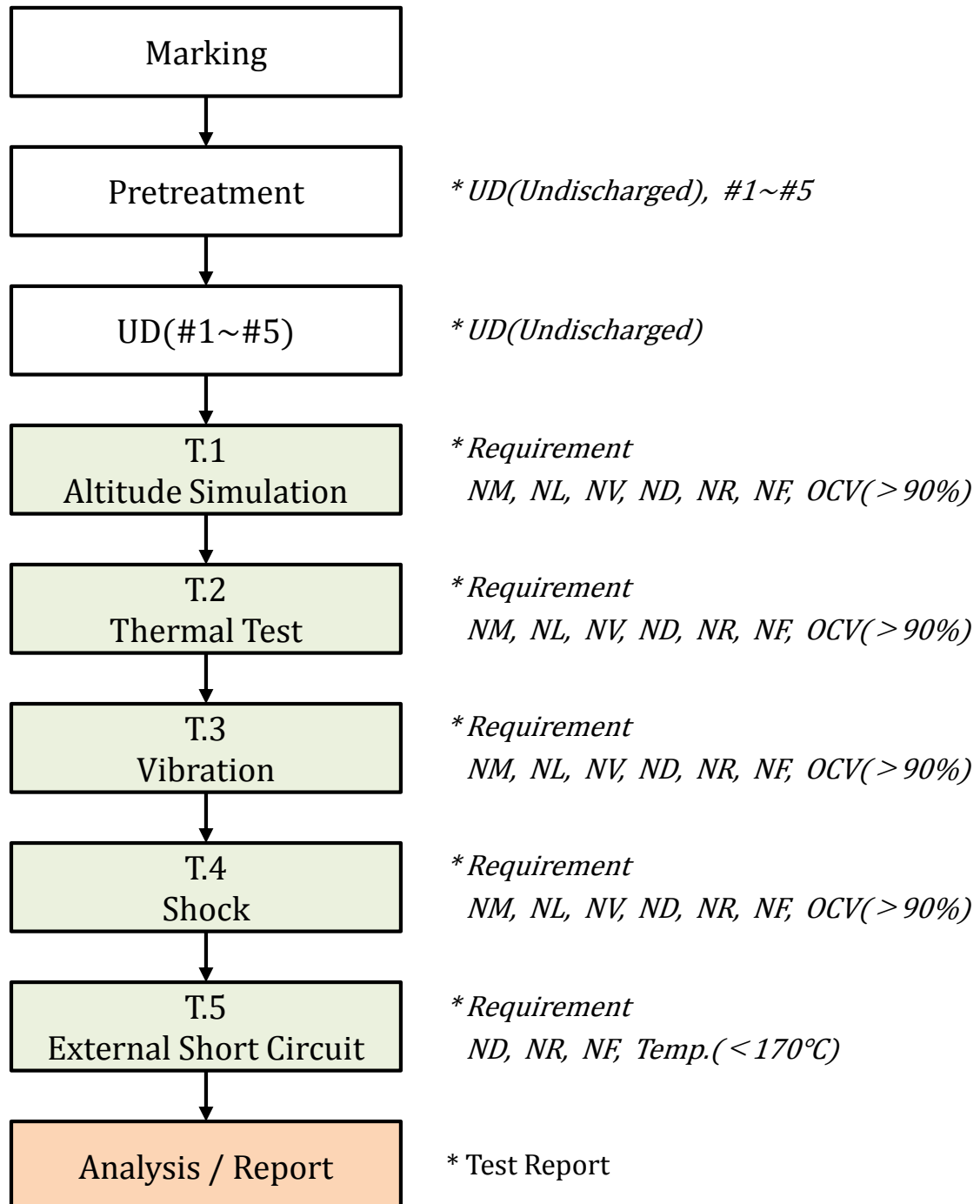
* See appended 3-4.Test results(table T.5)

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.6	<i>Test T.6 : Impact</i>	N/A
38.3.4.6.1	<i>Purpose :</i> This test simulates an impact.	
38.3.4.6.2	<p><i>Test Procedure :</i></p> <p>The test sample cell or component cell is to be placed on a flat surface. A 15.8mm diameter bar is to be placed across the center of the sample. A 9.1kg mass is to be dropped from a height of 61 ± 2.5cm onto the sample.</p> <p>A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter curved surface lying across the center of the test sample. A prismatic cell is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subjected to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each impact.</p> <p>A coin or button cell is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8mm diameter curved surface lying across its center.</p>	N/A
38.3.4.6.3	<p><i>Requirement :</i></p> <p>Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire within six hours of this test.</p>	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.7	<i>Test T.7: Overcharge</i>	N/A
38.3.4.7.1	<i>Purpose :</i> This test evaluates the ability of a rechargeable battery to withstand an overcharge condition.	
38.3.4.7.2	<i>Test Procedure :</i> The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows: (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. (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. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.	N/A
38.3.4.7.3	<i>Requirement :</i> Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven days of the test.	N/A

Sub-Section 38.3 Lithium metal and Lithium ion batteries		
Clause	Requirement + Test	Verdict
38.3.4.8	<i>Test T.8 : Forced discharge</i>	N/A
38.3.4.8.1	<p><i>Purpose :</i> This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.</p>	
38.3.4.8.2	<p><i>Test Procedure :</i> Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.</p> <p>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).</p>	N/A
38.3.4.8.3	<p><i>Requirement :</i> Primary or rechargeable cells meet this requirement if there is no disassembly and no fire within seven days of the test..</p>	N/A

3-3. Test procedure



3-4. Test results

Test T.1 : Altitude simulation					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-Discharged	T 1-1	65.6	3.66	65.6	3.66
	T 1-2	65.8	3.66	65.8	3.66
	T 1-3	65.8	3.66	65.8	3.66
	T 1-4	65.7	3.67	65.7	3.67
	T 1-5	65.8	3.66	65.8	3.66

Test T.1 : Altitude simulation					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 1-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 1-2	0	100		
	T 1-3	0	100		
	T 1-4	0	100		
	T 1-5	0	100		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

Test T.2 : Thermal Test					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 2-1	65.6	3.66	65.6	3.68
	T 2-2	65.8	3.66	65.8	3.67
	T 2-3	65.8	3.66	65.8	3.68
	T 2-4	65.7	3.67	65.7	3.68
	T 2-5	65.8	3.66	65.8	3.68

Test T.2 : Thermal Test					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 2-1	0	100.6	NM, NL, NV ND, NR, NF	PASS
	T 2-2	0	100.3		
	T 2-3	0	100.6		
	T 2-4	0	100.3		
	T 2-5	0	100.6		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

Test T.3 : Vibration					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 3-1	65.6	3.68	65.6	3.68
	T 3-2	65.8	3.67	65.8	3.67
	T 3-3	65.8	3.68	65.8	3.68
	T 3-4	65.7	3.68	65.7	3.68
	T 3-5	65.8	3.68	65.8	3.67

Test T.3 : Vibration					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 3-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 3-2	0	100		
	T 3-3	0	100		
	T 3-4	0	100		
	T 3-5	0	99.7		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

Test T.4 : Shock					
Sample No.		Prior to the test		After the test	
		Mass M (g)	OCV (V)	Mass M (g)	OCV (V)
Un-discharged	T 4-1	65.6	3.68	65.6	3.68
	T 4-2	65.8	3.67	65.8	3.67
	T 4-3	65.8	3.68	65.8	3.68
	T 4-4	65.7	3.68	65.7	3.67
	T 4-5	65.8	3.67	65.8	3.67

Test T.4 : Shock					
Sample No.		Variation		Result	
		Mass M loss(%)	OCV (%)		
Un-discharged	T 4-1	0	100	NM, NL, NV ND, NR, NF	PASS
	T 4-2	0	100		
	T 4-3	0	100		
	T 4-4	0	99.7		
	T 4-5	0	100		

* NM(No mass loss), NL(No leakage), NV(No venting), ND(No disassembly),
NR(No rupture), NF(No fire),

* OCV(Open circuit voltage) : Variation[(After/Prior)×100], Allowed(> 90%)

<i>Test T.5 : External short circuit</i>			
Sample No.		Open circuit voltage (V)	Measured maximum Temperature(°C)
Un-Discharged	T 5-1	3.68	95.4
	T 5-2	3.67	103.9
	T 5-3	3.68	108.1
	T 5-4	3.67	97.8
	T 5-5	3.67	96.1

<i>Test T.5 : External short circuit</i>				
Sample No.		Allowed	Result	
		Maximum Temperature(°C)		
Un-discharged	T 5-1	95.4	ND, NR, NF	PASS
	T 5-2	103.9		
	T 5-3	108.1		
	T 5-4	97.8		
	T 5-5	96.1		

* Supplementary information :

Their external temperature does not exceed 170°C and there is ND(No disassembly), NR(No rupture) and NF(No fire)



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Declaration of Conformity to EU REACH

2022. 01. 17

Products listed below that are manufactured by XenoEnergy are in compliance to Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Specifically, products manufactured do not contain the substances listed in the following sections of this directive:

- XenoEnergy products do not contain any of the Substances of Very High Concern (SVHC) as defined in Article 57 and Annex XIV with amendments dated:
 - 9 October 2008
 - 13 January 2010
 - 30 March 2010
 - 18 June 2010
 - 15 December 2010
 - 20 June 2011
 - 19 December 2011
 - 18 June 2012
 - 19 December 2012
 - 20 June 2013
 - 16 December 2013
 - 16 June 2014
 - 17 December 2014
 - 15 June 2015
 - 17 December 2015
 - 20 June 2016
 - 12 January 2017
 - 7 July 2017
 - 15 January 2018
 - 27 June 2018
 - 14 February 2018
 - 16 July 2019
 - 16 January 2020
 - 25 June 2020
 - 19 January 2021
 - 08 July 2021 / 17 Jan 2022 (Number of substances on the candidate list: Total 223)

XenoEnergy Products do not contain any of the substances as described in Article 67 and Annex XVII.

Product Identification: Lithium Thionyl Chloride (Li-SOCl₂) & Sulfuryl Chloride (Li-SO₂Cl₂) Battery

XL-050F / XLP-050F / XL-050H / XL-055F / XLP-055F / XL-060F / XLP-060F / XL-060H
XL-100F / XL-145F / XL-205F / XL-1459F / XL-2059F / XL-060F/1S3P/Wire+XLC1325

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Declaration of Conformity to EU RoHS 3

January 07, 2022

Products listed below that are manufactured by XenoEnergy Co.,Ltd. are in compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (also known as "RoHS Recast") and Directive 2015/863 published in 2015 by the EU, and adds four additional restricted substances (phthalates) to the original list of six. In addition, this declaration of conformity is issued under the sole responsibility of XenoEnergy Co., Ltd. Specifically, products manufactured do not contain the substances listed in the table below in concentrations greater than the listed maximum value.

Substance	Maximum Limit (ppm)	Results
Lead (Pb)	5	N.D.
Cadmium (Cd)	0.5	N.D.
Mercury (Hg)	2	N.D.
Hexavalent Chromium (Cr6+)	8	N.D.
Poly Brominated Biphenyls (PBB)	5	N.D.
Poly Brominated Diphenyl ethers (PBDE)	5	N.D.
Di-(2-ethylhexyl) phthalate (DEHP)	50	N.D.
Di-butyl phthalate (DBP)	50	N.D.
Benzyl butyl phthalate (BBP)	50	N.D.
Di-isobutyl phthalate (DIBP)	50	N.D.

* N.D. = Not Detected.

Product Identification: Lithium Thionyl Chloride (Li-SOCl₂) Battery

- XL-050F / XLP-050F / XL-050H
- XL-055F / XLP-055F
- XL-060F / XLP-060F / XL-060H / XL-060F/1S3P/Wire+XLC1325
- XL-100F
- XL-140F / XL-145F / XL-1459F
- XL-200F / XL-205F / XL-2059F

XENOENERGY CO., LTD.

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