

Test Report issued under the responsibility of:



TEST REPORT EN IEC 60086-5 Primary Batteries Part 5: Safety of batteries with aqueous electrolyte	
Report Number..... : 2404B0730SHA-021 Date of issue : 2024-11-15 Total number of pages 21	
Name of Testing Laboratory preparing the Report	Intertek Testing Services (Shanghai FTZ) Co., Ltd. Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Applicant's name	Zhejiang Mustang Battery Co., Ltd.
Address.....	No.818 Rongji Road, Luotuo Town, Ningbo, China 315202
Test specification: Standard : EN IEC 60086-5:2021+AC:2022-07 Test procedure..... : Testing Non-standard test method : N/A	
TRF template used..... : IECEE OD-2020-F1:2021, Ed.1.4 Test Report Form No. : IEC60086_5C Test Report Form(s) Originator : Intertek Semko AB Master TRF : Dated 2021-11-01 Copyright © 2021 IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE System). All rights reserved. This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.	
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Test item description..... :	Extra Alkaline Battery	
Trade Mark..... :	Raymax	
Manufacturer	Same as applicant	
Model/Type reference	LR20 (D)	
Ratings	1.5V	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	Testing Laboratory:	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Testing location/ address..... :		Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Tested by (name, function, signature)..... :		Michael Zheng (Engineer) <i>Michael Zheng</i>
Approved by (name, function, signature).... :		Liping Chen (Mandated Reviewer) <i>Liping Chen</i>
Testing procedure: CTF Stage 1:		
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature).... :		
Testing procedure: CTF Stage 2:		
Testing location/ address..... :		
Tested by (name + signature)		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature).... :		
Testing procedure: CTF Stage 3:		
Testing procedure: CTF Stage 4:		
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature).... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment): Appendix 1: Photos of the product.....Page 21	
Summary of testing: The test results presented in this report relate only to the item tested. The results indicates that the specimen complies with standard "EN IEC 60086-5:2021+AC:2022-07".	
Tests performed (name of test and test clause): Clause 6.3.2.1, Test A: storage after partial use Clause 6.3.2.2, Test B-1: transportation-shock Clause 6.3.2.3, Test B-2: transportation-vibration Clause 6.3.2.4, Test C: climatic-temperature cycling Clause 6.4.2.1, Test D: incorrect installation Clause 6.4.2.2, Test E: external short circuit Clause 6.4.2.3, Test F: overdischarge Clause 6.4.2.4, Test G: free fall	Testing location: Intertek Testing Services (Shanghai FTZ) Co., Ltd. Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Summary of compliance with National Differences (List of countries addressed): None	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Test item particulars.....:	
Classification of installation and use.....: Primary battery	
Supply Connection 1.5V	
.....:	
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)	
Testing..... :	
Date of receipt of test item 2024-05-19	
Date (s) of performance of tests 2024-06-06 to 2024-07-25	
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator. This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60086 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) Same as applicant	
General product information:	
Products covered by this report are primary alkaline Zinc Manganese Dioxide batteries.	

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict
4	REQUIREMENTS FOR SAFETY		
4.1	Design		P
4.1.1	General		P
	Batteries shall be so designed that they do not present a safety hazard under conditions of normal (intended) use		P
4.1.2	Venting		P
	All batteries shall incorporate a pressure relief feature or shall be so constructed that they will relieve excessive internal pressure at a value and rate which will preclude explosion		P
	The battery case material and/or its final assembly shall be so designed that, in the event of one or more cells venting, the battery case does not present a hazard in its own right		P
4.2	Quality plan		P
	The manufacturer shall prepare a quality plan defining the procedures for the inspection of materials, components, cells and batteries during the course of manufacture, to be applied to the total process of producing a specific type of battery		P
5	SAMPLING		
5.1	General		P
	Samples should be drawn from production lots in accordance with accepted statistical methods and shall meet the requirements specified for dimensions and open circuit voltage set forth in EN IEC 60086-2.		P
5.2	Sampling for type approval		P
	The number of samples drawn for type approval is given in below,		P
	Open circuit voltage (n = 70) Dimensions (n = 70)		P
	Intended use A Partial use (n = 5) B-1 Transportation-shock (n = 5) B-2 Transportation-vibration (n = 5) C Climatic (n = 5)		P

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict
	Reasonably foreseeable A misuse D Incorrect installation (n = 20) E External short circuit (n = 5) F Overdischarge (n = 20) G Free fall (n = 5)		P
5.3	Validity of testing		N/A
	Cells or batteries with aqueous electrolyte shall be subjected to the tests, as required in this document. Testing remains valid until a design change or requirement revision has been made. Retesting is required when:		N/A
	a) a battery specification changes by more than 0,1 g or 20 % mass, whichever is greater, for the cathode, anode or electrolyte;		N/A
	b) a battery specification change would lead to a failure of any of the tests;		N/A
	c) there is an addition of new tests or requirements;		N/A
	d) there is a requirement change that would lead to a failure of any of the tests.		N/A
6	TESTING AND REQUIREMENTS		
6.1	General		P
6.1.1	Applicable safety tests		P
	Applicable safety tests are shown in Table 1		P
	The tests described in Tables 2 and 6 are intended to simulate conditions which the battery is likely to encounter during intended use and reasonably foreseeable misuse		P
6.1.2	Cautionary notice		P
6.1.3	Ambient temperature		P
	Unless otherwise specified, these tests shall be carried out at (20 ± 5) °C	23°C	P
6.2	Evaluation of test criteria		P
6.2.1	Explosion		P
	An explosion is considered to have occurred when there is an instantaneous release wherein solid matter from any part of the battery is propelled to a distance greater than 25 cm away from the battery.	No explosion	P
6.2.2	Fire		P
	A fire is considered to have occurred if flames are emitted from a test cell or battery.	No fire	P

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.3	Leakage		P
	Leakage is considered to have occurred if there is an unplanned escape of electrolyte from a cell or battery.	No leakage	P
6.2.4	Venting		P
	Venting is considered to have occurred if there is a release of excessive internal pressure from a cell or battery in a manner intended by design to preclude explosion.	No venting	P
6.3	Intended use		P
6.3.1	Intended use tests and requirements		P
6.3.2	Intended use test procedures		P
6.3.2.1	Test A – Storage after partial use		P
	An undischarged battery is discharged under an application or service output test condition, with the load defined in EN IEC 60086-2 resulting in the longest test duration until the service life falls by 50 % of the highest minimum average duration (MAD) value, followed by storage at (45 ± 2) °C for 30 days		P
	Results: no leakage, no fire and no explosion..... :	(See appended table)	P
6.3.2.2	Test B-1 – Transportation-shock		P
	The shock test shall be carried out under the conditions defined in Table 3 and the sequence in Table 4		P
	Results: no leakage, no fire and no explosion..... :	(See appended table)	P
6.3.2.3	Test B-2 – Transportation-vibration		P
	The vibration test shall be carried out under the following test conditions and the sequence in Table 5		P
	Results: no leakage, no fire and no explosion..... :	(See appended table)	P
6.3.2.4	Test C – Climatic-temperature cycling		P
	Temperature cycling procedure (see 1) to 7) and/or Figure 2)		P
	Result: no fire and no explosion..... :	(See appended table)	P
6.4	Reasonably foreseeable misuse		P
6.4.1	Reasonably foreseeable misuse tests and requirements		P
6.4.2	Reasonably foreseeable misuse test procedures		P

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.2.1	Test D – Incorrect installation (four batteries in series)		P
	The circuit were complete for - 24 hours elapsed, or		N/A
	- until the battery case temperature has returned to ambient		P
	Results: no fire and no explosion..... :	(See appended table)	P
6.4.2.2	Test E – External short circuit		P
	The circuit were complete for - 24 hours elapsed, or		N/A
	- until the battery case temperature has returned to ambient		P
	Results: no fire and no explosion..... :	(See appended table)	P
6.4.2.3	Test F – Overdischarge		P
	Results: no fire and no explosion..... :	(See appended table)	P
6.4.2.4	Test G – Free fall test		P
	Results: no fire and no explosion..... :	(See appended table)	P
7	INFORMATION FOR SAFETY		
7.1	Precautions during handling of batteries		P
	When used correctly, primary batteries with aqueous electrolyte provide a safe and dependable source of power. However, battery misuse or abuse may result in leakage, or in extreme cases, fire and/or explosion		P
	a) Always insert batteries correctly with regard to the polarities (+ and –) marked on the battery and the equipment	Warning statement marked on battery body.	P
	b) Do not short-circuit batteries		N/A
	c) Keep batteries out of the reach of children	Warning statement marked on battery body.	P
	d) Do not charge batteries	Warning statement marked on battery body.	P
	e) Do not force discharge batteries		N/A
	f) Do not mix old and new batteries or batteries of different types or brands	Warning statement marked on battery body.	P
	g) Exhausted batteries should be immediately removed from equipment and properly disposed of		N/A
	h) Do not expose batteries to heat.	Warning statement marked on battery body.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	i) Do not weld or solder directly to batteries		N/A
	j) Do not dismantle batteries	Warning statement marked on battery body.	P
	k) Do not deform batteries		N/A
	l) Do not dispose of batteries in fire	Warning statement marked on battery body.	P
	m) Do not allow children to replace batteries without adult supervision		N/A
	n) Do not encapsulate and/or modify batteries		N/A
	o) Store unused batteries in their original packaging away from metal objects. If already unpacked, do not mix or jumble batteries		N/A
	p) Remove batteries from equipment if it is not to be used for an extended period of time unless it is for emergency purposes		N/A
7.2	Packaging		N/A
	The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking	The end package is not considered in this report.	N/A
	The materials and packaging design shall be chosen so as to prevent the development of unintentional electrical contact, corrosion of the terminals and some protection from the environment		N/A
7.3	Handling of battery cartons		N/A
	Battery cartons should be handled with care. Rough handling might result in battery damage. This can cause leakage, explosion, or fire.	The end package is not considered in this report.	N/A
7.4	Display and storage		N/A
	a) Batteries shall be stored in well-ventilated, dry and cool conditions	The end package is not considered in this report.	N/A
	b) Battery cartons should not be piled up in several layers (or should not exceed a specified height)		N/A
	c) When batteries are stored in warehouses or displayed in retail stores, they should not be exposed to direct sun rays for a long time or placed in areas where they get wet by rain		N/A
	d) Do not mix unpacked batteries so as to avoid mechanical damage and/or short-circuit among each other		N/A
	e) See Annex A for additional details		N/A
7.5	Transportation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When loaded for transportation, battery packages should be so arranged to minimise the risk of falling		N/A
7.6	Disposal		N/A
	a) Do not dismantle batteries	Not checked	N/A
	b) Do not dispose of batteries in fire except under conditions of controlled incineration		N/A
	c) Primary batteries may be disposed of via the communal refuse arrangements, provided that no local rules to the contrary exist		N/A
	d) The provision for the collection of used batteries		N/A
	Following should be considered:		N/A
	• Store collected batteries in a non-conductive container.		N/A
	• Store collected batteries in a well-ventilated area.		N/A
	• Do not mix collected batteries with other materials.		N/A
	• Consider protecting used battery terminals, particularly those batteries with high voltage		N/A
	• Failure to observe these recommendations may result in leakage, fire, and/or explosion.		N/A
8	INSTRUCTIONS FOR USE		
	a) Always select the correct size and grade of battery most suitable for the intended use	The Instruction is not considered in this report.	N/A
	Information provided with the equipment to assist correct battery selection should be retained for reference		N/A
	b) Replace all batteries of a set at the same time		N/A
	c) Clean the battery contacts and also those of the equipment prior to battery installation		N/A
	d) Ensure that the batteries are installed correctly with regard to polarity (+ and –)		N/A
	e) Remove batteries from equipment which is not to be used for an extended period of time		N/A
	f) Remove exhausted batteries promptly		N/A
9	MARKING AND PACKAGING		
9.1	General batteries		P
	With the exception of small batteries (see 9.2), each battery shall be marked with the following information		P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) designation, IEC or common	Batteries are marked IEC designation "LR20" and common designation "D"	P
	b) expiration of a recommended usage period or year and month or week of manufacture	Marked 04-2029 on battery bottom	P
	c) polarity of the positive (+) terminal	Batteries are marked polarity "+" and "-"	P
	d) nominal voltage	Batteries are marked nominal voltage "1.5V"	P
	e) name or trade mark of the manufacturer or supplier	Batteries are marked trademark "Raymax"	P
	f) cautionary advice	Warning statement marked on battery body.	P
9.2	Swallowable button cells		N/A
	a) designation, IEC or common		N/A
	b) expiration of a recommended usage period or year and month or week of manufacture		N/A
	c) polarity of the positive (+) terminal		N/A
	d) nominal voltage		N/A
	e) name or trade mark of the manufacturer or supplier		N/A
	f) cautionary advice		N/A
	g) Caution for ingestion of swallowable batteries, see also 7.1 c) and Annex D		N/A
	h) Child resistant packaging		N/A
9.3	Safety pictograms		N/A
	Safety pictograms that could be considered for use as an alternative to written cautionary advice are provided in Annex C.		N/A
Annex A	Additional information on display and storage		
	It takes the form of advice to battery manufacturers, distributors, users, and equipment designers		N/A
	Storage and stock rotation		N/A
Annex B	Battery compartment design guidelines		
B.1	Background		N/A
B.1.1	General		N/A
B.1.2	Battery failures resulting from poor battery compartment design		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Poor battery compartment design may lead to reversed battery installation or to short circuiting of the batteries		N/A
B.1.3	Potential hazards resulting from battery reversal		N/A
B.1.4	Potential hazards resulting from a short circuit		N/A
B.2	General guidance for appliance design		N/A
B.2.1	Key battery factors to be first considered		N/A
B.2.2	Other important factors to consider		N/A
B.3	Specific measures against reversed installation		N/A
B.3.1	General		N/A
	To overcome the problems associated with the reversed placement of a battery, consideration should be given at the design stage to ensure that batteries cannot be installed incorrectly or, if so installed, will not make electrical contact		N/A
B.3.2	Design of the positive contact		N/A
B.3.3	Design of the negative contact		N/A
B.3.4	Design with respect to battery orientation		N/A
B.3.5	Dimensional considerations		N/A
B.4	Specific measures to prevent short-circuiting of batteries		N/A
B.4.1	Measures to prevent short-circuiting due to battery jacket damage		N/A
B.4.2	Measures to prevent external short-circuit of a battery caused when coiled spring contacts are employed for battery connection		N/A
B.5	Special considerations regarding recessed negative contacts		N/A
B.6	Waterproof and non-vented devices		N/A
B.7	Other design considerations		N/A
Annex C	Safety pictograms		
C.1	General		N/A
	Cautionary advice to fulfil the marking requirements in this standard has, on a historical basis, been in the form of written text		N/A
C.2	Pictograms		N/A
	The pictogram recommendations and cautionary advices are given in Table C.1		N/A

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict
	 DO NOT CHARGE		N/A
	 DO NOT DEFORM / DAMAGE		N/A
	 DO NOT DISPOSE OF IN FIRE		N/A
	 DO NOT INSERT INCORRECTLY		N/A
	 KEEP OUT OF REACH OF CHILDREN		N/A
	 DO NOT MIX DIFFERENT TYPES OR BRANDS		N/A
	 DO NOT MIX NEW AND USED		N/A
	 DO NOT OPEN / DISMANTLE		N/A
	 DO NOT SHORT CIRCUIT		N/A
	 INSERT CORRECTLY		N/A
C.3	Recommendations for use		N/A
	The following instructions are provided for use of the pictograms		N/A
	a) Pictograms shall be clearly legible		N/A
	b) Whilst colours can be used, they should not detract from the information displayed. If colours are used, the background of pictograms E and J should be blue and the circle and diagonal bar of the other pictograms should be red.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) Not all of the pictograms need to be used together for a particular type or brand of battery. In particular, pictogram D and J are meant as alternatives for a similar purpose		N/A
Annex D	Use of the KEEP OUT OF REACH OF CHILDREN safety sign		N/A
D.1	General		N/A
D.2	Safety sign		N/A
	When a safety sign is used to convey the message that these swallowable button cells (i.e. can fit in the ingestion gauge, see Figure 7) should be kept out of the reach of children, the following best practices apply. The safety sign recommendation and cautionary advice for use on battery packaging are given in Table C.1, safety pictogram E.		N/A
D.3	Best practices for marking the packaging		N/A
	Packaging of swallowable button cells (i.e. can fit in the ingestion gauge, see Figure 7) should be marked with the safety pictogram E of Table C.1 to alert the purchaser of the increased risk of such cells.		N/A
	a) Refer to Table 7 for marking requirements on packaging.		N/A
	b) The safety sign should be on contrasting background. The background should cover at least 50 % of the area of the pictogram.		N/A
	c) The size of the safety sign should be 6 mm in diameter or larger.		N/A
	d) If the text "KEEP OUT OF REACH OF CHILDREN" is used, it should contrast with the background colour on which it is printed.		N/A
Annex E	Child resistant packaging		
E.1	General		N/A
E.1.1	General		N/A
E.1.2	Applicability		N/A
E.1.3	Packaging design		N/A
E.1.3.1	Single cell packaging		N/A
	The packaging for button cells should meet one of the following:		N/A
	a) packaging strength as described in E.1.3.3		N/A
	b) packaging requirements based on local legislation or standardization [8], [9], [10], if applicable.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
E.1.3.2	Multi-cell packaging		N/A
	Each cell containment in a multi-cell packaging should meet the above requirements even when another cell containment is removed from the packaging.		N/A
E.1.3.3	Packaging strength		N/A
	The packaging strength should be such that the packaging passes the tests described in Clause E.2.		N/A
E.2	Packaging tests		N/A
E.2.1	General		N/A
	The following test methods were developed based on the analysis of the behaviour of children in a test where they were required to try and open button cell packaging within a limited time. The tests should be conducted by an instructed person or, alternatively, if necessary, using suitable equipment.		N/A
E.2.2	Test items		N/A
	a) Bending test		N/A
	b) Torsion test		N/A
	c) Tearing test		N/A
	d) Pushing test		N/A
E.2.3	Test procedure		N/A
	The test procedure is conducted with ten sample packagings. Each sample is subjected to a series of tests in the order and frequency outlined in Table E.1.		N/A
E.2.4	Criteria		N/A
	Each test sample should meet the following criteria.		N/A
	a) each cell should be kept in its packaging until the end of the test series		N/A
	b) in order to prevent a child from pulling the cell out from its compartment, the packaging should not open too wide. The maximum allowable size of an opening in the packaging is 6 mm diameter for a round hole and 10 mm length for a slit. See Figure E.5 for maximum packaging openings.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

6.3.2.1	TABLE: Test A – Storage after partial use					P
Model, Sample number	OCV at start of test (Vdc)	Longest test duration load	MAD (h)	Storage temperature (45 ± 2 °C)	Results	
LR20 / 001	1.5047 / 1.5388V	2.2 Ω	8 h	45 °C	No leakage, no fire and no explosion	
LR20 / 002	1.5058 / 1.5402V	2.2 Ω	8 h	45 °C		
LR20 / 003	1.4913 / 1.5305V	2.2 Ω	8 h	45 °C		
LR20 / 004	1.5040 / 1.5381V	2.2 Ω	8 h	45 °C		
LR20 / 005	1.4913 / 1.5304V	2.2 Ω	8 h	45 °C		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Leakage - Bulge - Others (please explain)						

6.3.2.2	TABLE: Test B-1 – Transportation-shock			P
Model, Sample number	Ambient (20 ± 5 °C)	OCV at start of test (Vdc)	Results	
LR20 / 006	23°C	1.6178 / 1.6177V	No leakage, no fire and no explosion	
LR20 / 007	23°C	1.6196 / 1.6195V		
LR20 / 008	23°C	1.6174 / 1.6174V		
LR20 / 009	23°C	1.6195 / 1.6195V		
LR20 / 010	23°C	1.6177 / 1.6177V		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Leakage - Bulge - Others (please explain)				

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict

6.3.2.3	TABLE: Test B-2 – Transportation-Vibration			P
Model, Sample number	Ambient (20 ± 5 °C)	OCV at start of test (Vdc)	Results	
LR20 / 011	23°C	1.6179 / 1.6179V	No leakage, no fire and no explosion	
LR20 / 012	23°C	1.6183 / 1.6184V		
LR20 / 013	23°C	1.6192 / 1.6191V		
LR20 / 014	23°C	1.6188 / 1.6198V		
LR20 / 015	23°C	1.6190 / 1.6190V		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Bulge - Others (please explain)				

6.3.2.4	TABLE: Test C – Climatic-temperature cycling		P
Model, Sample number		OCV at start of test (Vdc)	Results
LR20 / 016		1.6194 / 1.6192V	No leakage, no fire and no explosion
LR20 / 017		1.6209 / 1.6202V	
LR20 / 018		1.6199 / 1.6195V	
LR20 / 019		1.6176 / 1.6176V	
LR20 / 020		1.6220 / 1.6214V	
Supplementary information:			
- No fire - No explosion - No leakage - Fire - Explosion - Leakage - Bulge - Others (please explain)			

EN IEC 60086-5			
Clause	Requirement + Test	Result - Remark	Verdict

6.4.2.1	TABLE: Test D – Incorrect installation					P
Model, Sample number	Ambient (20 ± 5 °C)	OCV of reversed battery (Vdc)	Resistance of circuitry (Ω)	Maximum case temperature (°C)	Results	
LR20 / 021~024	23°C	1.6177V	0.076 Ω	64°C	No fire and no explosion	
LR20 / 025~028	23°C	1.6172V	0.078 Ω	71°C		
LR20 / 029~032	23°C	1.6189V	0.077 Ω	59°C		
LR20 / 033~036	23°C	1.6182V	0.082 Ω	66°C		
LR20 / 037~040	23°C	1.6176V	0.079 Ω	69°C		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Bulge - Others (please explain)						

6.4.2.2	TABLE: Test E – External short circuit					P
Model, Sample number	Ambient (20 ± 5 °C)	OCV of reversed cell (Vdc)	Resistance of circuitry (Ω)	Maximum case temperature (°C)	Results	
LR20 / 041	23°C	1.6183V	0.076 Ω	101°C	No fire and no explosion	
LR20 / 042	23°C	1.6190V	0.078 Ω	98°C		
LR20 / 043	23°C	1.6186V	0.077 Ω	105°C		
LR20 / 044	23°C	1.6187V	0.082 Ω	111°C		
LR20 / 045	23°C	1.6193V	0.079 Ω	111°C		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Bulge - Others (please explain)						

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Clause	Requirement + Test	Result - Remark	Verdict

6.4.2.3	TABLE: Test F – Overdischarge					P
Model, Sample number	Ambient (20 ± 5 °C)	OCV at start of test (Vdc)	Highest MAD (h)	R1 (Ω)	Results	
LR20 / 046~049	23°C	1.6173V	16 h	8.8 Ω	No fire and no explosion. Max. temperature: 38°C	
LR20 / 050~053	23°C	1.6190V	16 h	8.8 Ω		
LR20 / 054~057	23°C	1.6179V	16 h	8.8 Ω		
LR20 / 058~061	23°C	1.6172V	16 h	8.8 Ω		
LR20 / 062~065	23°C	1.6185V	16 h	8.8 Ω		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Bulge - Others (please explain)						

6.4.2.4	TABLE: Test G – Free fall test			P
Model, Sample number	Ambient (20 ± 5 °C)	OCV at start of test (Vdc)	Results	
LR20 / 066	23°C	1.6185 / 1.6184V	No fire and no explosion	
LR20 / 067	23°C	1.6194 / 1.6194V		
LR20 / 068	23°C	1.6188 / 1.6188V		
LR20 / 069	23°C	1.6179 / 1.6179V		
LR20 / 070	23°C	1.6190 / 1.6189V		
Supplementary information: - No fire - No explosion - No leakage - Fire - Explosion - Leakage - Bulge - Others (please explain)				

Product Photos:

LR20 (D)

