Ono Works: 5, Takumidai, Ono-shi, Hyogo 675-1322, Japan
Phone: (+81) 794-63-8054 Facsimile: (+81) 794-63-8058 http://www.maxell.co.jp

Certification

C190311-1

model name : CR1616			
☑ Lithium metal cell or battery		☐ Lithium-ion cell or battery	
Lithium content		Watt-hour rating	
☑ cell	☐ battery(pack)	☐ cell	☐ battery(pack)
☑ ≦ 0.3g	☐ ≦ 0.3g	☐ ≦ 2.7Wh	☐ ≦ 2.7Wh
☐ ≦ 1g	☐ ≦ 2g	☐ ≦ 20Wh	☐ ≦ 100Wh
☐ ＞ 1g	☐ ＞ 2g	☐ ＞ 20Wh	☐ ＞ 100Wh
		Nominal Voltage	V
		Rated Capacity	mAh

Transport tests and results

Test number	Designation	Results	Remarks
T-1	Altitude	Accepted	
T-2	Thermal cycling	Accepted	
T-3	Vibration	Accepted	
T-4	Shock	Accepted	
T-5	External short circuit	Accepted	
T-6	Crush	Accepted	
T-7	Overcharge	Not applicable	for rechargeable battery only
T-8	Forced Discharge	Accepted	

We certify that above results are confirmed in accordance with the Manual of Tests and Criteria of the UN Recommendations on the Transport of Dangerous Goods(5th revised edition Amendment2), Part Ⅲ, sub-section 38.3

Name / Title of Signatory

Takashi Kimura / Senior Manager, MD Design Dept.

Signature

T. Kimura

March 11, 2019

Compliant with 6th revised edition
(Form revision date : 8-Jan-2017)

Test No.	C-1804-4				
Test	**T.1: Altitude simulation**				
Item (Status)	**CR1616** (Undischarged)		Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30 恭	Prepared by: 中谷 '18.5.30 洸
Place	Safety test house	Equipment No.	P-23-01	Type	Li content
Number of test specimen	10			Cell or Battery	0.02 g
Performed by	Koya nakatani				

Time and temperature					
Test time	Start	2018/4/5 9:15	Finish	2018/4/5 15:15	
Temperature		20.3℃		20.5℃	
Observe time	Start	2018/4/5 15:15	Finish	2018/4/5 16:16	
Temperature		20.3℃		20.3℃	

Test procedure

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least 6 hours at ambient temperature (20 ± 5 °C).

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.
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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Test time 6 hr Pressure: Less than 11.6kPa									
Voltage	Pre-test(V_1) [V]	3.245	3.239	3.248	3.241	3.237	3.243	3.251	3.238	3.235	3.244
	After-test(V_2) [V]	3.245	3.248	3.236	3.251	3.250	3.247	3.244	3.251	3.248	3.237
	Change rate*1 [%]	100	100	100	100	100	100	100	100	100	100
Mass	Pre-test(M_1) [g]	1.045	1.052	1.046	1.049	1.046	1.052	1.046	1.041	1.048	1.055
	After-test(M_2) [g]	1.045	1.052	1.046	1.049	1.046	1.052	1.046	1.041	1.048	1.055
	Mass loss*2 [%]	0.00	0.00	0.00	-0.01	0.00	0.01	0.00	-0.01	0.00	0.00
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Test No.	C-1804-4					
Test	**T.1: Altitude simulation**					
Item (Status)	**CR1616** (Fully discharged)		Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30 恭	Prepared by: 中谷 '18.5.30 洸	
Place	Safety test house	Equipment No.	P-23-01	Type	Li content	
Number of test specimen	10			Cell or Battery	0.02 g	
Performed by	Koya nakatani					

Time and temperature					
Test time	Start	2018/4/5 9:15	Finish	2018/4/5 15:15	
Temperature		20.3℃		20.5℃	
Observe time	Start	2018/4/5 15:15	Finish	2018/4/5 16:16	
Temperature		20.3℃		20.3℃	

Test procedure

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least 6 hours at ambient temperature (20 ± 5 °C).

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Test time 6 hr Pressure: Less than 11.6kPa									
Voltage	Pre-test(V_1) [V]	-	-	-	-	-	-	-	-	-	-
	After-test(V_2) [V]	-	-	-	-	-	-	-	-	-	-
	Change rate*1 [%]	-	-	-	-	-	-	-	-	-	-
Mass	Pre-test(M_1) [g]	1.053	1.042	1.048	1.042	1.038	1.036	1.046	1.047	1.043	1.046
	After-test(M_2) [g]	1.053	1.042	1.048	1.041	1.038	1.036	1.046	1.048	1.043	1.046
	Mass loss*2 [%]	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Compliant with 6th revised edition
(Form revision date : 8-Jan-2017)

Test No.	C-1804-4				
Test	**T.2: Thermal test**				
Item (Status)	**CR1616** (Undischarged)		Approved by	Checked by	Prepared by
			鈴木 '18.5.30	竹内 '18.5.30 恭	中谷 '18.5.30 洸
Place	Safety test house	Equipment No.	A-02-01	Type	Li content
Number of test specimen	10			Cell or Battery	0.02 g
Performed by	Koya nakatani				

Time and temperature					
Test time	Start	2018/4/6 13:00	Finish	2018/4/11 15:15	
Temperature		-		21.0℃	
Observe time	Start	2018/4/11 18:00	Finish	2018/4/12 18:45	
Temperature		21.2℃		21.2℃	

Test procedure

Test cells and batteries are to be stored for at least 6 hours at a test temperature equal to 72 ± 2 °C, followed by storage for at least 6 hours at a test temperature equal to - 40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C).

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.
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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Setting temperature: 72°C/-40°C Setting time: 6h Setting cycle:10									
Voltage	Pre-test(V_1) [V]	3.232	3.248	3.249	3.251	3.250	3.250	3.247	3.247	3.241	3.245
	After-test(V_2) [V]	3.250	3.255	3.254	3.253	3.245	3.254	3.248	3.253	3.251	3.254
	Change rate*1 [%]	101	100	100	100	100	100	100	100	100	100
Mass	Pre-test(M_1) [g]	1.054	1.047	1.041	1.042	1.045	1.048	1.048	1.037	1.049	1.041
	After-test(M_2) [g]	1.053	1.048	1.041	1.042	1.045	1.048	1.048	1.037	1.049	1.041
	Mass loss*2 [%]	0.01	0.00	0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.00
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Test No.	C-1804-4					
Test	**T.2: Thermal test**					
Item (Status)	**CR1616** (Fully discharged)			Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30 恭	Prepared by: 中谷 '18.5.30 洸
Place	Safety test house	Equipment No.	A-02-01	Type	Li content	
Number of test specimen	10			Cell or Battery	0.02 g	
Performed by	Koya nakatani					

Time and temperature					
Test time	Start	2018/4/6 13:00	Finish	2018/4/11 15:15	
Temperature		-		21.0°C	
Observe time	Start	2018/4/11 18:00	Finish	2018/4/12 18:45	
Temperature		21.2°C		21.2°C	

Test procedure

Test cells and batteries are to be stored for at least 6 hours at a test temperature equal to 72 ± 2 °C, followed by storage for at least six hours at a test temperature equal to - 40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C).

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Setting temperature: 72°C/-40°C Setting time: 6h Setting cycle:10									
Voltage	Pre-test(V_1) [V]	-	-	-	-	-	-	-	-	-	-
	After-test(V_2) [V]	-	-	-	-	-	-	-	-	-	-
	Change rate*1 [%]	-	-	-	-	-	-	-	-	-	-
Mass	Pre-test(M_1) [g]	1.047	1.049	1.048	1.052	1.040	1.039	1.051	1.051	1.036	1.046
	After-test(M_2) [g]	1.047	1.049	1.048	1.052	1.040	1.039	1.051	1.051	1.036	1.046
	Mass loss*2 [%]	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$ x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Compliant with 6th revised edition
(Form revision date : 8-Jan-2017)

Test No.	C-1804-4				
Test	**T.3: Vibration**				
Item (Status)	**CR1616** (Undischarged)		Approved by	Checked by	Prepared by
Place	Safety test house	Equipment No.	A-07-01	Type	Li content
Number of test specimen	10			Cell or Battery	0.02 g
Performed by	Koya nakatani				

Time and temperature					
Test time	Start	2018/4/20 9:00	Finish	2018/4/20 18:00	
Temperature		21.0℃		21.0℃	
Observe time	Start	2018/4/20 18:00	Finish	2018/4/20 18:45	
Temperature		20.0℃		20.8℃	

Test procedure

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 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours 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 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz.

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.
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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Vibration : 7Hz -200Hz-7Hz Test time: 3 hours for each direction(x, y, z); total 9 hours									
Voltage	Pre-test(V_1) [V]	3.259	3.254	3.256	3.264	3.265	3.250	3.254	3.255	3.265	3.250
	After-test(V_2) [V]	3.268	3.271	3.272	3.280	3.281	3.266	3.283	3.280	3.280	3.291
	Change rate*1 [%]	100	101	100	100	100	100	101	101	100	101
Mass	Pre-test(M_1) [g]										
	After-test(M_2) [g]										
	Mass loss*2 [%]	######	######	######	######	######	######	######	######	######	######
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Test No.	C-1804-4					
Test	**T.3: Vibration**					
Item (Status)	**CR1616** (Fully discharged)			Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30 恭	Prepared by: 中谷 '18.5.30 洸
Place	Safety test house		Equipment No.	A-07-01	Type	Li content
Number of test specimen	10				Cell or Battery	0.02 g
Performed by	Koya nakatani					
Time and temperature: Test time	Start	2018/4/20 9:00		Finish	2018/4/20 18:00	
Temperature		21.0℃			21.0℃	
Observe time	Start	2018/4/20 18:00		Finish	2018/4/20 18:45	
Temperature		20.0℃			20.8℃	

Test procedure

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 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours 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 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz.

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Vibration : 7Hz -200Hz-7Hz Test time: 3 hours for each direction(x, y, z); total 9 hours									
Voltage	Pre-test(V_1) [V]	-	-	-	-	-	-	-	-	-	-
	After-test(V_2) [V]	-	-	-	-	-	-	-	-	-	-
	Change rate*1 [%]	-	-	-	-	-	-	-	-	-	-
Mass	Pre-test(M_1) [g]	1.045	1.045	1.046	1.038	1.045	1.050	1.044	1.046	1.049	1.048
	After-test(M_2) [g]	1.045	1.045	1.046	1.038	1.045	1.050	1.044	1.046	1.049	1.048
	Mass loss*2 [%]	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Compliant with 6th revised edition
(Form revision date : 8-Jan-2017)

Test No.	C-1804-4				
Test	**T.4: Shock**				
Item (Status)	**CR1616** (Undischarged)		Approved by	Checked by	Prepared by
			鈴木 '18.5.30	竹内 '18.5.30 恭	中谷 '18.5.30 洸
Place	Safety test house	Equipment No.	A-08-01	Type	Li content
Number of test specimen	10			Cell or Battery	0.02 g
Performed by	Koya nakatani				

Time and temperature					
Test time	Start	2018/4/19 10:45	Finish	2018/4/19 11:45	
Temperature		20.1℃		20.1℃	
Observe time	Start	2018/4/19 11:45	Finish	2018/4/19 12:15	
Temperature		20.1℃		20.1℃	

Test procedure

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 half-sine shock of peak acceleration of 150 gn and pulse duration of 6 milliseconds. 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.

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.
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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Peak acceleration: 150 gn Pulse duration: 6 ms									
Voltage	Pre-test(V_1) [V]	3.288	3.287	3.283	3.283	3.291	3.289	3.293	3.284	3.285	3.285
	After-test(V_2) [V]	3.284	3.295	3.293	3.300	3.286	3.299	3.294	3.299	3.297	3.292
	Change rate*1 [%]	100	100	100	101	100	100	100	100	100	100
Mass	Pre-test(M_1) [g]	1.048	1.054	1.048	1.037	1.039	1.054	1.046	1.044	1.045	1.033
	After-test(M_2) [g]	1.048	1.054	1.048	1.036	1.039	1.054	1.046	1.044	1.045	1.033
	Mass loss*2 [%]	0.00	0.00	-0.01	0.00	0.00	0.01	0.00	0.00	-0.01	0.00
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Test No.	C-1804-4					
Test	**T.4: Shock**					
Item (Status)	**CR1616** (Fully discharged)			Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30 恭	Prepared by: 中谷 '18.5.30 洸
Place	Safety test house	Equipment No.	A-08-01	Type		Li content
Number of test specimen	10			Cell or Battery		0.02 g
Performed by	Koya nakatani					

Time and temperature					
Test time	Start	2018/4/19 10:45	Finish	2018/4/19 11:45	
Temperature		20.1℃		20.1℃	
Observe time	Start	2018/4/19 11:45	Finish	2018/4/19 12:15	
Temperature		20.1℃		20.1℃	

Test procedure

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 half-sine shock of peak acceleration of 150 gn and pulse duration of 6 milliseconds. 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.

Requirements

There is no leakage (no mass loss), no venting, no disassembly, no rupture and no fire.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Peak acceleration: 150 gn Pulse duration: 6 ms									
Voltage	Pre-test(V_1) [V]	-	-	-	-	-	-	-	-	-	-
	After-test(V_2) [V]	-	-	-	-	-	-	-	-	-	-
	Change rate*1 [%]	-	-	-	-	-	-	-	-	-	-
Mass	Pre-test(M_1) [g]	1.048	1.051	1.042	1.050	1.038	1.043	1.047	1.049	1.052	1.043
	After-test(M_2) [g]	1.048	1.051	1.042	1.050	1.038	1.043	1.047	1.049	1.052	1.043
	Mass loss*2 [%]	0.00	0.01	0.00	-0.01	0.00	0.00	0.00	0.01	0.00	0.00
After-test Status	Leakage	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.	N.L.
	Venting	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.	N.V.
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

*1: Change rate[%]=V_2/V_1 x 100
Limit Change rate: 90%

*2: Mass loss[%]=$(M_1-M_2)/M_1$x 100

Mass M of cell or battery	Mass loss limit
M < 1g	0.5%
1g ≤ M ≤ 75g	0.2%
M > 75g	0.1%

Compliant with 6th revised edition
(Form revision date : 8-Jan-2017)

Test No.	C-1804-4				
Test	**T.5: External short circuit**				
Item (Status)	**CR1616** (Undischarged)		Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30	Prepared by: '18.5.30 洸
Place	Safety test house	Equipment No.	A-02-30	Type	Li content
Number of test specimen	10			Cell or Battery	0.02 g
Performed by	Koya nakatani				

Time and temperature					
Test time	Start	2018/4/23 9:00	Finish	2018/4/23 16:00	
Temperature		21.0℃		21.2℃	
Observe time	Start	2018/4/23 16:00	Finish	2018/4/24 9:00	
Temperature		21.2℃		20.9℃	

Test procedure

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 55 ± 2 °C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 55 ± 2 °C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 55 ± 2 °C. The cell or battery must be observed for a further six hours for the test to be concluded.

Requirements

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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Setting Temperature of chamber: 55°C Resistance: Less than 0.1ohm									
Voltage	Pre-test [V]	3.283	3.278	3.289	3.291	3.289	3.285	3.296	3.290	3.298	3.284
Mass	Pre-test [g]	1.039	1.054	1.042	1.045	1.047	1.047	1.049	1.045	1.045	1.040
Max. Temperature (°C)		59.5	59.1	59.5	59.9	59.8	60.2	59.4	59.3	60.1	59.8
After-test Status	Leakage	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Venting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

Test No.	C-1804-4					
Test	**T.5: External short circuit**					
Item (Status)	**CR1616** (Fully discharged)			Approved by	Checked by	Prepared by
				鈴 '18.5.30 木	竹内 '18.5.30 恭	中谷 '18.5.30 洸
Place	Safety test house		Equipment No.	A-02-30	Type	Li content
Number of test specimen	10				Cell or Battery	0.02 g
Performed by	Koya nakatani					
Time and temperature: Test time	Start	2018/4/23 9:00		Finish	2018/4/23 16:00	
Temperature		21.0℃			21.2℃	
Observe time	Start	2018/4/23 16:00		Finish	2018/4/24 9:00	
Temperature		21.2℃			20.9℃	

Test procedure

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 55 ± 2 °C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 55 ± 2 °C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 55 ± 2 °C. The cell or battery must be observed for a further six hours for the test to be concluded.

Requirements

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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Setting Temperature of chamber: 55°C Resistance: Less than 0.1ohm									
Voltage	Pre-test(V_1) [V]	-	-	-	-	-	-	-	-	-	-
Mass	Pre-test(M_1) [g]	1.043	1.050	1.042	1.041	1.036	1.051	1.041	1.048	1.045	1.053
Max. Temperature (°C)		55.2	55.4	55.0	55.0	55.1	55.5	55.2	55.5	55.5	55.1
After-test Status	Leakage	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Venting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.

C-1312-3

Compliant with 5th revised edition Amendment 1
(Revision date : 1-Jan-2013)

Test	T.6: Crush			
Item (Status)	CR1616 (Undischarged)	Approved by	Checked by	Prepared by
		佐野 '13.12.03	13.12.3	山 13.12.2
Place	Safety test house		Nominal Voltage	Rated Capacity
Number of test specimen	5		3.0V	55mAh
Performed by	Atsushi Yamano			

Time and temperature	Test time	Start	2013/12/1 10:15	Finish	2013/12/1 10:45
	Temperature		20.5℃		21.0℃
	Observe time	Start	2013/12/1 10:45	Finish	2013/12/2 18:15
	Temperature		21.0℃		19.5℃

Test procedure

A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.
(a) The applied force reaches 13 kN ± 0.78 kN;
(b) The voltage of the cell drops by at least 100 mV; or
(c) The cell is deformed by 50% or more of its original thickness.
Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.
A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.

Requirements

Cells and batteries 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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		131024	131024	131024	131024	131024					
Test condition		Crushing speed: 1.5cm/s Ram diameter: 32 mm Pressure: 13KN (17 Mpa) Direction of the force : Widest side									
Force	Peak (kN)	15.000	15.000	15.000	15.000	15.000					
Voltage	Pre-test(V_1) [V]	3.240	3.237	3.243	3.248	3.239					
	After-test(V_2) [V]	3.234	3.230	3.240	3.245	3.234					
	Drop*1 [V]	0.006	0.007	0.003	0.003	0.005					
Mass	Pre-test [g]	-	-	-	-	-					
Thick-ness	Pre-test(T_1) [mm]	1.561	1.572	1.563	1.557	1.547					
	After-test(T_2) [mm]	1.566	1.579	1.572	1.567	1.571					
	Change rate*2 [%]	100%	100%	101%	101%	102%					
Max. Temperature (°C)		30℃<	30℃<	30℃<	30℃<	30℃<					
After-test Status	Leakage	N/A	N/A	N/A	N/A	N/A					
	Venting	N/A	N/A	N/A	N/A	N/A					
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.					
	Rupture	N/A	N/A	N/A	N/A	N/A					
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.					

*1: Drop*1 [V]=V_1-V_2 *2: Change rate[%]=T2/T1 x 100

C-1312-3

Compliant with 5th revised edition Amendment 1
(Revision date : 1-Jan-2013)

Test	T.6: Crush			
Item (Status)	CR1616 (Fully discharged)	Approved by	Checked by	Prepared by
Place	Safety test house		Nominal Voltage	Rated Capacity
Number of test specimen	5		3.0V	55mAh
Performed by	Atsushi Yamano			

Time and temperature					
Test time	Start	2013/12/1 10:15	Finish	2013/12/1 10:45
Temperature		20.5℃		21.0℃
Observe time	Start	2013/12/1 10:45	Finish	2013/12/2 18:15
Temperature		21.0℃		19.5℃

Test procedure

A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.
(a) The applied force reaches 13 kN ± 0.78 kN;
(b) The voltage of the cell drops by at least 100 mV; or
(c) The cell is deformed by 50% or more of its original thickness.
Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.
A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.

Requirements

Cells and batteries 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.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		131024	131024	131024	131024	131024					
Test condition		Crushing speed: 1.5cm/s Ram diameter: 32 mm Pressure: 13KN (17 Mpa) Direction of the force : Widest side									
Force	Peak (kN)	15.000	15.000	15.000	15.000	15.000					
Voltage	Pre-test(V_1) [V]	2.810	2.824	2.811	2.819	2.814					
	After-test(V_2) [V]	2.796	2.816	2.803	2.816	2.808					
	Drop*1 [V]	0.014	0.008	0.008	0.003	0.006					
Mass	Pre-test [g]	-	-	-	-	-					
Thick-ness	Pre-test(T_1) [mm]	1.534	1.549	1.571	1.530	1.552					
	After-test(T_2) [mm]	1.541	1.561	1.579	1.534	1.561					
	Change rate*2 [%]	100%	101%	101%	100%	101%					
Max. Temperature (°C)		30℃<	30℃<	30℃<	30℃<	30℃<					
After-test Status	Leakage	N/A	N/A	N/A	N/A	N/A					
	Venting	N/A	N/A	N/A	N/A	N/A					
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.					
	Rupture	N/A	N/A	N/A	N/A	N/A					
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.					

*1: Drop*1 [V]=V_1-V_2 *2: Change rate[%]=T2/T1 x 100

Test No.	C-1804-4					
Test	**T.8: Forced discharge**					
Item (Status)	**CR1616** (Fully discharged)			Approved by: 鈴 '18.5.30 木	Checked by: 竹内 '18.5.30 恭	Prepared by: 中谷 '18.5.30 洸
Place	Safety test house		Equipment No.	E-07-27	Type	Li content
Number of test specimen	10				Cell or Battery	0.02 g
Performed by	Koya nakatani					
Time and temperature: Test time	Start	2018/4/20 9:30		Finish	2018/4/23 9:30	
Temperature		21.1℃			20.9℃	
Observe time	Start	2018/4/23 9:30		Finish	2018/5/7 9:00	
Temperature		20.9℃			21.0℃	

Test procedure

Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.
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).

Requirements

There is no disassembly and no fire during the test and within seven days of the test.

Test result

No.		1	2	3	4	5	6	7	8	9	10
Lot No.		18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04	18-04
Test condition		Discharge current: 2mA Forced discharge time: 28h									
Voltage	Pre-test [V]	-	-	-	-	-	-	-	-	-	-
Mass	Pre-test [g]	-	-	-	-	-	-	-	-	-	-
After-test Status	Leakage	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Venting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Disassembly	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Rupture	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Fire	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.	N.F.