



Prüfbericht-Nr.: <i>Test Report No.:</i>	50221368 003	Auftrags-Nr.: <i>Order No.:</i>	156105133	Seite 1 von 11 <i>Page 1 of 11</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2019-10-07		
Auftraggeber: <i>Client:</i>	LG Chem, Ltd. 128, Yeoui-daero, Yeongdeungpo-gu, Seoul ,150-721, Rep. of Korea				
Prüfgegenstand: <i>Test item:</i>	Secondary Lithium System, LiNiMnCoO ₂				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	RESU10M				
Auftrags-Inhalt: <i>Order content:</i>	Notice of Alteration				
Prüfgrundlage: <i>Test specification:</i>	IEC 62619:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes. – Safety requirements for secondary lithium cells and batteries, for use in industrial applications				
Wareneingangsdatum: <i>Date of receipt:</i>	2019-10-07	See photo document for more detail			
Prüfmuster-Nr.: <i>Test sample No.:</i>	N/A				
Prüfzeitraum: <i>Testing period:</i>	N/A				
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland Korea Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Korea Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft/ tested by:	kontrolliert/ reviewed by:				
2019-10-07 Seung-Wook Lee / Project Engineer			2019-10-07 HwangHyun No / Technical Certifier		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges/ Other Aspects: No Test Required					
1. BMS Software version update. 2. Addition of alternate sensing cable. Refer to General Product Information for more details.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					



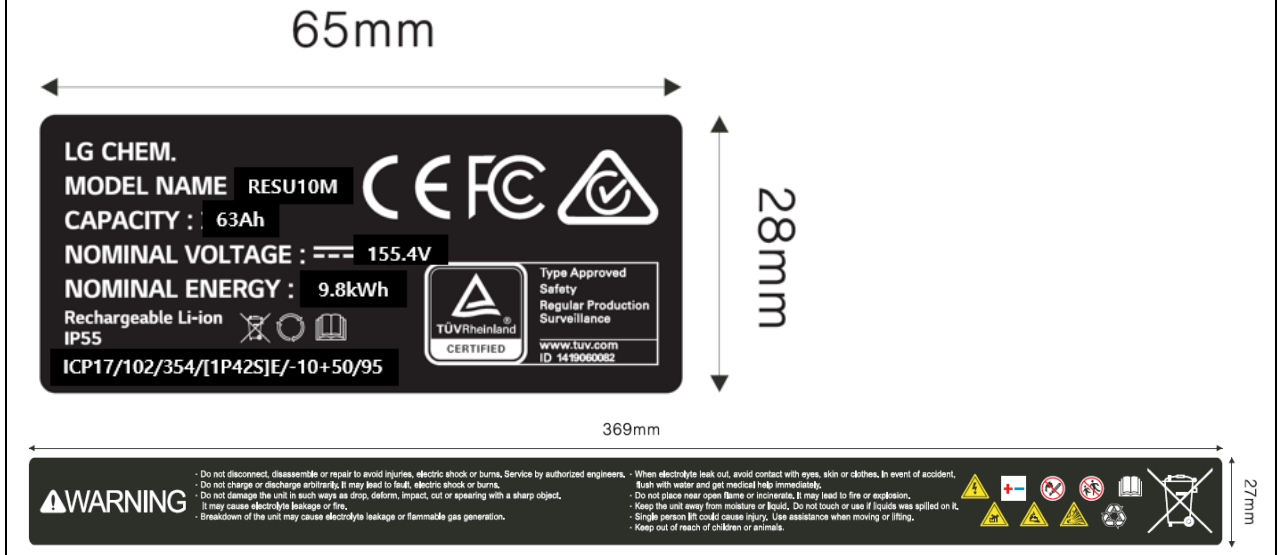
<p>TEST REPORT IEC 62619 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications</p>	
Report Number	50221368 003
Date of issue	2019-10-07
Total number of pages	11 pages
Name of Testing Laboratory preparing the Report	TÜV Rheinland Korea Ltd. 2F, Young City, N-Tower, 25, Mullaero 28-gil, Yeongdeungpo-gu, Seoul, 07298, Rep. of Korea
Applicant's name	LG Chem, Ltd.
Address	128, Yeoui-daero, Yeongdeungpo-gu, Seoul, 150-721, Rep. of Korea
Test specification:	
Standard	IEC 62619: 2017
Test procedure	See cover page
Non-standard test method	N/A
Test Report Form No.	IE62619A
Test Report Form(s) Originator	UL(Demko)
Master TRF	Dated 2018-06-07
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General disclaimer:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.</p>	

Test item description	Secondary Lithium System	
Trade Mark	LG CHEM or LG CHEM.	
Manufacturer	LG Chem, Ltd.	
Model/Type reference	RESU10M	
Ratings	DC 155.4 V, 63 Ah	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input type="checkbox"/> CB Testing Laboratory:	TÜV Rheinland Korea Ltd.	
Testing location/ address	2F, Young City, N-Tower, 25, Mullaero 28-gil, Yeongdeungpo-gu, Seoul, 07298, Rep. of Korea	
Tested by (name, function, signature)	Seung-Wook Lee, Project Engineer	<i>Seungwook</i>
Approved by (name, function, signature)	HwangHyun No, Technical Certifier	<i>Wohwanghyun</i>
<input type="checkbox"/> Testing procedure: TMP/CTF Stage 1:		
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature)		
<input type="checkbox"/> Testing procedure: WMT/CTF Stage 2:		
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature)		
Approved by (name, function, signature)		
<input type="checkbox"/> Testing procedure: SMT/CTF Stage 3:		
<input type="checkbox"/> 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): Attachment 1: NOTICE OF ALTERATIONS/MODIFICATION (1 page)	
Summary of testing:	
Tests performed (name of test and test clause): No Test	Testing location: TÜV Rheinland Korea Ltd. 2F, Young City, N-Tower, 25, Mullaero 28-gil, Yeongdeungpo-gu, Seoul, 07298, Rep. of Korea
Summary of compliance with National Differences (List of countries addressed): N/A	
<input checked="" type="checkbox"/> The product fulfils the requirements of EN 62619: 2017	

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: Secondary Lithium System	
Classification of installation and use: Stationary applications	
Supply Connection: N/A	
.....:	
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: 2019-10-07	
Date (s) of performance of tests: N/A	
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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:	
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.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : PEOPLEWORKS 225, Suchul-daero, Gumi-si, Gyeongsangbuk-do, 39270, Rep. of Korea	

General product information and other remarks:
Report Summary

All applicable tests according to IEC 62619:2017 have been carried out.

Product Description

The product uses cell model, JH3, manufactured by LG Chem, Ltd., which is certified to IEC 62619: 2017, certification number R1 50345796. Please see Table ANNEX A for more details.

Additional Information

The electronic circuits and software controls for the Secondary Li-ion System relied upon as the primary safety protection, which have been evaluated in accordance with UL/IEC 60730-1 Annex H. See more details, UL file number, MH49414, Project: 4788924322.

Engineering Condition of Acceptability

When installed in an end-product, consideration must be given to the following:

- The investigated Pollution Degree is 2.
- This product has been evaluated for indoor and outdoor use.

Model specification

	RESU10M	
Battery System	Cell Configuration	1P_42S
	Rated Capacity, Ah	63
	Nominal Voltage, V	155.4 Vdc
	Nominal Charging Voltage, V	176.4 Vdc
	Final voltage / End of discharge voltage, V	126 Vdc
	Profile of standard charge	CC/CV mode: 18.9 A, 176.4 Vdc, Cut off: 3.15 A
	Profile of standard discharge	CC mode: 18.9 A, Cut off: 126 Vdc
	Maximum current of the recommended charger (A)	40 A
	Upper limit charging voltage (V)	176.4 Vdc
	Maximum operating temperature (°C)	50 °C
	Wh rating (Wh)	9.8 kWh
	Nominal mass (g)	Max. 77 kg
	External dimensions (mm)	452 mm x 511 mm x 240 mm
	BMU Identification / Type No.	RESU GEN2, RESU_JH3
BMU / BMS software/hardware version	1.1.1.4 / V03	

History of amendments and modifications:

Ref. No. 50221368 001 (original test report)

Ref. No. 50221368 002 (amendment 1)

Ref. No. 50221368 003 (amendment 2)

Amendment 1:

1. BMS software version was updated:
 - 1) From 1.0.1.3 to 1.0.1.4
 - The updated BMS software version does not impact the test results and it also does not adversely affect the safety-related functions. Hence, no test was deemed necessary.
 - Functional safety evaluation was conducted on software update by UL. (Project: 4789087084)
2. Packing information in PHOTO DOCUMENTATION was updated.

Amendment 2:

1. BMS software version was updated:

1) From 1.0.1.4 to 1.1.1.4

- The updated BMS software version does not impact the test results and it also does not adversely affect the safety-related functions. Hence, no test was deemed necessary.
- Functional safety evaluation was conducted on software update by UL. (Project: 4789189517)

2. Addition of alternate sensing cable.

- Refer to Table 5.1 Critical components information.

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8	BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)		P
8.1	General requirements	See below	P
	Functional safety analysis for critical controls	Reliance on electric, electronic and software controls and systems for critical safety were subjected to analysis for functional safety.	P
	Conduct of a process hazard, risk assessment and mitigation of the battery system	Covered by UL/IEC 60730-1 Annex H. Reference Number: UL File Number, MH49414, Project number, 4789189517	P
8.2	Battery management system (or battery management unit)		P
8.2.1	Requirements for the BMS	Complied.	P
	The safety integrity level (SIL) target of the BMS	Covered by UL/IEC 60730-1 Annex H. Reference Number: UL File Number, MH49414, Project number, 4789189517 (Software class B)	P
	The charge control evaluated by tests in clauses 8.2.2 to 8.2.4	See Report No. 50221368 001 for more details.	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity ¹⁾	
Insulation:						
- Silicone Rubber Compound (Bottom cover)	HRS CO LTD	HR-7020U(BK)	Min. thickness 0.5 mm, V-0, 150 °C	ANSI/UL 746D, CSA-C22.2 No. 0.17	RU (E98818)	
- Shrinkable tubing	MIRAE KDK CO LTD	ACE TUBE HF	600 V, 125 °C, VW-1	ANSI/UL 224, CSA-C22.2 No. 198.1 (2006)	RU (E58072)	
Wiring:						
- Power cable	DO WOO ELECTRIC WIRE CO LTD	Style 1283	6 AWG, 600 V, 105 °C	UL 758	RU (E351213)	
- Sensing cable	KISEONG CABLE INC	Style 1007	22 AWG, 80 °C, 300 V	UL 758	RU (E203454)	
- Sensing cable (alternate)	Interchangeable	Interchangeable	Min. 22 AWG, 80 °C, 300 V	UL 758	UL approved	
Bus bar	Interchangeable	Interchangeable	C1100, Ni coating (1 ~ 8 µm)	IEC 62619: 2017	Tested in appliance	
Encapsulation:						
- Top Cover, Bottom Cover	LG Chem, Ltd	Interchangeable	Metal, ALDC12 (Aluminium die casting alloys)	IEC 62619: 2017	Tested in appliance	
- End plate, Top plate, Fuse cover	LG Chem, Ltd	Interchangeable	Metal, SGCC, thickness 1.2 mm	IEC 62619: 2017	Tested in appliance	
- Cell cartridge, End cover	LG Chem, Ltd.	LUPOL GP-1007F(#)	V-2, RTI [IMPACT] = 65 °C at Min. Thk 0.75 mm, RTI [IMPACT] = 120 °C at Min. Thk 1.5 mm, CTI = 0	ANSI/UL 94, CSA-C22.2 No. 0.17	RU (E67171)	
- Busbar housing	LG Chem, Ltd.	LUMILOY GN-2206F(#)	5VA at Min. Thk 2.0 mm, V-1 at Min. Thk 0.8 mm, RTI [IMPACT] = 65 °C, CTI = 3	ANSI/UL 94, CSA-C22.2 No. 0.17	RU (E67171)	
Terminal Block (BPU-PCS)	OSADA	OTB-260SH	600 V, 50 A	IEC 62477-1, UL1059	RU (E121961)	
Temperature / current management devices, additional:						
BMU / BMS	LG Chem, Ltd.	RESU GEN2, RESU_JH3	1.1.1.4 / V03	UL 991, ANSI/UL 1998	Tested in appliance	

IEC 62619					
Clause	Requirement + Test			Result - Remark	Verdict
Terminal (connector)	YEON HO ELECTRONICS CO LTD	SMH200-24C	PA66, V-0, 250 V, 3 A, 85 °C	ANSI/UL 94, CSA-C22.2 No. 182.3	RU (E108706)
Cell	LG Chem, Ltd.	JH3	3.7 V, 63 Ah	UL 1642, IEC 62619:2017	RU (MH19896) TUV Bauart (R1 50345796)
Circuit Breaker	ABB	S202M UC50	440 V, 50 A, 10 kA	IEC 60947-2, IEC60898-2, UL 1077	RU(E76126), CE
Fuse	COOPER BUSSMANN LLC	50FE	500 V, 50 A, 200 kA	IEC 269-4, UL 248-1	RU (E91958)
Main Contactor	YM Tech	EVR50-12S	450 V, 50 A	IEC60947-5-1, UL60947-1, JIS5442	CE (C009-CB20136CQC-049498), RU (E210800)
SMPS	KOREA TAIYO YUDEN CO.,LTD	TYDD30W1LA 01	Input: (36 ~ 200) V, Output: (11.64 ~ 12.36) V, 70 °C	UL 60950-1, IEC 60950-1	RU (E221347)
Label	DAEHAN PRINTING INC	DH-9513	(-40 to 80) °C	ANSI/UL 969	RU (MH49804)
Supplementary information:					
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

END OF TEST REPORT

CERTIFICATE
of Conformity
EC Council Directive 2014/30/EU
Electromagnetic Compatibility

Registration No.: AE 50429270 0001

Report No.: 50222838 001

Holder: LG Chem, Ltd.
128, Yeoui-daero,
Yeongdeungpo-gu, Seoul 150-721
Rep. of Korea

Product: Battery Pack

Identification: Type Designation: RESU 10M
Serial Number: none (prototype)

Tested acc. to: EN 61000-6-1:2007
EN 61000-6-3:2007+A1

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 2014/30/EU. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to the a.m. Directive.

Date 11.02.2019



Certification Body


TagSun Park

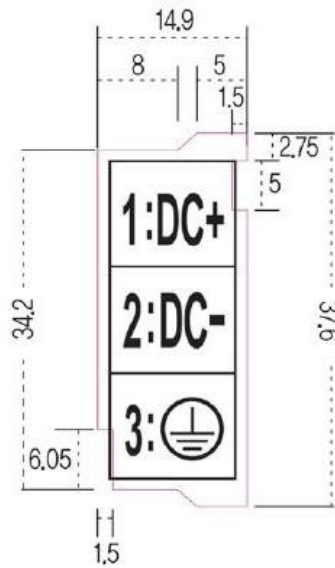
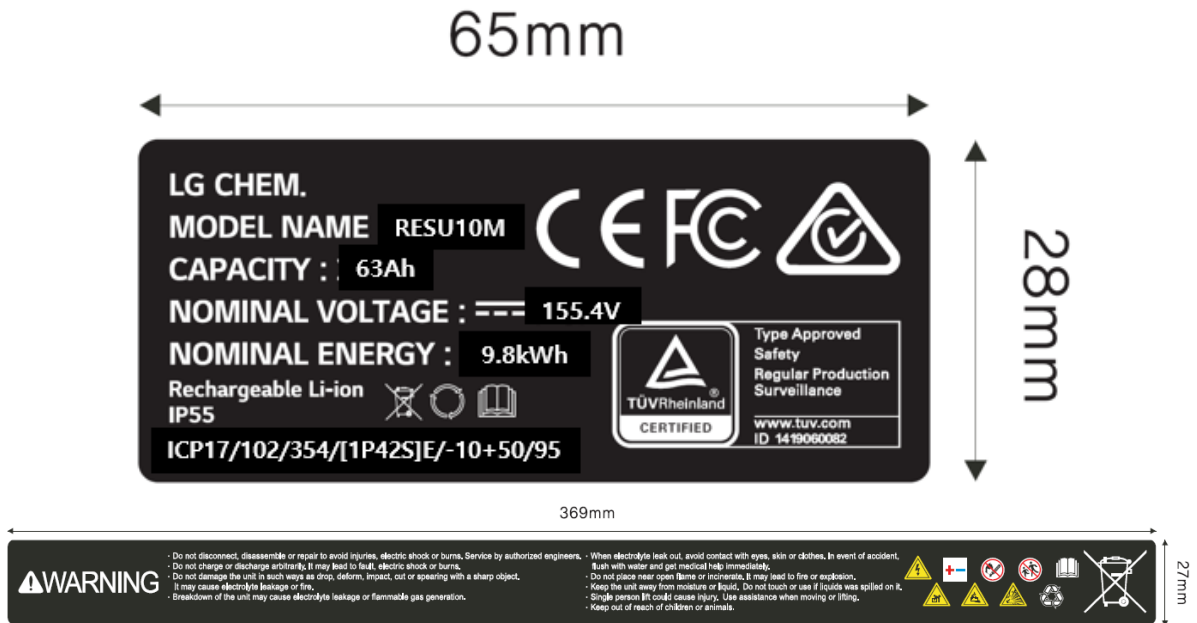
TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may only be used if all relevant and effective EC Directives are complied with. CE

Test item description :	(see cover page)	
Trade Mark :	LG	
Manufacturer	LG Chem, Ltd. 188, Munji-ro, Yuseong-gu, Daejeon, 305-738, Rep. of Korea	
Model/Type reference :	(see cover page)	
Ratings :	(see page 7 for more details)	
Testing procedure and testing location:		
<input type="checkbox"/>	CB Testing Laboratory:	
Testing location/ address :		
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address :		
Tested by (name + signature)		
Approved by (name + signature) :		
<input checked="" type="checkbox"/>	Testing procedure: TMP/CTF Stage 1:	
Testing location/ address :		(see page 3)
Tested by (name + signature)		(see cover page)
Approved by (name + signature) :		(see cover page)
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2:	
Testing location/ address :		
Tested by (name + signature)		
Witnessed by (name + signature) :		
Approved by (name + signature) :		
<input type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4:	
Testing location/ address :		
Tested by (name + signature)		
Witnessed by (name + signature) :		
Approved by (name + signature) :		
Supervised by (name + signature)		

List of Attachments (including a total number of pages in each attachment):	
Attachment separated from this Test Report: - 50212139 003_CDF for Construction Data Form : 4 pages	
Summary of testing:	
Tests performed (name of test and test clause): N/A	Testing location: TÜV Rheinland Korea Ltd. Young City, N-Tower, 25, Mullaero 28-gil, Yeongdeungpo-gu, Seoul #07298, Rep. of Korea
Summary of compliance with National Differences:	
List of countries addressed: N/A	
<input checked="" type="checkbox"/> The product fulfils the requirements of IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013 and EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013.	

Copy of marking plate:



Test item particulars.....:	
Equipment mobility.....:	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input checked="" type="checkbox"/> stationary <input type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
Connection to the mains.....:	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input checked="" type="checkbox"/> not directly connected to the mains
Operating condition.....:	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
Access location	<input checked="" type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location
Over voltage category (OVC)	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
Mains supply tolerance (%) or absolute mains supply values	N/A
Tested for IT power systems	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
IT testing, phase-phase voltage (V)	
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
Considered current rating of protective device as part of the building installation (A)	N/A
Pollution degree (PD)	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
IP protection class	IP55
Altitude during operation (m)	Less than 2000 m
Altitude of test laboratory (m)	Less than 2000 m
Mass of equipment (kg)	Max. 77 kg

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	(see cover page)
Date (s) of performance of tests	(see cover page)



LG Chem, Ltd.
128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Korea
Global Standard Certification Team
Tel: 82-42-870-6195, Fax: 82-42-863-0182

If any of pages is not legible or has not been received, please notify our office for re-transmission

CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 6th revised edition of the UN Manual of Tests and Criteria.

We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	RESU 10M
Cell Model name	JH3
Nominal voltage	77.7 V
capacity	63 Ah

Reviewed By: Jae Seung Lee

Professional
Global Standard Certification Team
LG Chem, Ltd.
E-mail: Paradiso@lgchem.com

Approved By: DaeHo Nam

Team Leader
Global Standard Certification Team
LG Chem, Ltd.
E-mail: kkammy@lgchem.com