

Prüfbericht-Nr.: <i>Test Report No.:</i>	CN21M2P2 001	Auftrags-Nr.: <i>Order No.:</i>	168317151	Seite 1 von 26 <i>Page 1 of 26</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021.05.06	
Auftraggeber: <i>Client:</i>	Hengdian Group DMEGC Magnetics Co., Ltd. Hengdian Industrial Zone, Dongyang City, Zhejiang, P.R. China			
Prüfgegenstand: <i>Test item:</i>	Lithium-ion Rechargeable Cell			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	INR18650-2850, INR18650-29E			
Auftrags-Inhalt: <i>Order content:</i>	cTÜVus mark			
Prüfgrundlage: <i>Test specification:</i>	UL 62133-2: 2020 CSA C22.2 No. 62133-2:20			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021.04.30	See attachment 2 for details		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A003043363-001~053, A003043356-001~053			
Prüfzeitraum: <i>Testing period:</i>	2021.05.10 to 2021.06.02			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
erstellt von: <i>created by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: 2021.06.17 <i>Date:</i>	<i>Joe Wang</i> Joe Wang	Datum: 2021.06.17 <i>Date:</i>	<i>Jeffrey Qin</i> Jeffrey Qin	
Stellung / Position	Project Engineer	Stellung / Position	Reviewer	
Sonstiges / Other:	<ol style="list-style-type: none"> This test report is issued for the purpose of cTÜVus mark approval. The complete report contains: (1) Test report including this cover page (26 pages); (2) Attachment 1: Equipment List (1 page); (3) Attachment 2: Photo Documentation (2 pages). 			
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:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
*Legend:	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>				

V05

TEST REPORT IEC 62133-2 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems	
Report Number.....	: CN21M2P2 001
Date of issue.....	: See cover page
Total number of pages	: See cover page
Name of Testing Laboratory preparing the Report : See cover page	
Applicant's name : See cover page	
Address..... : See cover page	
Test specification: Standard : See cover page Test procedure : cTÜVus Non-standard test method : N/A	
Test Report Form No. : IEC62133_2A Test Report Form(s) Originator : DEKRA Master TRF : Dated 2017-08-10	
Copyright © 2017 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.	
This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.	
General disclaimer: 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.	

Test item description :	Lithium-ion Rechargeable Cell	
Trade Mark :	DMEGC	
Manufacturer	Hengdian Group DMEGC Magnetics Co., Ltd. Hengdian Industrial Zone, Dongyang City, Zhejiang, P.R. China	
Model/Type reference	1) INR18650-2850, 2) INR18650-29E	
Ratings	1) 3.7V, 2850mAh, 2) 3.7V, 2900mAh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input type="checkbox"/>	CB Testing Laboratory:	
Testing location/ address :		
Tested by (name, function, signature) :		See cover page
Approved by (name, function, signature) ... :		See cover page
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
Testing location/ address :		
Tested by (name, function, signature) :		
Approved by (name, function, signature) ... :		
<input type="checkbox"/>	Testing procedure: 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: 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): See cover page	
Summary of testing:	
Tests performed (name of test and test clause): cl.7.1 Charging procedure for test purposes (Cells); cl.7.2.1 Continuous charging at constant voltage (Cells); cl.7.3.1 External short circuit (Cells); cl.7.3.3 Free fall (Cells); cl.7.3.4 Thermal abuse (Cells); cl.7.3.5 Crush (Cells); cl.7.3.7 Forced discharge (Cells); cl.7.3.9 Design evaluation – Forced internal short circuit (Cells)	Testing location: TÜV Rheinland (Shenzhen) Co., Ltd. 1F East & 2-4F, Cybio Technology Building No. 1, No. 16, Kejibei 2nd Road, High-Tech Industrial ParkNorth, Nanshan District, 518057, Shenzhen, China
Tests are made with the number of cells specified in UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20 Table 1.	
Summary of compliance with National Differences (List of countries addressed): N/A	
<input checked="" type="checkbox"/> The product fulfils the requirements of <u>IEC/EN 62133-2: 2017</u>	

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.



Lithium-ion Rechargeable Cell

DMEGC INR18650-2850

3.7V 2850mAh

INR19/66

Manufacture date :XXXXXX

+

-

Label for INR18650-2850



Lithium-ion Rechargeable Cell

DMEGC INR18650-29E

3.7V 2900mAh

INR19/66

Manufacture date :XXXXXX

+

-

Label for INR18650-29E

Test item particulars.....:	
Classification of installation and use.....:	N/A
Supply Connection	DC terminal
Recommend charging method declared by the manufacturer	Charging the cell with 0.5C constant current until 4.20V, then constant voltage at 4.20V until charge current reduces to 0.05C at 25±2°C.
Discharge current (0,2 It A)	570mA for INR18650-2850, 580mA for INR18650-29E
Specified final voltage.....:	2.45V
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current	5700mA for INR18650-2850, 5800mA for INR18650-29E
Charging temperature upper limit	60°C
Charging temperature lower limit.....:	0°C
Polymer cell electrolyte type.....:	<input type="checkbox"/> gel polymer <input type="checkbox"/> solid polymer <input checked="" type="checkbox"/> 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	See cover page
Date (s) of performance of tests	See cover page
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 IEC60080-02:	
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:	<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)	Same as manufacturer

General product information and other remarks:

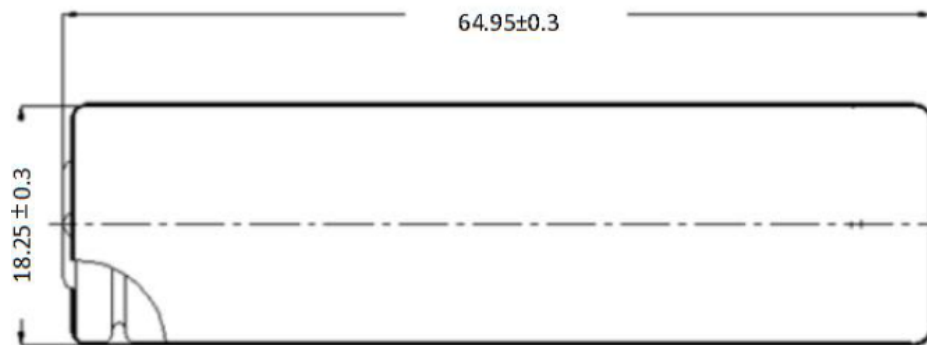
The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte, case. The positive and negative electrode plates are housed in the case in the state being separated by the separator.

The main features of the cell are shown as below (clause 7.1.1)

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
INR18650-2850	2850mAh	3.7V	1425mA	2850mA	5700mA	10000mA	4.25V	2.45V
INR18650-29E	2900mAh	3.7V	1450mA	2900mA	5800mA	10000mA	4.25V	2.45V

The main features of the cell are shown as below (clause 7.1.2):

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
INR18650-2850	4.25V	142.5mA	0°C	60°C
INR18650-29E	4.25V	145mA	0°C	60°C

Construction:


Cell (Unit: mm)

Circuit diagram:

None, cell only

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		P
5.1	General		P
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	Insulation and wiring		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No metal case exists.	N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition	Venting mechanism exists on the top of cylindrical cell.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	Temperature, voltage and current management	Cell only	N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N/A
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified		N/A
5.5	Terminal contacts		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Complied.	P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short-circuit		P
5.6	Assembly of cells into batteries	Cell only	N/A
5.6.1	General		N/A
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		N/A
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		N/A
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components added as appropriate and consideration given to the end-device application		N/A
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		N/A
5.6.2	Design recommendation	Cell only	N/A
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2		N/A

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage		N/A
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries	Cell only	N/A
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	Quality plan		P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Complied. ISO 9001: 2015 certificate provided.	P
5.8	Battery safety components		N/A
	According annex F		N/A
6	TYPE TEST AND SAMPLE SIZE		P
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old	Complied	P
	Coin cells with resistance $\leq 3 \Omega$ (measured according annex D) are tested according table 1	Cylindrical cell	N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of $20 \text{ °C} \pm 5 \text{ °C}$	Tests are carried out at $20 \text{ °C} \pm 5 \text{ °C}$.	P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection	Cell only	N/A
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test	Cell only	N/A
7	SPECIFIC REQUIREMENTS AND TESTS		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of $20 \text{ °C} \pm 5 \text{ °C}$, using the method declared by the manufacturer	See page 6.	P
	Prior to charging, the battery have been discharged at $20 \text{ °C} \pm 5 \text{ °C}$ at a constant current of 0,2 It A down to a specified final voltage	See page 6.	P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charge temperature 0~60°C declared. 65°C used for upper limit tests temperature, -5°C used for lower limit tests temperature.	P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer	Charging for 7 days with 1000mA and 4.20V.	P
	Results: No fire. No explosion. No leakage..... :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)	Cell only	N/A
	Oven temperature (°C)..... :		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N/A
7.3	Reasonably foreseeable misuse		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Cell only	N/A
	The batteries were tested until one of the following occurred:		N/A
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		N/A
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor		N/A
	Results: No fire. No explosion..... :		N/A
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)..... :	130	—
	Results: No fire. No explosion	No fire. No explosion.	P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	Results: No fire. No explosion..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery	Cell only	N/A
	The supply voltage which is:		N/A
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		N/A
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		N/A
	Test was continued until the temperature of the outer casing:		N/A
	- Reached steady state conditions (less than 10 °C change in 30-minute period); or		N/A
	- Returned to ambient		N/A
	Results: No fire. No explosion..... :		N/A
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P
	Results: No fire. No explosion..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)	Cell only	N/A
7.3.8.1	Vibration	Cell only	N/A
	Results: No fire, no explosion, no rupture, no leakage or venting. :		N/A
7.3.8.2	Mechanical shock	Cell only	N/A
	Results: No leakage, no venting, no rupture, no explosion and no fire :		N/A

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P
	The cells complied with national requirement for:	France, Japan, Republic of Korea and Switzerland	—
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	800N for cylindrical cells	P
	Results: No fire	(See appended table 7.3.9)	P
8	INFORMATION FOR SAFETY		P
8.1	General		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications.	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards	Cell only	N/A
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision		N/A
8.2	Small cell and battery safety information		N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N/A
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N/A
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N/A
9	MARKING		P
9.1	Cell marking		P
	Cells marked as specified in IEC 61960, except coin cells	The cell is marked in accordance with IEC 61960-3, also see page 5.	P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		N/A
9.2	Battery marking	Cell only	N/A
	Batteries marked as specified in IEC 61960, except for coin batteries		N/A
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement		N/A
	Terminals have clear polarity marking on the external surface of the battery		N/A
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries		N/A
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2	Not coin cells	N/A
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package	Not small cells.	N/A
9.4	Other information		P
	Storage and disposal instructions	Information for disposal instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions	Information for recommended charging instructions mentioned in manufacturer's specifications.	P
10	PACKAGING AND TRANSPORT		P
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells.	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		P
A.1	General		P
A.2	Safety of lithium ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General	Charging voltage is 4.25V	P
A.3.2	Upper limit charging voltage	4.25V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	4.25V applied	N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	See A.4.2.2.	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature declared by client is: 0~60°C	P
A.4.3	High temperature range	Charging high temperature declared by client is: 60°C.	P
A.4.3.1	General		P
A.4.3.2	Explanation of safety viewpoint		P
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		P
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range	No documents provided by manufacturer explaining the upper limit exceed 45°C, 65°C applied for testing in this report for safety considerations.	P
A.4.4	Low temperature range	Charging low temperature declared by client is: 0°C.	P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	No documents provided by manufacturer explaining the lower limit exceed 10°C, -5°C applied for testing in this report for safety considerations.	P
A.4.5	Scope of the application of charging current		P

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		P
A.5.5.1	Insertion of nickel particle in winding core		P
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		P
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
ANNEX B	RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS		P
ANNEX C	RECOMMENDATIONS TO THE END-USERS		P
ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A
D.1	General		N/A

UL 62133-2: 2020, CAN/CSA-C22.2 No. 62133: 20			
Clause	Requirement + Test	Result - Remark	Verdict
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement..... :	(See appended table D.2)	N/A
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
ANNEX E	PACKAGING AND TRANSPORT		N/A
ANNEX F	COMPONENT STANDARDS REFERENCES		N/A

TABLE: Critical components information					P
Object / part No.	Manufacturer / trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Cell	Hengdian Group DMEGC Magnetics Co., Ltd.	INR18650-2850, INR18650-29E	3.7V, 2850mAh 3.7V, 2900mAh	UL 62133-2: 2020, CAN/CSA- C22.2 No. 62133: 20	Tested with appliance
-Electrolyte	Shenzhen Capchem Technology Co.Ltd	D24	Composition: EC/EMC/DMC/LiPF ₆	--	--
-Separator	CANGZHOU MINGZHU PLAS TIC CO.,LTD	61mm*16µm	PE, Shutdown temperature: ≤150°C	--	--
-Anode	TIANLI (XIANGXIANG) ENERGY MATERIAL CO.,LTD	TLP813	LiNi _{0.8} Co _{0.8} Mn _{0.3} O ₂	--	--
-Cathode	JiangXi ZiChen Technology Co.,Ltd	8C	Carbon (>99.95%)	--	--
-Cell Case	Wuxi Jinyang Maruyi Electronics Co., Ltd.	Pre-plated nickel steel shell	Material: nickel plated steel, thickness: 0.18±0.02 mm	--	--
Supplementary information: ¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

7.2.1	TABLE: Continuous charging at constant voltage (cells) (INR18650-2850)				P
Sample no.	Recommended charging voltage V _c (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
Cell #1	4.20	1.425	4.17	P	
Cell #2	4.20	1.425	4.17	P	
Cell #3	4.20	1.425	4.17	P	
Cell #4	4.20	1.425	4.17	P	
Cell #5	4.20	1.425	4.17	P	
Supplementary information:					
- No fire or explosion - No leakage					

7.2.1	TABLE: Continuous charging at constant voltage (cells) (INR18650-29E)				P
Sample no.	Recommended charging voltage V _c (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
Cell #6	4.20	1.45	4.16	P	
Cell #7	4.20	1.45	4.15	P	
Cell #8	4.20	1.45	4.16	P	
Cell #9	4.20	1.45	4.16	P	
Cell #10	4.20	1.45	4.16	P	
Supplementary information:					
- No fire or explosion - No leakage					

7.3.1	TABLE: External short-circuit (cell) (INR18650-2850)					P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (°C)	Results	
Samples charged at charging temperature upper limit (65°C)						
Cell #11	54.0	4.18	82.4	112.4	P	
Cell #12	54.0	4.19	78.5	113.7	P	
Cell #13	54.0	4.19	93.7	105.8	P	
Cell #14	54.0	4.19	92.3	113.4	P	
Cell #15	54.0	4.19	77.4	107.6	P	
Samples charged at charging temperature lower limit (-5°C)						
Cell #16	53.1	4.14	85.6	113.0	P	
Cell #17	53.1	4.14	81.8	116.0	P	
Cell #18	53.1	4.14	89.9	116.2	P	

Cell #19	53.3	4.16	71.4	113.0	P
Cell #20	53.3	4.15	90.5	109.4	P
Supplementary information: - No fire or explosion					

7.3.1	TABLE: External short-circuit (cell) (INR18650-29E)					P
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (°C)	Results	
Samples charged at charging temperature upper limit (65°C)						
Cell #21	54.1	4.19	79.7	115.2	P	
Cell #22	54.1	4.19	81.5	109.4	P	
Cell #23	54.1	4.19	83.6	114.6	P	
Cell #24	54.1	4.19	87.2	120.8	P	
Cell #25	54.1	4.19	82.3	113.2	P	
Samples charged at charging temperature lower limit (-5°C)						
Cell #26	54.1	4.15	81.3	120.9	P	
Cell #27	54.1	4.15	83.1	118.5	P	
Cell #28	54.1	4.15	85.4	128.6	P	
Cell #29	54.1	4.15	82.5	123.7	P	
Cell #30	54.1	4.16	87.2	118.7	P	
Supplementary information: - No fire or explosion						

7.3.2	TABLE: External short-circuit (battery)					N/A
Sample no.	Ambient T (°C)	OCV before test (Vdc)	Resistance of circuit (mΩ)	Maximum case temperature rise ΔT (K)	Component single fault condition	Results
Supplementary information:						

7.3.5	TABLE: Crush (cells) (INR18650-2850)				P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
Samples charged at charging temperature upper limit (65°C)					
Cell #57	4.19	4.17	13	P	
Cell #58	4.19	4.17	13	P	
Cell #59	4.19	4.17	13	P	
Cell #60	4.18	3.93	13	P	
Cell #61	4.18	4.17	13	P	
Samples charged at charging temperature lower limit (-5°C)					
Cell #62	4.17	4.15	13	P	
Cell #63	4.15	4.15	13	P	
Cell #64	4.15	4.14	13	P	
Cell #65	4.15	4.14	13	P	
Cell #66	4.15	4.14	13	P	
Supplementary information:					
- No fire or explosion					

7.3.5	TABLE: Crush (cells) (INR18650-29E)				P
Sample no.	OCV before test (Vdc)	OCV at removal of crushing force (Vdc)	Maximum force applied to the cell during crush (kN)	Results	
Samples charged at charging temperature upper limit (65°C)					
Cell #67	4.19	4.19	13	P	
Cell #68	4.19	4.19	13	P	
Cell #69	4.19	4.19	13	P	
Cell #70	4.19	4.19	13	P	
Cell #71	4.19	4.19	13	P	
Samples charged at charging temperature lower limit (-5°C)					
Cell #72	4.15	4.15	13	P	
Cell #73	4.16	4.16	13	P	
Cell #74	4.15	4.15	13	P	
Cell #75	4.16	4.16	13	P	
Cell #76	4.14	4.14	13	P	
Supplementary information:					
- No fire or explosion					

7.3.6		TABLE: Over-charging of battery			N/A
Constant charging current (A)					—
Supply voltage (Vdc)					—
Sample no.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results	
Supplementary information:					

7.3.7		TABLE: Forced discharge (cells) (INR18650-2850)			P
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Lower limit discharge voltage (Vdc)	Results	
Cell #77	3.15	2.85	2.45	P	
Cell #78	3.15	2.85	2.45	P	
Cell #79	3.18	2.85	2.45	P	
Cell #80	3.15	2.85	2.45	P	
Cell #81	3.15	2.85	2.45	P	
Supplementary information:					
- No fire or explosion					

7.3.7		TABLE: Forced discharge (cells) (INR18650-29E)			P
Sample no.	OCV before application of reverse charge (Vdc)	Measured reverse charge I_t (A)	Lower limit discharge voltage (Vdc)	Results	
Cell #82	3.24	2.90	2.45	P	
Cell #83	3.23	2.90	2.45	P	
Cell #84	3.23	2.90	2.45	P	
Cell #85	3.24	2.90	2.45	P	
Cell #86	3.24	2.90	2.45	P	
Supplementary information:					
- No fire or explosion					

7.3.8.1	TABLE: Vibration					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
Supplementary information:						

7.3.8.2	TABLE: Mechanical shock					N/A
Sample no.	OCV before test (Vdc)	OCV after test (Vdc)	Mass before test (g)	Mass after test (g)	Results	
Supplementary information:						

7.3.9	TABLE: Forced internal short circuit (cells) (INR18650-2850)					P
Sample no.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results	
Samples charged at charging temperature upper limit (65°C)						
Cell #87	65	4.19	1	800	P	
Cell #88	65	4.19	1	800	P	
Cell #89	65	4.19	1	800	P	
Cell #90	65	4.19	1*	800	P	
Cell #91	65	4.19	1*	800	P	
Samples charged at charging temperature lower limit (-5°C)						
Cell #92	-5	4.15	1	800	P	
Cell #93	-5	4.15	1	800	P	
Cell #94	-5	4.15	1	800	P	
Cell #95	-5	4.15	1*	800	P	
Cell #96	-5	4.14	1*	800	P	
Supplementary information:						
¹⁾ Identify one of the following: 1: Nickel particle inserted between positive and negative (active material) coated area. 2: Nickel particle inserted between positive aluminium foil and negative active material coated area. *No location 2 in this cell. - No fire						

7.3.9	TABLE: Forced internal short circuit (cells) (INR18650-29E)					P
Sample no.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results	
Samples charged at charging temperature upper limit (65°C)						
Cell #97	65	4.19	1	800	P	
Cell #98	65	4.19	1	800	P	
Cell #99	65	4.18	1	800	P	
Cell #100	65	4.19	1*	800	P	
Cell #101	65	4.18	1*	800	P	
Samples charged at charging temperature lower limit (-5°C)						
Cell #102	-5	4.14	1	800	P	
Cell #103	-5	4.14	1	800	P	
Cell #104	-5	4.15	1	800	P	
Cell #105	-5	4.14	1*	800	P	
Cell #106	-5	4.14	1*	800	P	
Supplementary information:						
¹⁾ Identify one of the following: 1: Nickel particle inserted between positive and negative (active material) coated area. 2: Nickel particle inserted between positive aluminium foil and negative active material coated area. *No location 2 in this cell. - No fire						

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results ¹⁾	
Supplementary information:					

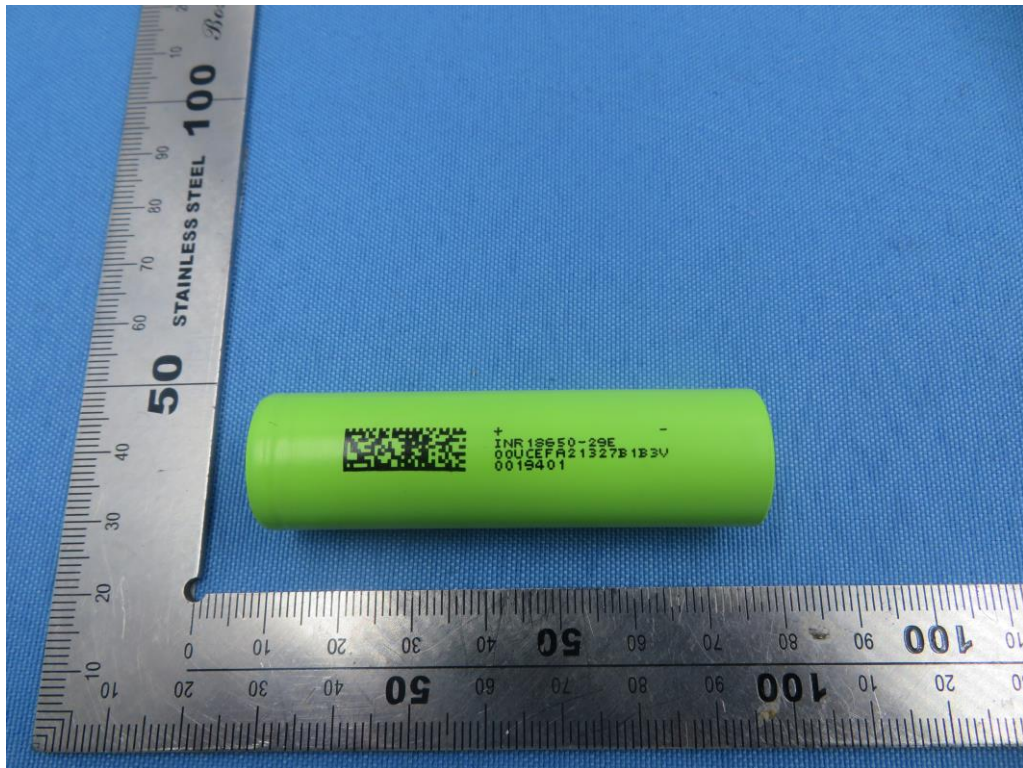
--End of Report--

	Eq. No.	Name	Manufacturer	Model No.	Date of Calibration	Date of next Calibration
<input checked="" type="checkbox"/>	1.909	Steel ruler(2 m)	ZhengJiang YongKang Shiya Bright Measuring Tool Factory	2m	2020.09.01	2021.08.31
<input checked="" type="checkbox"/>	1.923	Multimeter	Fluke	F117C	2020.09.19	2021.09.18
<input checked="" type="checkbox"/>	1.946	Midi logger	Graphtec corporation	GL220	2021.01.14	2022.01.13
<input checked="" type="checkbox"/>	1.955	Internal short-circuit Tester	Dongguan Bell Experiment Equipment Co., Ltd	BE-6045W	2021.03.25	2022.03.24
<input checked="" type="checkbox"/>	1.956	Nitrogen operation cabinet	Nanjing university equipment factory	zcx	--	*)
<input checked="" type="checkbox"/>	1.975	Thermal cycling chamber	YinHe (ChongQing) Testing Equipment Co.Ltd	GLH605F	2021.01.21	2022.01.20
<input checked="" type="checkbox"/>	1.976	Timer	ZHUIRI	PS-80	2020.08.27	2021.08.26
<input checked="" type="checkbox"/>	1.987	Battery Test System	NEWARE	CT-4008-5V10A-FA	2021.04.30	2022.04.29
<input checked="" type="checkbox"/>	1.993	Battery Test System	NEWARE	CT-4008-20V10A-NA	2021.04.30	2022.04.29
<input checked="" type="checkbox"/>	2.016	Midi Logger	GRAPHTEC	GL240	2021.01.14	2022.01.13
<input checked="" type="checkbox"/>	2.023	Resistance Meter	HIOKI	RM3544	2021.04.30	2022.04.29
<input checked="" type="checkbox"/>	2.025	Oven	GWS ENVIRONMENTAL EQUIPMENI CO., LTD	PH-01	2021.06.08	2022.06.07
<input checked="" type="checkbox"/>	2.033	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.16	2021.10.15
<input checked="" type="checkbox"/>	2.034	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.16	2021.10.15
<input checked="" type="checkbox"/>	2.035	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.16	2021.10.15
<input checked="" type="checkbox"/>	2.036	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.16	2021.10.15
<input checked="" type="checkbox"/>	2.037	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.16	2021.10.15
<input checked="" type="checkbox"/>	2.038	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.19	2021.10.18
<input checked="" type="checkbox"/>	2.039	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.19	2021.10.18
<input checked="" type="checkbox"/>	2.040	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.10.16	2021.10.15
<input checked="" type="checkbox"/>	2.050	Crush Tester	Dongguan Bell Experiment Equipment Co., Ltd.	BE-6045W-2T	2021.04.30	2022.04.29
<input checked="" type="checkbox"/>	2.064	Thermal cycling chamber	YinHe(ChongQing) Testing Equipment Co., Ltd.	KWGDS6025IIF	2020.09.17	2021.09.16
<input checked="" type="checkbox"/>	2.065	Dew point meter	Rotronic	DP71	2020.12.21	2021.12.20
<input checked="" type="checkbox"/>	2.075	DC power supply	GWINSTEK	GES874378	2020.12.21	2021.12.20
<input checked="" type="checkbox"/>	2.077	DC power supply	GWINSTEK	GES874379	2020.12.18	2021.12.20
<input checked="" type="checkbox"/>	2.078	DC power supply	GWINSTEK	GES874366	2020.12.21	2021.12.20
<input checked="" type="checkbox"/>	2.079	DC power supply	GWINSTEK	GES874361	2020.12.21	2021.12.20
<input checked="" type="checkbox"/>	2.081	Multimeter	Fluke	179C	2020.07.13	2021.07.12
<input checked="" type="checkbox"/>	2.085	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.08.14	2021.08.13
<input checked="" type="checkbox"/>	2.086	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.08.14	2021.08.13
<input checked="" type="checkbox"/>	2.087	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.08.14	2021.08.13
<input checked="" type="checkbox"/>	2.088	Battery Testing System	NEWARE	CT-4008-5V6A-S1-F	2020.08.14	2021.08.13
<input checked="" type="checkbox"/>	2.104	DC power supply	GWINSTEK	GW	2020.11.02	2021.11.01
<input checked="" type="checkbox"/>	2.105	DC power supply	GWINSTEK	GW	2020.11.02	2021.11.01
<input checked="" type="checkbox"/>	3.902	Drop tester	DongGuan GaoXin Testing Equipment Ltd	GX-6050-A	--	*)

*) Initial calibration or verification only

Product: Lithium-ion Rechargeable Cell

Type Designation: INR18650-2850, INR18650-29E



Picture 1 Front view of cell (INR18650-29E)



Picture 2 Side view of cell (INR18650-29E)