



Test Report issued under the responsibility of:



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 :	50290440 002
Date of issue :	2020-01-13
Total number of pages	11 pages
Name of Testing Laboratory preparing the Report	TÜV Rheinland (Shenzhen) Co., Ltd.
Applicant's name	Hengdian Group DMEGC Magnetics Co., Ltd.
Address :	Hengdian Industrial Zone, Dongyang City, Zhejiang, P. R. China
Test specification:	
Standard	IEC 62133-2:2017
Test procedure	CB Scheme
Non-standard test method	N/A
Test Report Form No.	IEC62133_2A
Test Report Form(s) Originator :	DEKRA
Master TRF	Dated 2017-08-10
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Test item description :	Lithium-ion Rechargeable Cell	
Trade Mark :	DMEGC	
Manufacturer	Same as applicant	
Model/Type reference	INR18650-20P	
Ratings	3.7V, 2000mAh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.
Testing location/ address :	1F East & 2-4F, Cybio Technology Building No. 1, No. 16 Kejibei 2nd Road, High-Tech Industrial Park North, Nanshan District, 518057, Shenzhen, China	
Tested by (name, function, signature) :	Harris Yin	<i>Harris Yin</i>
Approved by (name, function, signature) ... :	Daniel Dai	<i>Daniel Dai</i>
<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 previous report 50290440 001 for details.	
Summary of testing:	
Tests performed (name of test and test clause): cl.5.6.2 Design recommendation; cl.7.1 Charging procedure for test purposes (for cells and batteries); cl.7.3.1 External short circuit (cells); cl.7.3.4 Thermal abuse (cells); cl.7.3.5 Crush (cells); cl.7.3.9 Design evaluation – Forced internal short circuit (cells) Tests are made with the number of cells specified in IEC 62133-2: 2017 Table 1.	Testing location: TÜV Rheinland (Shenzhen) Co., Ltd. 1F East & 2-4F, Cybio Technology Building No. 1, No. 16 Kejibei 2nd Road, High-Tech Industrial Park North, Nanshan District, 518057, Shenzhen, China
Summary of compliance with National Differences (List of countries addressed): See previous report 50290440 001 for details. <input checked="" type="checkbox"/> The product fulfils the requirements of <u>EN62133-2: 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.

See previous report 50290440 001 for details.

Test item particulars:	
Classification of installation and use:	To be defined in final product
Supply Connection	DC terminal
Recommend charging method declared by the manufacturer	Charging the cell with 1000mA constant current until 4.2V, then constant voltage until the charge current reduces to 40mA at ambient 20°C±5°C.
Discharge current (0,2 It A)	400mA
Specified final voltage:	2.45V
Upper limit charging voltage per cell:	4.25V
Maximum charging current	6000mA
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
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	2019-12-16
Date (s) of performance of tests	2019-12-17 to 2019-12-31
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 applicant	

General product information and other remarks:

The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte and 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	Final Voltage
INR18650-20P	2000mAh	3.7V	1000mA	20000mA	6000mA	30000mA	4.25V	2.45V

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
INR18650-20P	4.25V	100mA	0°C	60°C

Construction:

See previous report 50290440 001 for details.

Circuit diagram:

See previous report 50290440 001 for details.

Description of change(s):

1. Revised the “Maximum Charge Current” from “4000mA” to “**6000mA**” for customer’s requirement, see page 6 for details;
2. Changed the “Maximum Discharge Current” from “20000mA” to “**30000mA**” for customer’s requirement, see page 6 for details;
3. Revised the “Charge temperature range” from “0°C ~ 45°C” to “**0°C ~ 60°C**”.

For the above described change(s) the following was considered to be necessary:

Change	Testing	Comments	Result
1	cl.7.3.1 External short circuit (Cells); cl.7.3.4 Thermal abuse (Cells); cl.7.3.5 Crush (Cells); cl.7.3.9 Design evaluation – Forced internal short circuit (Cells).	cl.7.3.1, cl.7.3.4, cl.7.3.5, cl.7.3.9 considered necessary for the cell, due to revising the “Maximum Charge Current”.	P
2	N/A	No related tests are considered necessary.	P
3	cl.7.3.1 External short circuit (Cells); cl.7.3.4 Thermal abuse (Cells); cl.7.3.5 Crush (Cells); cl.7.3.9 Design evaluation – Forced internal short circuit (Cells).	cl.7.3.1, cl.7.3.4, cl.7.3.5, cl.7.3.9 considered necessary for the cell, due to revising the “Charge temperature range”.	

History of amendments and modifications:

Ref. No. 50290440 001, dated 2019-10-10 (original test report)

 Ref. No. 50290440 002, dated 2020-01-13 (1st modification)

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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 °C ± 5 °C, using the method declared by the manufacturer	See page 5.	P
	Prior to charging, the battery have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage	See page 5.	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 range: 0-60°C declared. -5°C used for lower limit tests. 65°C used for upper limit tests.	P
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
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C)..... :	130°C	—
	Results: No fire. No explosion	No fire. No explosion	P
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
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Tested complied.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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

7.3.1	TABLE: External short-circuit (cell)					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 #1	54.4	4.21	77.2	112.1	P	
Cell #2	54.4	4.21	79.4	106.9	P	
Cell #3	54.4	4.21	76.3	124.2	P	
Cell #4	54.4	4.21	78.7	124.7	P	
Cell #5	54.4	4.21	78.9	121.4	P	
Samples charged at charging temperature lower limit (-5°C)						
Cell #6	54.2	4.12	76.5	125.3	P	
Cell #7	54.2	4.12	78.9	121.9	P	
Cell #8	54.2	4.13	79.7	108.6	P	
Cell #9	54.2	4.12	77.4	126.3	P	
Cell #10	54.2	4.12	80.0	123.3	P	
Supplementary information:						
- No fire or explosion						

7.3.5	TABLE: Crush (cells)				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 #11	4.21	4.21	13	P	
Cell #12	4.21	4.21	13	P	
Cell #13	4.21	4.21	13	P	
Cell #14	4.21	4.21	13	P	
Cell #15	4.21	4.21	13	P	
Samples charged at charging temperature lower limit (-5°C)					
Cell #16	4.13	4.13	13	P	
Cell #17	4.13	4.13	13	P	
Cell #18	4.13	4.13	13	P	
Cell #19	4.12	4.12	13	P	
Cell #20	4.13	4.13	13	P	
Note:					
A 13KN force applied at the longitudinal side of cylindrical cells.					
Supplementary information:					
- No fire					
- No explosion					

7.3.9	TABLE: Forced internal short circuit (cells)					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 #21	65	4.20	1	800	P	
Cell #22	65	4.20	1	800	P	
Cell #23	65	4.20	1	800	P	
Cell #24	65	4.21	1	800	P	
Cell #25	65	4.20	1	800	P	
Samples charged at charging temperature lower limit (-5°C)						
Cell #26	-5	4.12	1	800	P	
Cell #27	-5	4.12	1	800	P	
Cell #28	-5	4.12	1	800	P	
Cell #29	-5	4.12	1	800	P	
Cell #30	-5	4.12	1	800	P	
<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 fire</p>						

-- End of Report --