



TEST REPORT

Report No.: NTS2408379E

Product: 12V Electric Cordless Drill Set

Model No.: JZONZ96MUKWJ8

Applicant: DENCREST LIMITED

Address: RM 1502-F7 EASEY COMM BLDG 253-261 HENNESSY RD WANCHAI HONG KONG

Issued by: NOWD Testing Services Co., Ltd.

Lab 5A, Building 29B, Yintian Industrial Zone, Yantian Community,

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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.....	NTS2408379E
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Testing laboratory	NOWD Testing Services Co., Ltd.
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Testing location	As above
Applicant's name.....	DENCREST LIMITED
Address.....	RM 1502-F7 EASEY COMM BLDG 253-261 HENNESSY RD WANCHAI HONG KONG
Manufacturer.....	DENCREST LIMITED
Address.....	RM 1502-F7 EASEY COMM BLDG 253-261 HENNESSY RD WANCHAI HONG KONG
Test specification:	
Standard.....	IEC 62133-2: 2017+A1: 2021
Test procedure.....	Type test
Non-standard test method.....	N/A
Test Report Form No.....	EN62133-2A
Master TRF.....	Dated 2021-07
This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of NOWD Testing Services Co., Ltd.	
Test item description.....	12V Electric Cordless Drill Set
Trade Mark.....	N/A
Model/Type reference.....	JZONZ96MUKWJ8
Ratings.....	12V $\overline{\text{---}}$, 1A



Particulars: test item vs. test requirements	
Classification of installation and use.....	Build-in
Supply connection.....	DC wires
Recommend charging method declared by the manufacturer.....	Charged by using the charging voltage 12V ± 0.05 V and charging current 250mA, until charging current is reduced to 0.1 It A (50mA) by using a constant voltage charging method.
Discharge current (0,2 It A)	2200mA
Specified final voltage.....	12VDC
Chemistry	☐ nickel systems..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....	4.25V DC
Maximum charging current.....	250mA
Charging temperature upper limit.....	+45 °C
Charging temperature lower limit.....	0 °C
Polymer cell electrolyte type.....	☐ gel polymer..... ☐ solid polymer
Possible test case verdicts:	
Test case does not apply to the test object	N/A (Not applicable)
Test object does meet the requirement.....	P (Pass)
Test object does not meet the requirement.....	F (Fail)
Testing:	
Date of receipt of test item.....	Aug 21, 2024
Date(s) of performance of test.....	Aug 21, 2024 to Aug 29, 2024
General remarks:	
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 testing laboratory. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator.	
Copy of Label:	
12V Electric Cordless Drill Set Model No.: DISHUN001 Rating: 12V , 1A DENCREST LIMITED Made in China	

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

4	Parameter measurement tolerances		P
	Parameter measurement tolerances		P

5	General safety considerations		P
5.1	General		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		P
	Insulation resistance (MΩ)..... :	> 5MΩ	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate creepage and clearance 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		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		P
5.4	Temperature/ voltage/ current management		P
	Batteries are designed such that abnormal temperature rise conditions are prevented		P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified		P
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		P
	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 circuits	Insulation tape	P
5.6	Assembly of cells into batteries		P
5.6.1	Each battery should 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.		P
	However this protection may be provided external to the battery such as within the charger or the end devices. If protection is external to the battery, the manufacturer of the battery shall 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, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	Each battery has an independent control and protection		N/A
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		N/A
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard		N/A
5.6.2	Design recommendation		P
	For the battery consisting of a single cell or a single cellblock: - Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - 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: - 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 shall not be counted as an overcharge protection.		N/A
	For batteries consisting of series-connected cells or cell blocks, cells should 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 should not be discharged beyond the cell manufacturer's specified final voltage.		P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry should be incorporated into the battery management system.		N/A
5.6.3	Mechanical protection for cells and components of batteries		P
	Mechanical protection for cells, cell connections and control circuits within the battery should be provided to prevent damage as a result of intended use and reasonably foreseeable misuse.		P
	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 should be 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 should be considered when conducting mechanical tests.		P
5.7	Quality plan		P

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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	ISO 9001 certificate of battery manufacturer was provided	P
5.8	battery safety components		P
	See Annex F.		P

6	Type test conditions		P
	Tests were made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old	Tests are performed according to specified in table 1 of the standard. Samples are not more than 6 months old.	P
	The internal resistance of coin cells shall be measured in accordance with Annex D.		N
	Coin cells with internal resistance less than or equal to 3Ω shall be tested in accordance with Table 1.		N
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	The tests are conducted in an ambient of 20°C ± 5°C.	P

7	Specific requirements and tests		P
7.1	Charging procedures for test purposes		P
7.1.1	First procedure: This charging procedure applied to tests 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.	20 ± 5 °C	P
	Prior to charging, the battery shall have been discharged at 20 °C ± 5 °C at a constant current of 0.2 It A down to a specified final voltage.	0.2 It A = 100mA	P
7.1.2	Second procedure: This charging procedure applied to the tests of 7.3.1, 7.3.2, 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.	0-45 °C; The upper limit charging voltage is 4.25V during test.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	See Figures A.1 and A.2 for an example of an operating region for charge and discharge.		--
	See Table A.1 for a list of lithium ion chemistries and examples of operating region parameters.		--

7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)		P
	Results: No fire. No explosion..... :	For cell (See Table 7.2.1)	P
7.2.2	Moulded case stress at high ambient temperature (battery)	For battery	P
	Internal components of batteries shall not be exposed during use at high temperature.		P
	This requirement only applies to batteries with a moulded case.		P
	Oven temperature (°C)..... :	70°C±2°C	—
	Results: No physical distortion of the battery casing resulting in exposure if internal components	No deformation on the shell	P

7.3	Reasonably foreseeable misuse		P
7.3.1	External short circuit (cell)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See Table 7.3.1)	P
7.3.2	External short circuit (battery)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		P
	- 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		P
	Results: No fire. No explosion..... :	(See Table 7.3.2)	P

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	A single fault in the discharge protection circuit should be conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test.		P
	A single fault applies to protective component parts such as MOSFET (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor.	MOSFET	P
	Results: No fire. No explosion..... :	(See Table 7.3.2)	P
7.3.3	Free fall		P
	Results: No fire. No explosion.		P
7.3.4	Thermal abuse (cells)		P
	Each fully charged cell, according to the second procedure in 7.1.2, is placed in a gravity or circulating air-convection oven, in an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, for 1 h.		P
	The oven temperature is raised at a rate of $5\text{ }^{\circ}\text{C}/\text{min} \pm 2\text{ }^{\circ}\text{C}/\text{min}$ to a temperature of $130\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.		P
	The cell remains at this temperature for 30 min before the test is terminated.	130°C, 30 min	P
	Results: No fire. No explosion.		P
7.3.5	Crush (cells)		P
	Each fully charged cell crushed between two flat surfaces in an ambient temperature.		--
	The force for the crushing is applied by a device exerting a force of $13\text{ kN} \pm 0.78\text{ kN}$.		P
	Once the maximum force has been applied, or an abrupt voltage drop of one-third of the original voltage has been obtained, the force is released.		P
	A cylindrical or prismatic cell is crushed with its longitudinal axis parallel to the flat surfaces of the crushing apparatus.		P
	Test only the wide side of prismatic cells.		P
	A coin cell shall be crushed by applying the force on its flat surface.		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.5)	P
7.3.6	Over-charging of battery		P
	Charging for longer periods than specified by the manufacturer shall not cause fire or explosion.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Each test battery shall be discharged at a constant current of 0.2 I _t A, to a final discharge voltage specified by the manufacturer.	12V	P
	Sample batteries shall then be charged at a constant current of 2.0 I _t A,	2200mA	P
	using a supply voltage:	See below	--
	-- 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	12V	P
	-- 1.2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	-- Sufficient to maintain a current of 2.0 I _t A throughout the duration of the test or until the supply voltage is reached.	Max. current: 600mA	P
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		P
	- Returned to ambient		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.6)	P
7.3.7	Forced discharge (cells)		P
	A cell shall withstand polarity reversal without causing fire or explosion.		P
	A protective device in a battery or system can be adopted.		P
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer. The discharged cell is then subjected to a forced discharge at 1 I _t A to the negative value of the upper limit charging voltage.	600mA	P
	The total duration for the forced discharge testing is 90 min.		P
	Results: No fire. No explosion..... :	(See Table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		P
7.3.8.1	Vibration		P
	Vibration encountered during transportation and use shall not cause leakage, fire or explosion.		P
	Test batteries shall be subjected to sinusoidal vibration according to Table 3		P
	Frequency range	7 Hz – 200 Hz	--

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Clause	Requirement + Test	Result - Remark	Verdict
	Axis	X, Y, Z	--
	Duration of logarithmic sweep cycle	15 min	--
	Number of cycles	12 cycles per axis	--
	This cycle shall be repeated 12 times for a total of approximately 3 h for each of three mutually perpendicular mounting positions.	3 h for each X, Y, Z directions, total is 9 h.	P
	Results: No fire, no explosion, no rupture, no leakage or venting..... :		P
7.3.8.2	Mechanical shock		P
	Shock encountered during transportation and use shall not cause leakage, fire or explosion.		P
	Each test battery shall be subjected to three shocks in each direction of three mutually perpendicular mounting positions of the battery for a total of 18 shocks.		P
	For each shock, the parameters given in Table 4 shall be applied.	See below:	--
	Waveform	Half sine	--
	Peak acceleration	150 g _n	--
	Pulse duration	6 ms	--
	Number of shocks per half axis	3	--
	Results: No fire, no explosion, no rupture, no leakage or venting..... :		P
7.3.9	Design evaluation – Forced internal short circuit (cells)		P
	The cells complied with national requirement for..... :		—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		P
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400N	N/A
	Results: No fire..... :	(See Table 7.3.9)	P

8	Information for safety		P
8.1	General		--
	The use, and particularly abuse, of portable sealed secondary lithium cells and batteries may result in the creation of hazards and may cause harm.		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.		P

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards.		P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		P
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user.....:		P
	Guidance is provided in EN TR 62188 on the design and manufacture of portable batteries, and non-exhaustive lists of good advice are provided for information in Annexes B and C.		P
	Conformity can be checked by examination of manufacturer's documentation.		P
	Do not allow children to replace batteries without adult supervision.		P
8.2	Small cell and battery safety information		--
	Small cells and batteries and equipment using small cells and batteries are to be provided with information regarding ingestion hazards.		P
	Small cells and batteries that may pose an ingestion hazard are those that can fit within the limits of the ingestion gauge shown in Figure 3.		P
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		--
	• Keep small cells and batteries which are considered swallowable out of the reach of children.		P
	• Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion.		P
	• In case of ingestion of a cell or battery, seek medical assistance promptly.		P

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
9	Marking		P
9.1	Cell marking		N/A
	Cells shall be marked as specified in EN 61960, except coin cells. Coin cells whose external surface area is too small to accommodate the markings on the cells shall 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
	However, the cell marking can be indicated with the battery, the instructions and/or the specifications.		N/A
	Conformity is checked by inspection		N/A
9.2	battery marking	See the marking plate.	P
	Batteries shall be marked as specified in EN 61960, except for coin batteries.		P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries shall show the designation and polarity.		N/A
	Batteries marked with an appropriate caution statement.		P
	Terminals shall have clear polarity marking on the external surface of the battery.		P
	Conformity is checked by inspection		P
9.3	Caution for ingestion of small cells and batteries		P
	Coin cells and batteries identified as small batteries according to 8.2 shall include a caution statement regarding the hazards of ingestion in accordance with 8.2.		P
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion shall be given on the immediate package.		P
	Conformity is checked by inspection		P
9.4	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.		P
	Recommended charging instructions marked on or supplied with the battery.		P
10	Packaging		P



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Clause	Requirement + Test	Result - Remark	Verdict
	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

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Clause	Requirement + Test	Result - Remark	Verdict

Annex A	Charging range of secondary lithium ion cells for safe use		P
A.1	General		P

A.2	Safety of lithium-ion secondary battery		P
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A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A

A.4	Consideration of temperature and charging current		P
A.4.1	General	Charging temperature range is 0-45°C for both cell and battery	P
A.4.2	Recommended temperature range		P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		P
A.4.3	High temperature range	45°C for both cell and battery	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 high temperature range		N/A
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N/A
A.4.4	Low temperature range	0°C for both cell and battery	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 low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		P
A.4.5	Scope of the application of charging current		P

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Clause	Requirement + Test	Result - Remark	Verdict
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle to cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle to winding core		N/A
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		N/A
A.5.6	Insertion of nickel particle to 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		N/A
A.6.2	Example of a nickel particle preparation procedure		N/A
A.6.3	Positioning (or placement) of a nickel particle		N/A
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

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
Annex D	Measurement of the internal AC resistance for coin cells	Not coin cells	N/A
D.1	General		N/A
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		P

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Critical components information						--
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity ¹⁾	
battery cell	Dongguan Lihao New Energy Technology Co., Ltd	JHCY 502540	12V d.c. 500mAh	IEC 62133-2	Test with equipment	
DC wire	Shanghai Jiukai Wire & Cable Co., Ltd.	1571	28AWG, 80°C	UL 758	UL E342399	
PCB	ABLIC Inc.	G3J+8205-6	V-0	UL94	UL	
Protect IC	AO TU	G3J	TSOT236	IEC 62133-2	Test with equipment	
MOSFET	ABLIC Inc.	8205-6	TO263	IEC 62133-2	Test with equipment	
NTC	XING LIN	28#PVC	150mm Tadpole type	IEC 62133-2	Test with equipment	
Supplementary information:						
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.						

7.2.1	TABLE: Continuous charging at constant voltage (for cell)				P
Model	Recommended charging voltage V _c , (Vdc)	Recommended charging current I _{rec} , (mA)	OCV at start of test, (Vdc)	Results	
A9	12	600	12.196	A & B	
A9	12	600	12.117	A & B	
A9	12	600	12.068	A & B	
A9	12	600	12.149	A & B	
A9	12	600	12.116	A & B	
Supplementary information: A - No fire or explosion B - No leakage C - Leakage D - Fire E - Explosion F - Bulge G - Others (please explain)					

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.1	TABLE: External short circuit (cell)					P
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (°C)	Results	
Samples charged at charging temperature upper limit (45°C)						
A9	55.0	12.196	0.078	94.5	A	
A9	55.0	12.068	0.077	97.0	A	
A9	55.0	12.149	0.079	94.2	A	
A9	55.0	12.149	0.075	99.6	A	
A9	55.0	12.116	0.074	95.5	A	
Samples charged at charging temperature lower limit (0°C)						
A9	55.2	12.149	0.076	96.0	A	
A9	55.2	12.116	0.076	93.8	A	
A9	55.2	12.149	0.073	98.1	A	
A9	55.2	12.149	0.078	91.8	A	
A9	55.2	12.196	0.080	97.0	A	
Supplementary information: A - No fire or explosion B - No leakage C - Leakage D - Fire E - Explosion F - Bulge G - Others (please explain)						

EN 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: External short circuit (battery)					P
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (°C)	Results	
Normal working						
A9	22.5	12.196	0.076	Shut down immediately Tested for 24 h	A & B	
A9	23.5	12.117	0.074		A & B	
A9	22.5	12.068	0.079		A & B	
A9	23.4	12.149	0.078		A & B	
A9	22.5	12.116	0.079		A & B	
Single fault in the discharge protection circuit						
A9	23.0	12.149	0.079	70.1	A & B	
A9	23.2	12.116	0.078	68.9	A & B	
A9	23.3	12.068	0.079	72.3	A & B	
A9	23.0	12.149	0.074	69.7	A & B	
A9	23.1	12.116	0.077	70.6	A & B	
Supplementary information:						
A - No fire or explosion B - No leakage C - Leakage D - Fire E - Explosion F - Bulge G - Others (please explain)						

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.5	TABLE: Crush (for cells)					P
Model	OCV at start of test, (Vdc)	OCV at removal of crushing force, (Vdc)	Width/ diameter of cell before crush, (mm)	Required deformation for crush, (mm)	Results	
Samples charged at charging temperature upper limit (45°C)						
A9	12.068	12.068	11.90	1.190	A, G	
A9	12.149	12.149	11.84	1.184	A, G	
A9	12.089	12.068	11.79	1.179	A, G	
A9	12.133	12.116	11.82	1.182	A, G	
A9	12.067	12.061	11.91	1.191	A, G	
Samples charged at charging temperature lower limit (0°C)						
A9	12.162	12.149	11.68	1.168	A, G	
A9	12.189	12.089	11.79	1.179	A, G	
A9	12.149	12.149	11.80	1.180	A, G	
A9	12.089	12.068	11.90	1.190	A, G	
A9	12.133	12.116	11.40	1.140	A, G	
Supplementary information: A - No fire or explosion B - No leakage C - Leakage D - Fire E - Explosion F - Bulge G - Others (please explain): The values of diameter of cell were not measured. The test was conducted until the test force was reached max. force.						

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery			P
Constant charging current (mA).....:		500mA		—
Supply voltage (Vdc).....:		12V dc		—
Model	OCV before charging, (Vdc)	Resistance of circuit, (Ω)	Maximum outer casing temperature, ($^{\circ}\text{C}$)	Results
A9	12.149	--	38.0	A
A9	12.089	--	30.6	A
A9	12.149	--	37.3	A
A9	12.015	--	33.2	A
A9	12.159	--	35.8	A
Supplementary information: A - No fire or explosion B - No leakage C - Leakage D - Fire E - Explosion F - Bulge G - Others (please explain)				

7.3.7	TABLE: Forced discharge (cells)			P
Model	OCV before application of reverse charge, (Vdc)	Measured Reverse charge I_r , (mA)	Time for reversed charge, (minutes)	Results
A9	12.133	500	90	A
A9	12.165	500	90	A
A9	12.149	500	90	A
A9	12.089	500	90	A
A9	12.149	500	90	A
Supplementary information: A - No fire or explosion B - No leakage C - Leakage D - Fire E - Explosion F - Bulge G - Others (please explain)				

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.9	TABLE: Forced internal short circuit (cells)					P
Model	Chamber ambient, (°C)	OCV at start of test, (Vdc)	Particle location ¹⁾	Maximum applied pressure, (N)	Results	
A9	45.1	12.133	1	108.6	A	
A9	45.1	12.165	1	105.3	A	
A9	45.1	12.149	1	102.4	A	
A9	45.1	12.133	1	95.7	A	
A9	45.1	12.149	1	98.8	A	
A9	10.3	12.089	1	104.1	A	
A9	10.3	12.149	1	89.8	A	
A9	10.3	12.015	1	96.8	A	
A9	10.3	12.159	1	110.5	A	
A9	10.3	12.149	1	102.5	A	

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 aluminum foil and negative active material coated area.

A - No fire or explosion

B - No leakage

C - Leakage

D - Fire

E - Explosion

F - Bulge

G - Others (please explain)

Photos



Fig 1. - Overview 1



Fig 2. - Overview 1

Photos

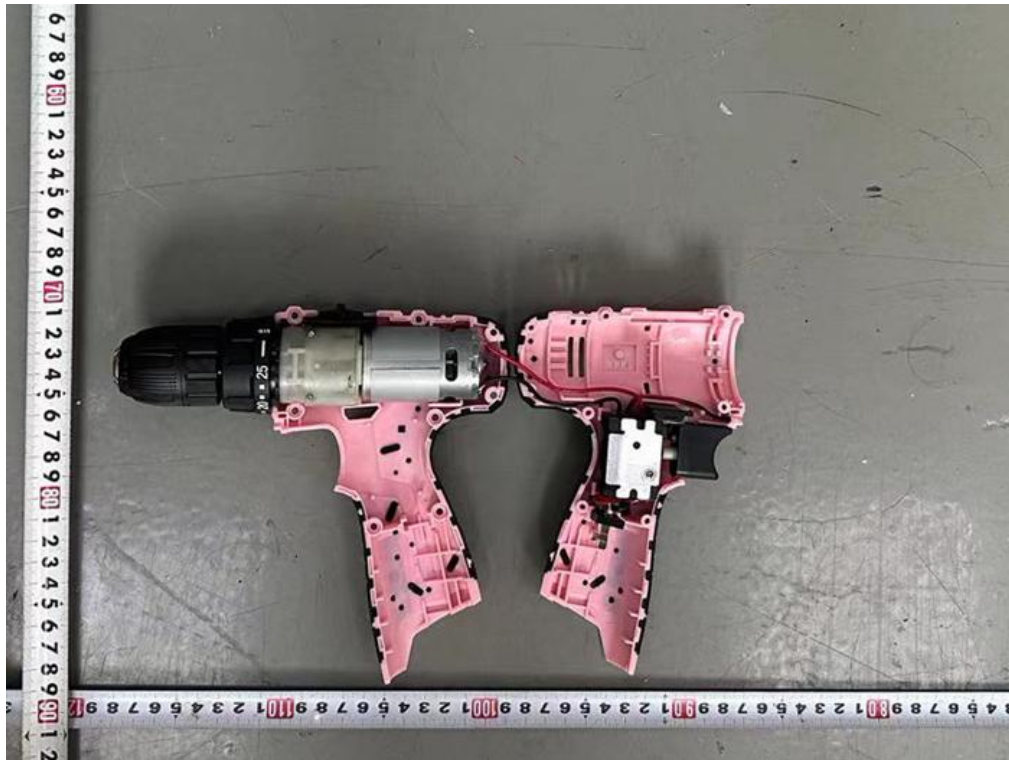


Fig 3. - Overview 1

===== End of Test Report =====