Ningbo Chemical Power Source Engineering Technology Research and Development Center

TEST REPORT

Report Number: 2021(086)

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Sample Description	GP "AA/LR6" Super Alkaline Batteries	**Test Basis**	IEC 60086-1：2015 IEC 60086-2：2015 IEC 60086-5：2016 2013/56/EU
Manufacturer	ZhongYin (Ningbo) Battery Co.,Ltd (Postcode:315011，Address：128 XingGuang Road, High-Tech Park Ningbo, China)	**Test Period**	2021.2.7~2021.4.10
Inspection Site	Ningbo Chemical Power Source Engineering Technology Research and Development Center	**Client**	Ningbo Battery & Electrical Appliance IMP/EXP Co., Ltd
Main Test Instrument	F-732 mercury-testing instrument TAS-990 atomic absorption spectrophotometer. Digital Multimeter The type DM-2000 Automatic Discharge Test System for Batteries DV-200-2 Electrodynamic vibrator testing system		
Test Items	1. All Initial Routine Test Items 2. Safety Performance 3. Heavy Metal Content		

EXECUTIVE SUMMARY:

The test results of all initial routine text items of the sample are in accord with IEC60086 & 2013/56/EU.

The sample(s) received a PASS rating.

Chief tester: Verified by: Authorized signer:

Issued Date: 2021.4.14

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	Test Item	Specification	Unit	Numbers Tested	Test Results	Pass/Fail
1	**Diameter**	13.7~14.5	mm	20pcs	14.04~14.15	Pass
2	**Total Height**	49.5~50.5	mm	20pcs	50.07~50.19	Pass
3	**Open-Circuit Voltage**	1.50~1.68	V	20pcs	1.630~1.637	Pass
4	**Conformance Check to Specified Minimum Average Duration (MAD)**					
1.5W2S /0.65W28S 10t/h,24h/d end-point voltage 1.05V		⩾40	pulses	8pcs	71 73 72 71 72 72 72 73 Average 72	Pass
50mA, 1h/8h,24h/d discharge, end-point voltage 1.0V		⩾ 30	h	8pcs	45.5 45.4 45.8 45.3 45.4 45.5 45.4 45.6 Average 45.5	Pass
250mA, 1h/d , discharge, end-point voltage 0.9V		⩾5	h	8pcs	7.7 7.7 7.8 7.7 7.8 7.7 7.7 7.7 Average 7.7	Pass
100mA, 1h/d , discharge, end-point voltage 0.9V		⩾15	h	8pcs	22.8 22.7 22.8 22.8 22.9 22.8 22.9 22.8 Average 22.8	Pass
3.9Ω,4m/h,8h/d discharge, end-point voltage 0.9V		⩾230	m	8pcs	404.8 405.5 405.7 406.3 405.2 405.8 406.2 405.7 Average 405.7	Pass
3.9Ω,1h/d ,discharge, end-point voltage 0.8V		⩾ 5	h	8pcs	7.5 7.6 7.5 7.5 7.5 7.4 7.5 7.5 Average 7.5	Pass
5	**Leakage-Resistant**					
1.5W2S /0.65W28S 10t/h,24h/d end-point voltage 0.6V		No leakage	/	8pcs	None leakage	Pass
50mA, 1h/8h,24h/d discharge, end-point voltage 0.6V		No leakage	/	8pcs	None leakage	Pass
250mA, 1h/d , discharge, end-point voltage 0.6V		No leakage	/	8pcs	None leakage	Pass
100mA, 1h/d , discharge, end-point voltage 0.6V		No leakage	/	8pcs	None leakage	Pass
3.9Ω,4m/h,8h/d discharge, end-point voltage 0.6V		No leakage	/	8pcs	None leakage	Pass
3.9Ω,1h/d ,discharge, end-point voltage 0.6V		No leakage	/	8pcs	None leakage	Pass

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6	**Heavy Metal Content**					
Cold Atomic Absorption Method	Hg	≤5	μg/g	2pcs	0.01 0.01	Pass
Atomic Absorption Spectrophotometric Method	Cd	≤20	μg/g	2pcs	6.3 6.2	Pass
	Pb	≤40	μg/g	2pcs	12.4 12.4	Pass

Test Item	Specification	Numbers Tested	Test Results	Pass /Fail
7 **Insulation resistance**				
Insulation resistance measurements shall be made immediately after a 2-minute period of uninterrupted test voltage application. However, if the instrument reading indicates that an insulation resistance meets the required limit.	The insulation resistance shall not less than 5MΩ	5pcs	>5MΩ	Pass
8 **Intended use**				
Partial use Undischarged battery is discharged with 3.9Ω resistive load(4m/h,8h/d discharge) until the service life falls by 50% of the MAD value, then stored at 45℃±5℃ for 30 days	No leakage No fire No explosion	5pcs	None leakage None fire None explosion	Pass
Transportation vibration Simple harmonic motion: Amplitude: ±0.8mm Frequency range; 10Hz~55Hz Varied rate:1Hz/min Vibration directions: each of three mutually perpendicular axes of the battery Vibration time: 85min~95min Rest the batteries for 1h.	No leakage No fire No explosion	5pcs	None leakage None fire None explosion	Pass
Transportation shock The minimum average acceleration during the first 3ms:75g_n The peak acceleration:125 g_n ~175 g_n Number of shocks: one shock in each of three mutually perpendicular axes of the battery Rest the batteries for 1h	No leakage No fire No explosion	5pcs	None leakage None fire None explosion	Pass

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Climatic-temperature cycling 1） Temperature cycling procedure 70℃,4h→ 20℃,2h →-20℃,4h →20℃2h 2） Interval between two temperatures: ≤30min 3） Repeat this sequence for 9 cycles After 10 cycles, Store the batteries for 7 days.	No fire No explosion	5pcs	None fire None explosion	Pass
9	**Reasonably foreseeable misuse**			
Incorrect installation Four undischarged batteries connected in series with one of the four batteries reversed (the tested battery). Continue the test until the temperature of the reversed battery returns to ambient.	No fire No explosion	20pcs	None fire None explosion	Pass
Over-discharge One battery is predischarged with 50mA, 1h/8h,24h/d,E.P.V0.6, then the battery is connected with three undischarged batteries and a 16Ω resistor in series. Continue the test until the open circuit voltage of the series string reaches 2.4V.	No fire No explosion	20pcs	None fire None explosion	Pass
External short circuit Connect the positive and negative terminals of each sample by a wire to create short-circuit of the sample. Place the batteries in an environment of 20±5℃. Continue the test for 24 hours or until the case temperature declines by 20 percent of the temperature rise.	No fire No explosion	5pcs	None fire None explosion	Pass
Free fall Undischarged batteries shall be dropped from a height of 1m onto a concrete surface. The sample shall be dropped twice, one time in each of two mutually perpendicular planes.	No fire No explosion	5pcs	None fire None explosion	Pass