

<b>TEST REPORT</b> <b>Primary batteries</b> <b>EN IEC 60086-1 – Part 1: General &amp; EN IEC 60086-2 – Part 2: Physical and electrical specifications</b>	
Report Reference No.....	2404B0730SHA-020
Tested by (name + signature).....	Michael Zheng <i>Michael Zheng</i>
Approved by (name + signature).....	Liping Chen <i>Liping Chen</i>
Date of issue .....	2024-11-15
<b>Testing Laboratory</b> .....	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Address.....	Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Testing location/procedure .....	<input checked="" type="checkbox"/> TL <input type="checkbox"/> RMT <input type="checkbox"/> SMT <input type="checkbox"/> WMP <input type="checkbox"/> TMP
Address.....	Same as above
<b>Applicant's name</b> .....	Zhejiang Mustang Battery Co., Ltd.
Address.....	No.818 Rongji Road, Luotuo Town, Ningbo, China   315202
<b>Test specification:</b>	
Standard .....	EN IEC 60086-1: 2021+AC:2022-07; EN IEC 60086-2: 2021+AC:2022-07
Test procedure.....	Testing
Non-standard test method.....	N/A
Test item description .....	Extra Alkaline Battery
Trade Mark .....	Raymax
Model and/or type reference.....	LR20 (D)
Manufacturer .....	Zhejiang Mustang Battery Co., Ltd. No.818 Rongji Road, Luotuo Town, Ningbo, China   315202
Rating(s) .....	1.5V
Expiration Date .....	Marked 04-2029 on battery bottom
Date Received .....	2024-05-19
Date Test Conducted.....	2024-06-06 to 2024-07-25
Test Result .....	<b>Pass</b>

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<b>EN IEC 60086-1 – Part 1: General</b>		
<b>Requirements</b>	<b>Result – Remark</b>	<b>Verdict</b>
<p><b>Clause 1: Scope</b> This part of EN IEC 60086 is intended to standardize primary batteries with respect to dimensions, nomenclature, terminal configurations, markings, test methods, typical performance, safety and environmental aspects. The object of this part of EN IEC 60086-1 is to benefit primary battery users, device designers and battery manufacturers by ensuring that batteries from different manufacturers are interchangeable according to standard form, fit and function. Furthermore, to ensure compliance with the above, this part specifies standard test methods for testing primary cells and batteries</p>	Alkaline Zinc Manganese Dioxide Battery	Pass
<p><b>Clause 2: Normative references</b> EN IEC 60086-2, Primary batteries – Part 2: Physical and electrical specifications EN IEC 60086-3, Primary batteries – Part 3: Watch batteries EN IEC 60086-4, Primary batteries – Part 4: Safety of lithium batteries EN IEC 60086-5, Primary batteries – Part 5: Safety of batteries with aqueous electrolyte</p>		Pass
<p><b>Clause 3: Terms and definitions</b></p>		Pass
<p><b>Clause 4: Requirements</b></p>		Pass
<p><b>Clause 4.1: General</b> (Design, Battery dimensions, Terminals, Classification, Designation, Marking)</p>	Dimension see table 1; Batteries are marked on intermediate package with IEC designation “LR20” marked on battery body with common designation “D”. Polarity “+” and “-”, nominal voltage “1.5V”, trademark “Raymax”, battery expiration date “04-2029” marked on battery bottom. Caution advice also marked on both battery body and intermediate package.	Pass
<p><b>Clause 4.1.3.2: Contact pressure resistance</b></p>	A force of 10 N applied through a steel ball of 1 mm diameter at the centre of each contact area for a period of 10 s shall not cause any apparent deformation which might prevent satisfactory operation of the battery.	Pass
<p><b>Clause 4.2: Performance</b> (Discharge performance, Dimensional stability, Leakage, Open-circuit voltage limits, Service output, Safety)</p>	See table 1 and 2	Pass

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<b>Clause 5: Performance – Testing</b> (Discharge testing, include Application tests and Service output tests, OCV testing, Battery dimensions, Leakage and deformation- closed circuit voltage drops for the first time below 40 % of the nominal voltage of the battery)	See table 2	Pass
<b>Clause 6: Performance – Test conditions</b>		N/A
<b>Clause 7: Sampling and quality assurance</b>	Samples selected randomly	Pass
<b>Clause 8 Battery packaging</b>		N/A
<b>Annex A (normative):</b> Criteria for the standardization of batteries		Pass
<b>Annex B (informative):</b> Recommendations for equipment design		N/A
<b>Annex C (normative):</b> Designation system (nomenclature)		Pass
<b>Annex D (informative):</b> Standard discharge voltage Us – Definition and method of determination		N/A
<b>Annex E (informative):</b> Preparation of standard methods of measuring performance (SMMP) of consumer goods		N/A
<b>Annex F (informative):</b> Guidance for proposing value of minimum average duration		N/A
<b>Annex G (normative):</b> Code of practice for packaging, shipment, storage, use and disposal of primary batteries		N/A
<b>Annex H (informative):</b> Compliance checklist		N/A

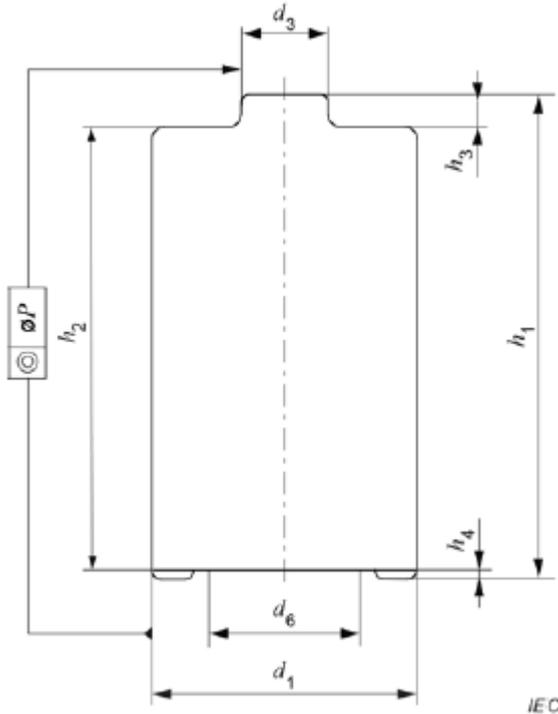
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<b>EN IEC 60086-2 – Part 2: Physical and electrical specifications</b>		
<b>Requirements</b>	<b>Result – Remark</b>	<b>Verdict</b>
<b><u>Clause 1: Scope</u></b> This part of EN IEC 60086 is applicable to primary batteries based on standardized electrochemical systems. It specifies – the physical dimensions, – the discharge test conditions and discharge performance requirements.	Alkaline Zinc Manganese Dioxide Battery	Pass
<b><u>Clause 2: Normative references</u></b> EN IEC 60086-1, Primary batteries – Part 1: General; ISO 1101, Geometrical product specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run-out		Pass
<b><u>Clause 3: Terms, definitions, symbols and abbreviations</u></b>		Pass
<b><u>Clause 4: Battery dimensions, symbols</u></b>		Pass
<b><u>Clause 5: Dimensional stability</u></b>		Pass
<b><u>Clause 6: Validity of testing</u></b>		Pass
<b><u>Clause 7: Constitution of the battery specification tables</u></b>	Classified as “LR20”.	Pass
<b><u>Clause 8: Physical and electrical specifications</u></b>		N/A
<b><u>Annex A (informative):</u></b> Tabulation of batteries by application	LR20: 1.5V;	Pass
<b><u>Annex B (informative):</u></b> Cross-reference index	Category 1 batteries: LR20	Pass
<b><u>Annex C (informative):</u></b> Index		Pass
<b><u>Annex D (informative):</u></b> Common designation	LR20 (Common Designation: D)	Pass
<b><u>Annex E (informative):</u></b> Compliance checklist		N/A

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**Table 1: Dimensions**

This was conducted in accordance with an application test stated in IEC/EN 60086-1/-2.  
The battery required to meet the dimensions, which was shown below:



h1 maximum overall height of the battery;  
h2 minimum distance between the flats of the positive and negative contacts;  
h3 minimum projection of the flat positive contact;  
h4 maximum recess of the negative flat contact surface;  
d1 maximum and minimum diameters of the battery;  
d3 maximum diameter of the positive contact within the specified projection height;  
d6 minimum outer diameter of the negative flat contact surface;  
∅ P concentricity of the positive contact.

Dimensions		LR20
$h_1$	max.	61,5
$h_2$	min.	59,5
$h_3$	min.	1,5
$h_4$	max.	1,0
$d_1$	max.	34,2
	min.	32,3
$d_3$	max.	9,5
$d_6$	min.	18,0
$\varnothing P$	max.	1,0

**Table 1: Dimensions and OCV measurement (continued)**

Designation	Open circuit voltage (V)	Dimensions (mm)								
		h1	h2	h3	h4	d1		d3	d6	$\varnothing P$
LR20	Max.	Max.	Min.	Min.	Max.	Max.	Min.	Max.	Min.	Max.
(D)	1.68	61.5	59.5	1.5	1.0	34.2	32.3	9.5	18.0	1.0

Sample no.									
All samples under test	1.617 ~ 1.623	60.86 ~ 60.95	2.50 ~ 2.55	-	33.20 ~ 33.26	8.64 ~ 8.69	23.03 ~ 23.11	0.11 ~ 0.12	
Verdict	Pass	Pass	Pass	Not applicable	Pass	Pass	Pass	Pass	Pass

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**Table 2: Discharge / Application Tests and leakage and deformation check**

Designation: LR20 (D)

Manufacturing date: 2022-02

Application:	Portable lighting	Portable stereo	Toy
Load:	2.2 Ω	600 mA	2.2 Ω
Daily period:	4 min / 15 min, 8 h / d	2 h / d	1 h / d
EV: (V)	0.9 V	0.9 V	0.8 V
MAD:	750 min	11 h	16 h

Test result:

Sample no.			
1	1382.9 min	18.5 h	25.0 h
2	1374.8 min	18.5 h	24.9 h
3	1366.9 min	18.6 h	25.0 h
4	1391.0 min	18.4 h	24.9 h
5	1391.0 min	18.2 h	24.9 h
6	1386.8 min	18.3 h	24.9 h
7	1370.9 min	18.6 h	25.1 h
8	1378.8 min	18.4 h	25.0 h
Average	1380.4 min	18.4 h	25.0 h
Verdict	Pass	Pass	Pass
Leakage check	No leakage	No leakage	No leakage
Deformation check	No deformation	No deformation	No deformation

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Product Photos:

LR20 (D)



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