

PRIMARY BATTERY TESTING

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EXECUTIVE SUMMARY

Discharge testing have been performed on Zinc Carbon batteries in accordance with IEC 60086-2.
Discharge time to specified voltage levels have been determined.

Brand	IEC Designation	Date code
Hi-Watt Super Heavy Duty	R03P	11-2019

The test results apply only to the tested samples.



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References:

IEC 60086-1, Ed. 12.0, 2015

IEC 60086-2, Ed. 13.0, 2015

EA guidelines on the expression of uncertainty in quantitative testing, December 2003



1 COMMISSION

The commission was conducted in accordance with our proposal No. Qu-00896482-0.

Zinc Carbon batteries have been tested in accordance with IEC 60086-2.

Test conditions are according to IEC 60086-1. Discharge time to specified voltage levels has been determined.



2 TEST SAMPLES

Table 2.1

Brand	IEC Designation	Delivery Date	ES Number
Hi-Watt Super Heavy Duty	R03P	2018-06-29	ES18-142

note: ES number is Intertek Semko AB identification for each sample. The test samples were delivered to Intertek for testing from Vestel Elektronik Sanayi ve Ticaret A.S., Turkey.

Photograph of tested products:



Figure 2.1: Hi-Watt Super Heavy Duty R03P



3 TEST PROGRAM

Test method in Table 3.1 is according to IEC 60086-2. This method is accredited by SWEDAC.

Size	Application	Load	Daily period	End voltage	MAD
R03P	Remote control	24 Ω	15 s/min, 8 h/day	1,0	4 h

MAD, minimum average duration requirement according to IEC 60086-2.

Result: Discharge time to end voltage

Test start: 2018-07-02

Test end: 2018-07-04



4 TEST CONDITIONS

Test conditions are according to IEC 60086-1.

IEC 60086-1 testing was performed on a PEC test system BDT1012 for primary batteries. The batteries were connected to the discharge circuits by pressure contacts.

Ambient temperature during test: $21 \pm 1^\circ\text{C}$
Humidity Digital still camera: 45 – 65 % RH

The time to voltage levels / cut-off voltage was determined by scanning every 10 ms and registration with ΔV and Δt .

4.1 Uncertainty of load resistance, voltage measurement and load current

The uncertainty of load resistance is calculated to be less than $\pm 0,5$ % based on calibrations.
The uncertainty of voltage measurement is calculated to be $\leq 0,25$ % based on calibrations.
The uncertainty of load current is calculated to be less than $\pm 0,5$ % based on calibrations.

Measurement uncertainty is reported in accordance with the EA publication EA-4/16 "EA guidelines on the expression of uncertainty in quantitative testing", December 2003.



5 TEST RESULTS

Test results are summarized in Table 5.1 below.

Table showing life of individual batteries, discharged to specified end voltages are compiled in Appendix A.

The test results apply only to the tested samples.

Table 5.1 Summary of test results for R03P

Application Load	End Voltage	Unit	Hi-Watt Super Heavy Duty		
			Average	Maximum	Minimum
Remote control 24 ohm, 15 sec/min, 8 h/d	1,0 V	[h]	4,18	4,45	3,93



APPENDIX-A TEST RESULTS FOR INDIVIDUAL BATTERIES

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Brand:	Hi-Watt Super Heavy Duty	Application:	Remote control
Size:	LR03	Load:	24 ohm,15 sec/min, 8 h/d
Made in:	China	Test No.:	7816
Date code:	11-2019	Test start:	2018-07-02

Discharge time in hours to

Battery	1,3 V	1,2 V	1,1 V	1,0 V	0,9 V	0,8 V	OCV
1	0,84	2,42	3,40	3,99	4,48	4,76	1,626
2	1,02	2,76	3,78	4,45	4,82	5,12	1,623
3	0,94	2,62	3,63	4,36	4,76	5,10	1,623
4	0,85	2,40	3,36	3,93	4,38	4,59	1,622
5	0,92	2,52	3,48	4,23	4,51	4,73	1,623
6	0,97	2,65	3,62	4,29	4,62	4,92	1,622
7	0,93	2,57	3,55	4,23	4,55	4,81	1,632
8	0,95	2,56	3,47	3,99	4,40	4,62	1,621
Average	0,93	2,56	3,54	4,18	4,57	4,83	
Std. Dev.	0,06	0,12	0,14	0,19	0,16	0,20	
Max. value	1,02	2,76	3,78	4,45	4,82	5,12	
Min. value	0,84	2,40	3,36	3,93	4,38	4,59	

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