



EVERGREEN (C.P.) USA INC.

338 N. Canal Street, Suite #8, So. San Francisco, CA 94080

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Performance Specification 4R25-EV Zinc Chloride Battery

1. Scope:

The purpose of this document is to specify the quality requirements for Hi-Watt battery produced with H4R25X zinc chloride battery.

2. Referenced Documents:

- 2.1 IEC publication 60086-1 Primary batteries --- Part 1 General.
- 2.2 IEC publication 60086-2 Primary batteries --- Part 2 Specification sheets.
- 2.3 IEC publication 410 Sampling plan and procedure for inspection by attribute.

3. Battery type and ratings:

3.1 Battery type:

Model	IEC	ANSI	JIS	NEDA
H4R25X	4R25	908		908

- 3.2 Nominal Voltage: 6.0 V
- 3.3 Average weight: 575 g
- 3.4 Rated Capacity: 7400 mAh (at 110 Ω , 12H / D, Endpoint 3.6 V)
- 3.5 Operating temperature: -20°C~50°C

4. Physical Characteristics:

4.1 Dimensions:

Dimensional requirements are drawn from IEC publication 60086-2, unless otherwise indicated on the relevant supplement.

4.2 Appearance:

The products shall be free from dents, scratches, corrosion, contamination, or disfigurations, which affect service and saleability.



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4.3 Date code:

Identify expiry date of the battery using Hi-Watt date coding 6 digits mark in the location of the bottom of cell, the first two digits indicate month, others indicate year. Expiry date code for 30 months is used (e.g a battery manufactured on Feb 2009 will carry an expiry code of 082011.)

5. Electrical Characteristics:

5.1 Environmental conditions

All electrical tests shall be conducted (in the sequence shown hereunder) at a temperature of $20 \pm 2^{\circ}\text{C}$ with a relative humidity between 45% to 75%, after stabilization under these condition for minimum period of 24 hours.

5.2 No-load voltage

The no-load voltage, measured under the conditions prescribe in 5.1. Voltage shall be carried out using a voltmeter with minimum input impedance of one megohm. The voltage shall be within the values specified.

Initial	12 months after manufactured
6.1-6.6 V	6.0-6.5V

5.3 On-load voltage

5.3.1 On-load voltage measurement shall be conducted under the conditions prescribed in 5.1.

Voltage measurement shall be carried out within 2 ± 0.2 second of applying load.

5.3.2 The load resistor including all parts of the external circuit shall be within 0.5% of the value stated

Initial	12 months after manufactured
Above 5.5 V	Above 5.4 V

Load resistance: $8.2\Omega \pm 0.5\%$

5.4 Jacket insulation

No voltage reading is permitted between the jacket and either positive or negative terminal.



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6. Service output:

- 6.1 To determine the service output, batteries shall be discharged through a fixed resistive load under conditions prescribed in 5.1 until the on-load voltage falls to the prescribed value (endpoint voltage).
- 6.2 Sample sizes for discharge test shall be in accordance with IEC Publication 60086-1 requirements.
- 6.3 Discharge loads, minimum average service lives, and endpoint shall be in accordance with those specified on relevant supplement.
- 6.4 Service Performance

Minimum Average Discharge Performance (Service time)		Capacity
9.1 Ω , 0.5h/h, 8h/day 3.6 V	7 hrs	3680mAh
8.2 Ω , 0.5h/day, 3.6 V	6.66 hrs	3837 mAh
110 Ω , 12h/day, 3.6 V	170 hrs	7400 mAh
After 12 months storage	90 %	

*Discharge curve see appendix 2

7. Leakage:

- 7.1 The delivered batteries stored under normal non-air conditioned environments shall not have electrolyte leakage during the guaranteed period.
- 7.2 When the batteries are discharged under the conditions of specified load, until the on-load voltage falls to 0.6 V per single cell, no leakage or deformation shall occur, in accordance with IEC Publication 60086-1 requirements.
- 7.3 For further leakage acceptance tests are to be agreed between HI-WATT and purchaser.

8. Marking:

Artwork for the batteries and packing shall conform to agree standard. This shall include as a minimum:

- A) Designation;
- B) The sign “ + ” shall be mark on or adjacent to positive terminal;

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C) Nominal voltage;

D) Appropriate cautionary advice.

9. Acceptance criteria:

9.1 Class 1,2,3 and 4

Defect classification	Critical	Major functional	Major	Minor
Class 1				
Live Jacket (Cl. 5.4)	×			
Polarity marking (Cl.8)	×			
Class 2				
No-load voltage(Cl.5.2)		×		
On-load voltage (Cl.5.3.2)		×		
Leakage		×		
Class 3				
Dimension (Cl.4.1)			×	
Major appearance defect (Cl.10.3)			×	
Class 4				
Minor appearance defect (Cl.10.4)				×

9.2 Class5

Defect classification	Sample size	Permitted failures
Service output	9	*
Leakage (Cl.7.2)	9	0

* Average service life shall be greater than or equal to the specified value. If this average is less than the specified value, a repeat test shall be made and a new average is calculated. If this average is still less than the specified value, the lot does not conform, and no further testing is permitted.



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10. Defect classification:

10.1 Critical defect (AQL 0.15%)

A defect that analysis, judgment and experience indicates is likely result in hazardous or unsafe conditions for the user.

10.2 Major functional defect (AQL 0.25%)

A defect, other than a critical defect, that is likely to result in a failure, or to reduce materially the ability to use the cell/battery for its intended purpose.

10.3 Major appearance defect (AQL 0.65%)

A defect that is not likely to reduce materially the ability to use the cell/battery for it's intended purpose, or that is a departure from specification having little bearing on the effective performance of the cell/battery, but may reduce saleability of the cells/batteries.

10.4 Minor appearance defect (AQL2.5%)

Minor surface blemishes or scratches that are unlikely to reduce saleability of the cells/batteries.

11. Environmental requirements :

No mercury or cadmium may be added to the product or used during the manufacturing process.

The heavy metal limits as following:

Mercury max 1ppm / battery

Cadmium max 5 ppm / battery

Lead max 200 ppm / battery

12. Packing:

The packing must be adequate to avoid mechanical damage during transport, handling and stacking.

The material and pack design must be chosen so as to prevent the development of unintentional conduction, corrosion of terminals and ingress of moisture.



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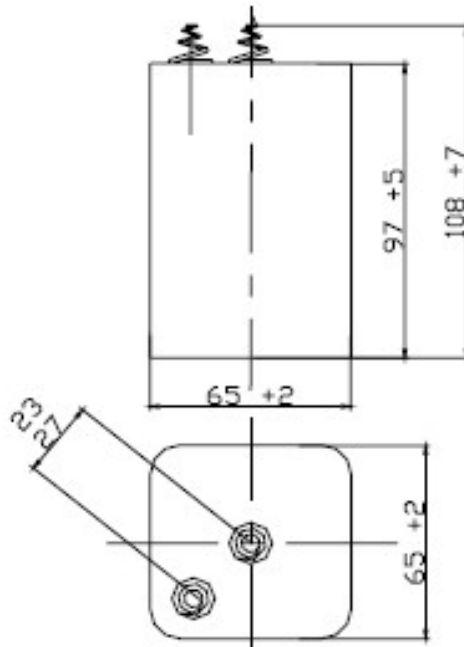
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Appendix 1:

Dimensions





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Appendix 2: (Test condition see section 6.4)

Discharge Curve

