



BATTERY TEST REPORT

IEC 60896-21 : 2004

IEC 60896-22 : 2004

Report Reference No..... : TQ2202006

Tested by
(printed name and signature) : Le Tan Phong.....

Approved by
(printed name and signature) : Adam Chen

Date of testing..... : 2022-02-22

Date of issue..... : 2022-02-22



Testing laboratory..... : Laboratory Le Long Viet Nam Limited Company
Address..... : Cum Cong Nghiep Duc My, Xa Duc Hoa Dong, Huyen Duc Hoa, Tinh Long An, 81999 Viet Nam . Tell:+84-72-3779666

Applicants Name..... : KUNG LONG BATTERIES INDUSTRIAL CO., LTD
Address..... : No., 6 Tzu-Li 3 Road,Nantou City 54067, Nantou Hsien, Taiwan

Test Specification:

Standard..... : IEC 60896-21:2004 and IEC 60896-22:2004

Non-standard test method..... : N/A

Test Report Form No..... : IEC 60896-21:2004 and IEC 60896-22:2004

Test item description..... : Valve Regulated Lead-Acid Battery

Trade Mark..... :

Model/Type reference..... : WP7.5-12

Series model..... : N/A

Rating(s) : 12V 7.5Ah

Battery dimension..... : 151mm x 65mm x 102mm (LxWxH)

Possible Test Case Verdicts:

Test case does not apply to the test object.....N/A

Test object does meet the requirement.....P(Pass)

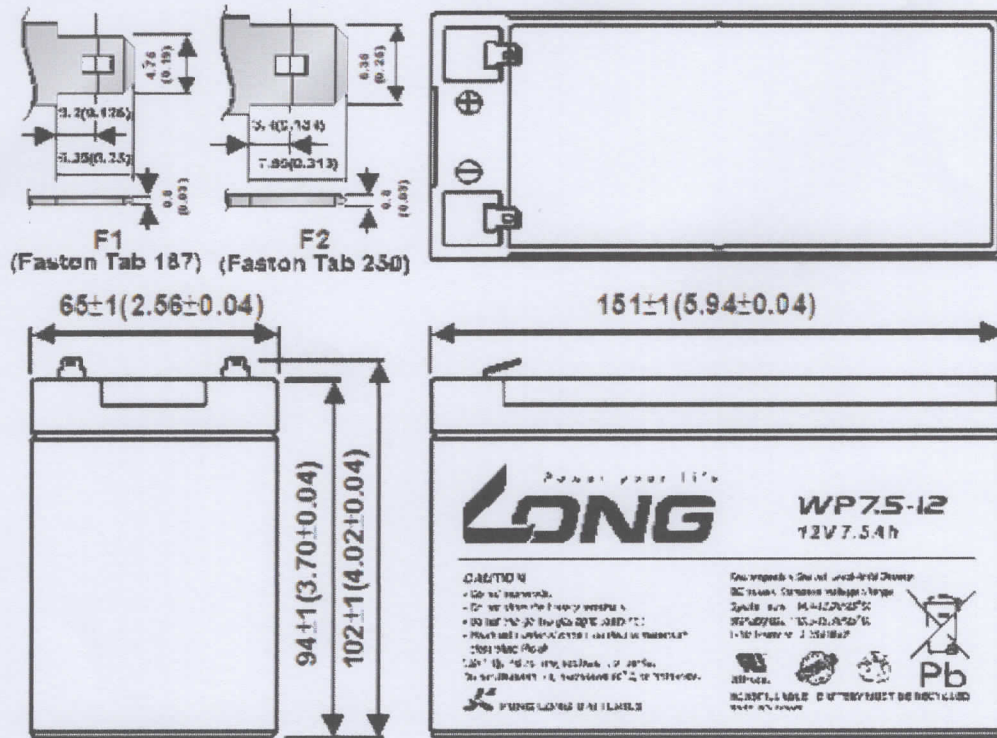
Test object does not meet the requirement.....F(Fail)

Testing Laboratory information:

Laboratory Le Long Viet Nam Limited Company
Cum Cong Nghiep Duc My, Xa Duc Hoa Dong, Huyen Duc Hoa, Tinh Long An, 81999 Viet Nam . Tell:
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Trade Mark And Dimension:



1. Test Item:

| No | Test Item | Clauses. | Verdict |
|----|--|----------|---------|
| 1 | Gas Emission | 6.1 | P |
| 2 | High current tolerance (High current discharge capacity) | 6.2 | P |
| 3 | Short circuit current and DC internal resistance | 6.3 | P |
| 4 | Protection against internal ignition from external spark sources | 6.4 | P |
| 5 | Protection against ground short propensity | 6.5 | P |
| 6 | content and durability of required markings | 6.6 | P |
| 7 | Material Identification | 6.7 | P |
| 8 | Valve operation | 6.8 | P |
| 9 | Flammability rating of materials | 6.9 | P |
| 10 | Intercell connector performance | 6.10 | P |



| | | | |
|----|---|------|---|
| 11 | Discharge Capacity | 6.11 | P |
| 12 | Charge retention during storage | 6.12 | P |
| 13 | Float service with daily discharges 25°C,80% | 6.13 | P |
| 14 | Recharge behavior | 6.14 | P |
| 15 | Service life at an operating temperature of 40°C all units to 0.8 C _{rt} | 6.15 | P |
| 16 | Impact of a stress temperature of 60°C,80% | 6.16 | P |
| 17 | Abusive over- discharge | 6.17 | P |
| 18 | Thermal run away sensitivity | 6.18 | P |
| 19 | Low temperature sensitivity | 6.19 | P |
| 20 | Dimensional stability at elevated internal pressure and temperatures | 6.20 | P |
| 21 | Stability against mechanical abuse of units during installation | 6.21 | P |

2. Test Result:

| No. | Test Item | Clauses. | Technical Specification | Test data |
|-----|--|----------|---|--|
| 1 | Gas Emission (V=Voltage per cell) | 6.1 | $U_{flo} \leq 0.05 \text{ml/cell} \cdot \text{h} \cdot \text{Ah} (25^\circ\text{C})$ | 0.0039 |
| | | | $2.40 \text{Vpc} \leq 1.70 \text{ml/cell} \cdot \text{h} \cdot \text{Ah} (25^\circ\text{C})$ | 0.0070 |
| 2 | High current tolerance (High current discharge capacity) | 6.2 | Discharge with 3 times of 15min rate current, or with a current equal to the maximum allowable discharge current. there is no melting or continuous power loss. $V_{5\text{min}} > 2.0 \text{Vpc}$ | Discharge with 3 times of 15min large current, there is no melting or continuous power loss. $V_{5\text{min}} = 12.97 \text{Voltage}$ |
| 3 | Short circuit current and DC internal resistance | 6.3 | I_{sc} | - I_{sc} (Short Circuit Current (A)): 250A |
| | | | Internal Resistance | - 19.0 mΩ (measured by HIOKI 3554 Battery Hitester) |
| 4 | Protection against internal ignition from external spark sources | 6.4 | There is no fast burn or explosive apart from valve | There is no fast burn or explosive apart from valve |
| 5 | Protection against ground short propensity | 6.5 | No earthing short or leakage | No earthing short or leakage |

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|-----|--|------|--|---|
| 6 | content and durability of required markings | 6.6 | Marks are easy for long-lasting | Marks are easy for long-lasting |
| 7 | Material Identification | 6.7 | ISO symbol is visible, and the symbol is remain after put in chemical reagent place | ISO symbol is visible, and the symbol is remain after put in chemical reagent place |
| 8 | Valve operation | 6.8 | Check the gas outlet before and after high-temp. | Open/close valve pressure (Kpa)is: Bef. high-temp.: 22.4/20.6 After high-temp.: 23.3/21.2 |
| 9 | Flammability rating of materials | 6.9 | Indicate sample's value with same thickness of containers and lids | ABS UL94 HB |
| 10 | Intercell connector performance | 6.10 | Indicate highest temp. reached | 36°C |
| 11. | Discharge Capacity | 6.11 | $C_{10} \geq 7.13 \text{Ah}$ | 106.8% @0.75A |
| | | | $C_8 \geq 6.83 \text{Ah}$ | 107.7% @0.86A |
| | | | $C_3 \geq 5.63 \text{Ah}$ | 109.5% @1.88A |
| | | | $C_1 \geq 4.13 \text{Ah}$ | 110.6% @4.13A |
| | | | $C_{0.25} \geq 2.63 \text{Ah}$ | 111.4% @10.5A |
| 12 | Charge retention during storage | 6.12 | $\geq 70\%$ | 78.5% |
| 13 | Float service with daily discharges 25°C,80% | 6.13 | Total Cycle times ≥ 300 | 317 times |
| 14 | Recharge behavior | 6.14 | $R_{bf24h} \geq 90\%$ | 96.4% |
| | | | $R_{bf168h} \geq 98\%$ | 101.2% |
| 15 | Service life at an operating temperature of 40°C all units to 0.8 C_{rt} | 6.15 | - Brief duration exposure time $\geq 500\text{d}$ - Medium duration exposure time $\geq 750\text{d}$ - Long duration exposure time $\geq 1100\text{d}$ - Very long duration exposure time $\geq 1700\text{d}$ | 635d (Brief duration exposure time) |
| 16 | Impact of a stress temperature of 60°C,80% | 6.16 | - Brief duration exposure time $\geq 105\text{d}$ - Medium duration exposure time $\geq 175\text{d}$ - Long duration exposure time $\geq 250\text{d}$ - Very long duration exposure time $\geq 350\text{d}$ | 157d (Brief duration exposure time) |
| 17 | Abusive over-discharge | 6.17 | Unbalanced series over discharge $C_{aod} > 0.80$ | 0.88 |
| | | | Cycle over discharge $C_{aoc} > 0.90$ | 0.97 |
| 18 | Thermal run away sensitivity | 6.18 | Battery temperature change at 2.40VPC, the temperature after 168h | 25.2°C |



| | | | | |
|----|--|------|---|---|
| | | | Battery temperature change at 2.60VPC, the temperature after 168h | 29.5°C |
| 19 | Low temperature sensitivity | 6.19 | $C_{als} > 95\%$ | 96.7% |
| 20 | Dimensional stability at elevated internal pressure and temperatures | 6.20 | percentage deviation over the girth value | $\Delta L = 0.05\%$ |
| 21 | Stability against mechanical abuse of units during installation | 6.21 | No fracture or leak of the battery case | No fracture or leak of the battery case |



— — — The End of Test Report — — —