



BATTERY TEST REPORT

IEC 60896-21 : 2004

IEC 60896-22 : 2004



VILAS 1048

Report Reference No: TQ2602004-A

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

Approved by: Adam Chen :
(printed name and signature)

Date of issue(DD/MM/YYYY): 26/02/2026

Testing laboratory: Laboratory Le Long Viet Nam Limited Company

Address.....: Duc My industrial clusters, My Hanh commune,Duc, Tay Ninh province, Viet Nam, 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.....: **LONG**

Model/Type reference.....: WPL100-12RN

Series model.....: N/A

Rating(s).....: 12V 100Ah/10Hr

Battery dimension: 329.5mm x 172.3mm x 222mm (LxWxH)

Possible Test Case Verdicts:

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

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

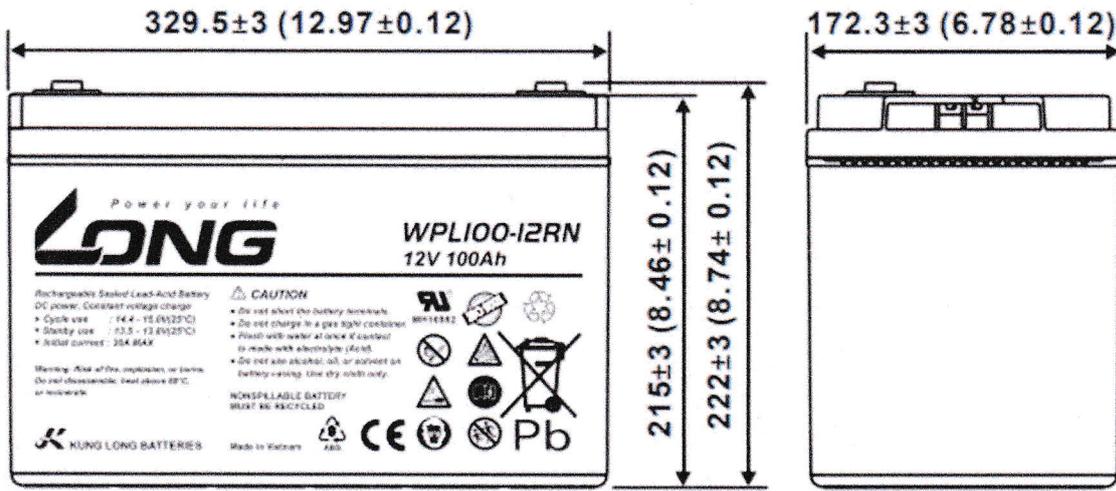
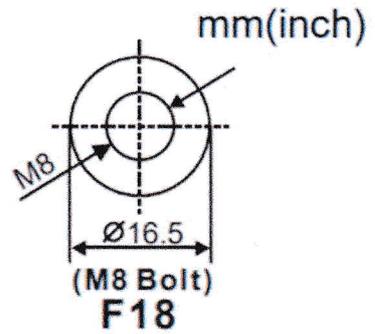
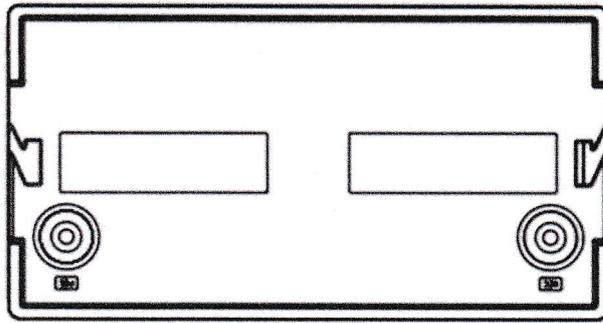
Test object does not meet the requirement.....: F(Fail)

Testing Laboratory information:

Laboratory Le Long Viet Nam Limited Company: Duc My industrial clusters, My Hanh commune, Tay Ninh province, Viet Nam . Tell: +84-72-3779666



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 | $U_{f10} \leq 0.05 \text{ml/cell} \cdot \text{h} \cdot \text{Ah} (25^\circ\text{C})$ | 0.0091 |
| | | | $2.40 \text{Vpc} \leq 1.70 \text{ml/cell} \cdot \text{h} \cdot \text{Ah} (25^\circ\text{C})$ | 0.0096 |
| 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. $V_{5\text{min}} = 12.95 \text{Voltage}$ |
| 3 | Short circuit current and DC internal resistance | 6.3 | I_{sc} | Isc:2008A |
| | | | Internal Resistance (IEC) | Ri: 0.006Ω |
| | | | Internal Resistance(At 1KHz) | 4 mΩ |
| 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 |
| 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.: 22.4/0.93 After high-temp.: 23.4/1.03 |
| 9 | Flammability rating of materials | 6.9 | Indicate sample's value with same thickness of containers and lids | ABS UL94HB (UL94 V-0) |
| 10 | Intercell connector performance | 6.10 | Indicate highest temp. reached | 33.2°C |
| 11. | Discharge Capacity | 6.11 | $C_{10} \geq 100.000 \text{Ah}$ | 102.4% @10.000A |
| | | | $C_8 \geq 92.000 \text{Ah}$ | 103.2% @11.500A |
| | | | $C_3 \geq 75.000 \text{Ah}$ | 106.7% @25.000A |
| | | | $C_1 \geq 60.000 \text{Ah}$ | 108.2% @60.000A |
| | | | $C_{0.25} \geq 50.000 \text{Ah}$ | 110.5% @200.000A |
| 12 | Charge retention during storage | 6.12 | $\geq 70\%$ | 85.4% |
| 13 | Float service with daily discharges 25°C,80% | 6.13 | Total Cycle times ≥ 300 | 443 times |
| 14 | Recharge behavior | 6.14 | $R_{bf24h} \geq 90\%$ | 99.2% |



| | | | | |
|----|--|------|--|--|
| | | | $R_{bf168h} \geq 98\%$ | 102.4% |
| 15 | Service life at an operating temperature of 40°C all units to 0.8 C_{rt} | 6.15 | - Brief duration exposure time $\geq 500d$ - Medium duration exposure time $\geq 750d$ - Long duration exposure time $\geq 1100d$ - Very long duration exposure time $\geq 1700d$ | 1786d (Very long duration exposure time) |
| 16 | Impact of a stress temperature of 60°C, 80% | 6.16 | - Brief duration exposure time $\geq 105d$ - Medium duration exposure time 175d - Long duration exposure time $\geq 250d$ - Very long duration exposure time $\geq 350d$ | 423d (Very long duration exposure time) |
| 17 | Abusive over- discharge | 6.17 | Unbalanced series over discharge $C_{aod} > 0.80$ | 0.84 |
| | | | Cycle over discharge $C_{aoc} > 0.90$ | 0.93 |
| 18 | Thermal run away sensitivity | 6.18 | Battery temperature change at 2.40VPC, the temperature after 168h | 23.5°C |
| | | | Battery temperature change at 2.60VPC, the temperature after 168h | 30.2°C |
| 19 | Low temperature sensitivity | 6.19 | $C_{als} > 95\%$ | 96.4% |
| 20 | Dimensional stability at elevated internal pressure and temperatures | 6.20 | percentage deviation over the girth value | $\Delta L = 0.02\%$ |
| 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 — — —