White Paper: Product Safety Testing and Certification

Introduction

Ensuring the safety and reliability of our products is a rigorous, multi-step process that combines **advanced engineering evaluation, controlled lab testing, and globally recognized third-party certification**. At Omnicharge, we do far more than meet regulatory requirements, we **stress-test every product under extreme and real-world scenarios**, ensuring that it remains safe, stable, and reliable throughout its lifecycle.

We integrate safety validation into every phase of development—from early design and component selection to pilot production and mass-manufacturing audits—ensuring that each product meets our internal safety thresholds, which are often **stricter than international standards.**

In-House Safety Testing

Before any power bank is released to the market, it undergoes a comprehensive suite of in-house evaluations designed to validate electrical, mechanical, thermal, and environmental safety. These tests ensure long-term reliability under typical, demanding, and even abusive use conditions.

- **Thermal Testing.** Our thermal testing protocols simulate both extreme ambient temperatures and intensive operational heat loads.
    - Power banks are placed in temperature chambers ranging from –20°C to +60°C to assess their stability under global climate variations.
    - Continuous charging and discharging cycles are performed to verify thermal regulation effectiveness during high-current usage.
    - Sensors track thermal gradients to ensure that heat is distributed evenly across the battery pack and enclosure, preventing localized hotspots.
    - This helps us confirm safe operation in hot climates, automotive cabins, outdoor environments, and prolonged workloads.

- **Impact and Drop Testing**. To ensure mechanical robustness, each unit undergoes multi-angle, multi-surface drop tests:
    - Devices are dropped from different heights onto wood and concrete surfaces.
    - Edge, face, and corner drops simulate realistic consumer accidents.
    - Structural integrity of the enclosure, battery isolation, and internal PCB fixation is examined post-impact.

      These tests confirm that internal cells remain protected and the enclosure

prevents deformation that could cause internal compression failures.

- **Electrical Safety Testing.** Omnicharge performs advanced electrical stress testing, exceeding most industry minimum requirements:
    - **Short-circuit tests** verify that protection circuits instantly interrupt dangerous current flow without generating smoke or heat.
    - **Overcurrent and overload tests** simulate abnormal power draw from faulty devices to ensure stable shutdown behavior.
    - **Overvoltage protection tests** validate the ability to block or regulate unstable input sources.
    - **Reverse polarity and misconnection testing** ensures safety even in incorrect cable-use scenarios.

      Together, these procedures ensure the product remains safe even under electrical abuse conditions.

- **Environmental and Durability Testing**. In addition to core tests, Omnicharge conducts expanded durability evaluations:
    - **Vibration testing** replicates transportation stress to ensure PCBA joints and connectors remain secure.
    - **Aging tests** accelerate lifecycle wear to verify that safety mechanisms remain functional over time.

      These additional tests help validate long-term reliability throughout the product's operational lifespan.

International Certifications

To validate product safety globally, Omnicharge collaborates with internationally recognized certification bodies. Our products meet—and often exceed—major regulatory standards, making them compliant across North America, Europe, and Asia.

- **IEC 62133 Compliance**. All Omnicharge power banks comply with IEC 62133, the most widely recognized safety standard for rechargeable batteries in portable devices. This certification confirms safe design for global markets, focusing on:
    - Electrical fault response
    - Charging stability
    - Cell construction integrity
    - Thermal safety under abusive conditions

- **IEC 62368 Compliance**. Our products adhere to IEC 62368-1, the modern hazard-based safety standard for ICT and AV equipment. This certification ensures protection against:
    - Electric shock

  - Fire hazards
  - Mechanical failures
  - Thermal risks

    By complying with this updated safety framework, our products are validated for both consumer and professional applications.

- **RoHS and CE Marking**. Omnicharge products meet:
  - **RoHS requirements**, restricting hazardous substances like lead, mercury, and cadmium.
  - **CE marking standards**, confirming compliance with EU electrical safety, electromagnetic compatibility, environmental, and consumer protection regulations.

    These certifications guarantee safety across European markets and align with global sustainability expectations.

UN38.3 Certification and Battery Testing

UN38.3 is a mandatory certification for all lithium battery products transported by air, sea, or land. Passing these tests ensures batteries remain stable under extreme transportation and environmental conditions.

Omnicharge power banks undergo the complete UN38.3 sequence, including:

- **T1: Altitude Simulation**. Simulates low-pressure environments found during air transport. Ensures the battery remains safe at 0–10 kPa without leakage, rupture, or fire.
- **T2: Thermal Test**. Cycles the battery rapidly between high and low temperatures, verifying resilience against thermal expansion, contraction, and structural fatigue.
- **T3: Vibration Test**. Simulates long-duration vibration exposure during shipping. Confirms internal components, solder joints, and cell terminals remain intact.
- **T4: Shock Test**. Applies mechanical shocks that replicate drops or impacts during transportation. Ensures the battery can withstand sudden acceleration and deceleration forces.
- **T5: External Short Circuit Test**. Simulates accidental shorting. Validates that the protection circuits trigger immediately and the battery temperature remains under the safety threshold.
- **T6: Impact Test.** Assesses the battery's tolerance to crushing or blunt force. Ensures sealed cells do not puncture, leak, or ignite under pressure.
- **T7: Overcharge Test.** Forces the battery into an overvoltage state to validate automatic cut-off mechanisms. Ensures safe shutdown during charger malfunction scenarios.

- **T8: Forced Discharge Test.** Simulates accidental reverse charging or deep discharge conditions. Verifies that the battery remains chemically stable even when fully drained.

Omnicharge
5055 Wilshire Blvd., Suite 835 Los Angeles, CA 90036

www.omnicharge.co
sales@omnipower.co