

BATTERY SAFETY FOR WEARABLES

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WHEN YOU NEED TO BE SURE



Skin Contact Components

- Skin Irritation / Allergies – Ni Release, Acrylates, etc.
- California Proposition 65



Electrical & Electronic Module

- Battery Safety
- Battery Performance
- Charger Safety
- Radio Frequency / FCC
- Interoperability – Bluetooth / WiFi
- Chemical Requirements – ROHS / REACH

TYPES OF BATTERIES

- What is the difference between a Battery Cell vs. a Battery Pack?
- What is the difference between Primary and Secondary batteries?
- What Battery standards Apply?
 - In the US UL 1642, Lithium Batteries for cells and UL 2054, Household for batteries
 - For the EU IEC 60086-4 for primary cells and batteries and IEC 62133 for secondary cells and batteries.

TYPES OF LI ION BATTERIES

- Lithium Primary
 - Examples: LED Clothing, Holiday Items, etc. (typically not Smart devices)
 - Usually small coin cells
 - Low energy

- Lithium Secondary
 - Fitness Trackers, Wearable Computing (typically Smart devices)
 - Larger in size and usually custom made in Asia
 - Higher energy



TYPICAL HAZARD SCENARIOS

- User Activity such as Exercise produce bodily fluids and constant movement
- Environment / Weather such as a hot summer in Florida or very cold winter in Wisconsin
- Physical Abuse such as dropping the device on the floor, a person sitting on it, or it being struck by something else
- Laundering the device – Washing and Drying
- Water Abuse – washing hands, swimming, falls in toilet, etc.

SAFETY RISKS FOR CELLS & GENERAL MANUFACTURING

- Cells lack the necessary protection circuits that are needed to prevent them from overcharging, overheating, or becoming unstable, which can potentially result in a fire hazard.

- There are Hundreds of Factories manufacturing Lithium-ion cells and batteries, some producing hundreds of millions of cells on fully automated production lines in humidity controlled factories. Others produce lower quantities through semi-automatic or manual assembly, in ambient temperature conditions which can impact quality.





- Abnormal Charging
- Abusive Overcharge
- Component Temperature
- Crush
- Drop Impact
- Heating
- Impact
- Mold Stress
- Projectile
- Short Circuit

- Garment may be accidentally washed or dried with battery
- Washing is not as significant of a hazard - electronic components can typically be exposed to water
- Dryers can see temperatures under normal conditions of 200 C at intake to tumbler
- Lithium batteries are exposed to 130 C during testing for safety certification
- **SO IT IS IMPORTANT THAT THE BATTERY IS CERTIFIED!**





SAFETY STANDARDS FOR BATTERIES

- For battery devices in the US consider UL 1642 for cells and UL 2054 for the battery packs.
- For battery devices in the EU and Canada consider IEC 60086-4 and IEC 62133 (CSA 62133 for Canada)
- Battery performance can be evaluated using the ANSI C18 Series
- For transportation, batteries should be tested to UN 38.3



SGS SOLUTIONS

- **Global Testing Services** -SGS Labs are well recognized in the areas of product safety, EMC / RF, Battery, wireless interoperability, energy efficiency, biocompatibility and medical regulatory requirements including IEEE/ IEC, American National Standards Institute (ANSI), FCC, Wi-Fi Alliance, Bluetooth SIG, A2LA, CTIA
- **International Market Access**- SGS has global International Type Approval teams that can get your product certified in your target markets..
- **Optimized test plans**- Our experts can provide to you smart testing plans to avoid unnecessary testing and optimized test plans to reduce costs while still complying with all country regulatory and performance requirements.
- **#1 Chemical Lab Network**- in the World! SGS chemical labs have experience to test your product for all environmental and safety chemical requirements in 26 labs around the world.
- **Performance Testing** – Customized test plans built for the features and attributes of the product from our Market Experts coming from manufacturing and retail.

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