

Lithium Battery Safety for Toys



What do you need to know?

In celebration of National Battery day on February 18, we would like to share with you some information about the safety of lithium batteries in toys. “Lithium batteries” are distinguished as primary (non-rechargeable), such as coin button cell batteries, and secondary (rechargeable). It is best to distinguish the batteries based on their chemistries, and voltages rather than specific form-factors.

- ANSI C18.3M (Part 2) Portable Lithium Primary Cells and Batteries- Safety Standard provides the following definition, “Battery, primary lithium” – a battery that has metallic lithium or lithium alloy as its anode and that is not designed to be charged.
- International Standards such as IEC 60086-1 Primary Batteries: General, and IEC 60086-2 Primary Batteries: Physical and Electrical Specifications are also consistent with this nomenclature.

Lithium ion, secondary (rechargeable) batteries can be used for toys if there is a safety scheme in place to verify certification for the cell, the system, and the end-product. It is critical to note there is a tremendous difference between certified vs. non-certified products; however, certification only minimizes the risk of fire/explosions rather than completely eliminating the risk. Thus, the risk level for

fires/explosions (compared to alkaline batteries) for lithium ion rechargeable batteries is high.

The following are highlighted standards for secondary lithium batteries which can eliminate the risk of fire and explosions, due to thermal runaway (electrical abuse, mechanical abuse, transportation, short circuit, miscellaneous factors):

- UL 62133 and IEC 62133-2: UL Standard for Safety Secondary Cells and Batteries Containing Alkaline or other Non-Acid Electrolytes—Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from Them for Use in Portable Applications
- UL 1642: UL Standard for Safety Lithium Batteries, Cells
- UL 2054: Electrical Safety Tests, Battery Packs: Reducing the risk of fire or explosion when batteries are used in a product.
- UL 2056: Outline for Investigation Safety of Power Banks
- UN 38.3: Mandatory Lithium Battery Transport Testing
 - U.S. Department of Transportation (DOT), International Civil Aviation Organization (ICAO), and International Air Transport Association (IATA)
- UL 4200A: UL Standard for Safety Products Incorporating Button or Coin Cell Batteries of Lithium Technologies

Below is a risk matrix to compare the main hazards of lithium batteries against a typical alkaline battery used in toys.

Hazards	Primary Lithium	Alkaline
Choking	Small part choking hazard for children under three years of age	Small part choking hazard for children under three years of age
Esophageal Burns	High Risk (if swallowed)	Medium Risk
Leakage	Low Risk	Low Risk (since there is not much electrolyte in these batteries)
Fire	Low Risk (individual cells) High Risk (bulk storage)	Low Risk

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