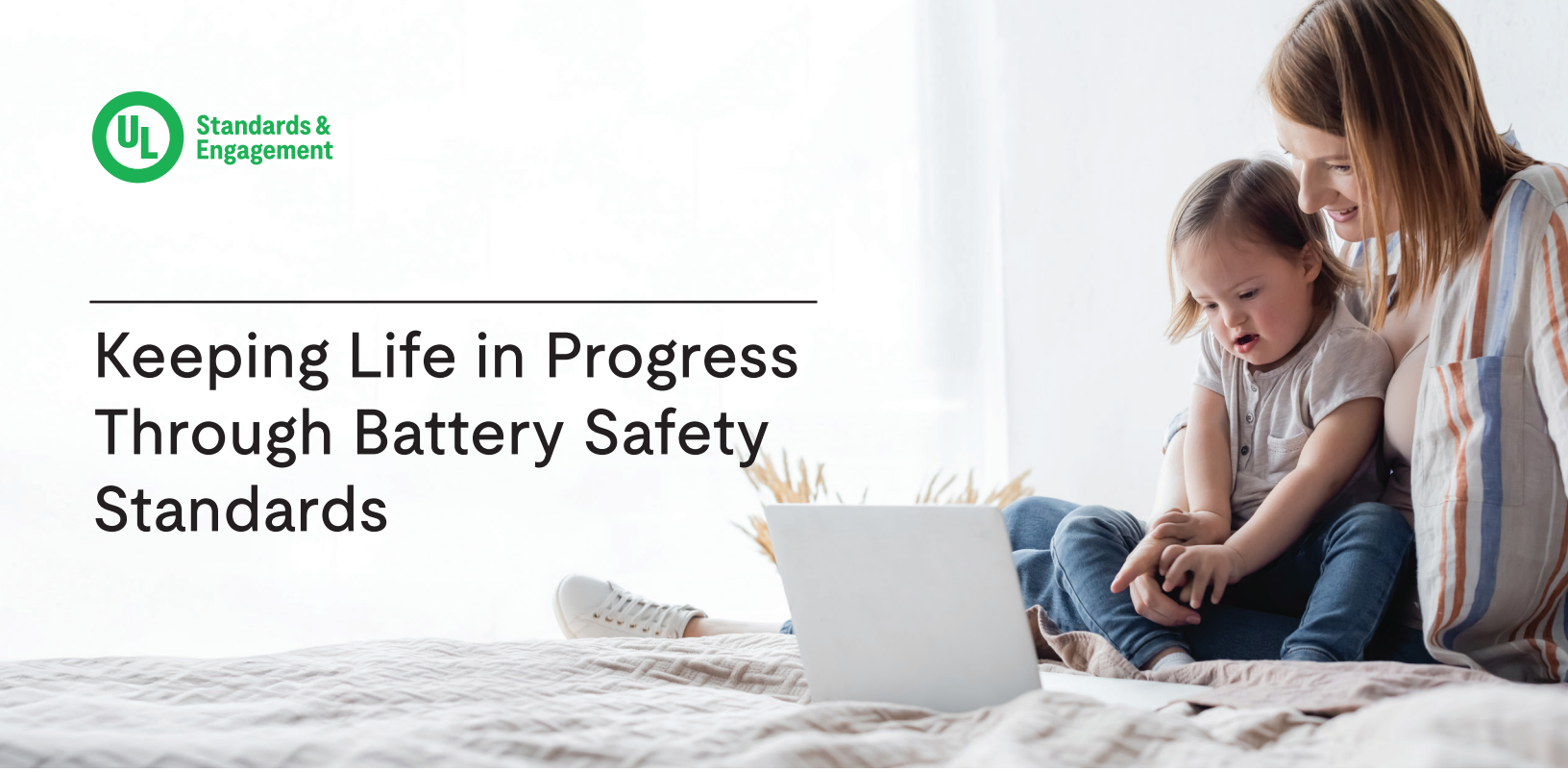
UL Standards & Engagement



Keeping Life in Progress Through Battery Safety Standards

As society moves toward clean, renewable, and sustainable energy sources, lithium-ion batteries have become a critical power source. These rechargeable batteries are small and compact, yet still capable of storing large amounts of energy. They are also ubiquitous, found in everything from smartphones and e-bikes to electric vehicles and large-scale energy grid storage systems. Standards help lessen the risks and hazards inherent in lithium-ion battery power and support technological progress in clean energy.

Lithium-Ion Battery Hazards

Thermal Runaway

Thermal runaway is a phenomenon in which a lithium-ion cell enters an uncontrollable, self-heating state. This reaction can be caused by substandard quality and design, poor components, physical abuse, and improper charging, discharging, or device integration. Thermal runaway can result in extremely high temperatures, violent cell venting, fire, and explosion.

Stranded Energy

Stranded energy refers to the remaining energy in a battery after it has been damaged or removed from service. If batteries are not properly managed, stranded energy can lead to thermal runaway and hazards such as electrical shock, fire, and explosion.

Off-Gassing

Off-gassing is the act of releasing gases from a battery during charging or discharging. Off-gassing at a minor scale can be a normal part of battery operation, but it can accelerate to dangerous levels if the battery is damaged, overcharged, or overheated. These gases can be flammable and toxic. Off-gassing poses an elevated safety risk if it occurs in a confined space, or one that is not properly ventilated.

Understanding the Battery Power Ecosystem

Our catalog includes more than 80 standards that reduce the risks associated with lithium-ion batteries and the devices that rely on them, such as electric vehicles and e-mobility devices, charging systems, grid energy storage, drones and robotic equipment, audio/video and virtual reality equipment, and household electronics and appliances.

e-Mobility

1. Personal e-Mobility Devices | UL 2272
2. e-Bikes | UL 2849
3. Light Electric Vehicles | UL 2271
4. Light Electric Rail | UL 1973

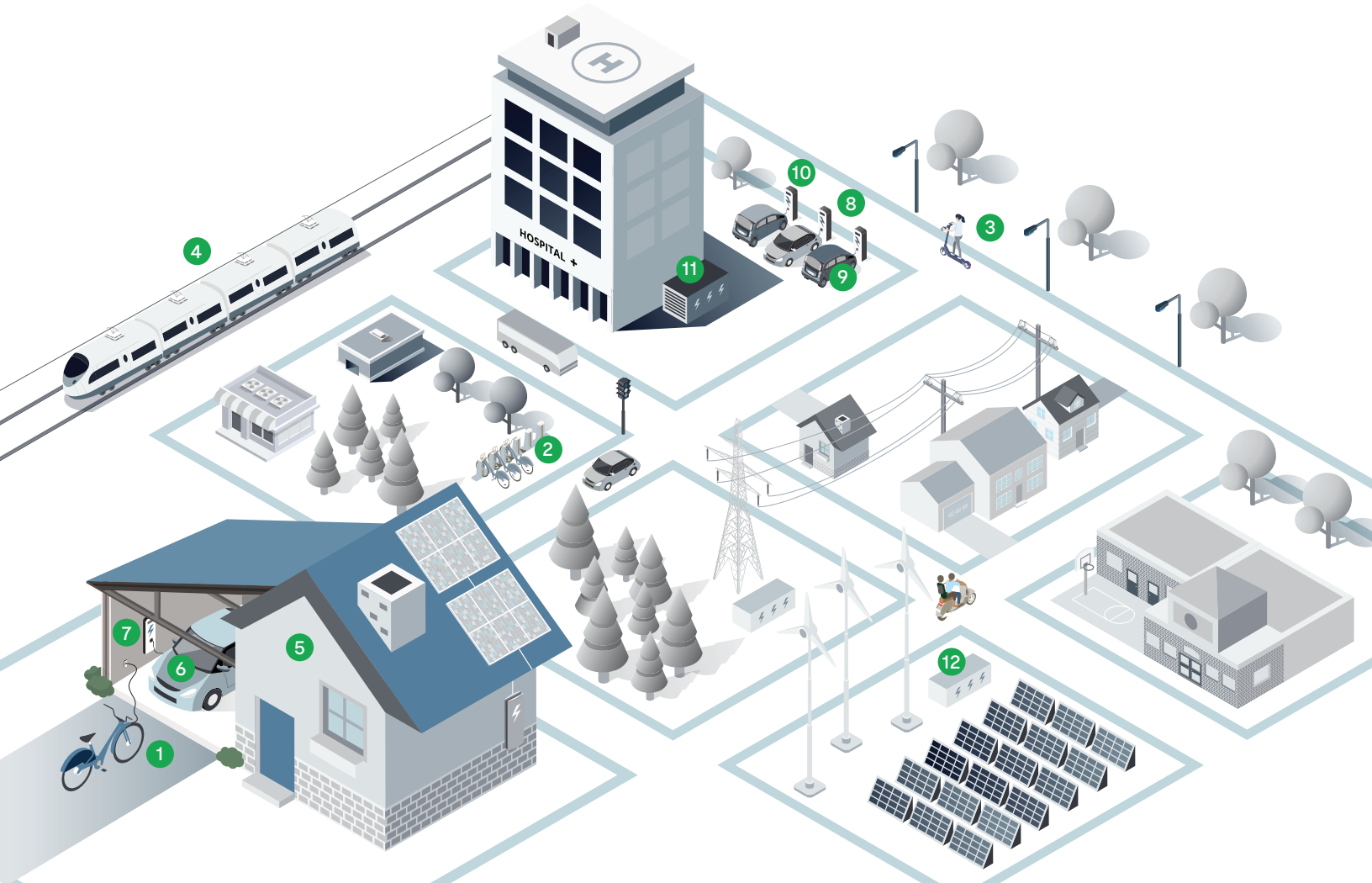
Batteries and Electrical Systems

5. Household and Commercial Batteries | UL 2054
6. Batteries for Electric Vehicles | UL 2580

Charging and Energy Storage and Distribution

7. Electric Vehicle Supply Equipment | UL 2594
8. Charging System Equipment | UL 2202
9. Plugs, Receptacles and Couplers | UL 2251
10. Protection Devices in Charging Systems | UL 2231-1, UL 2231-2
11. Energy Storage Systems | UL 9540

    Test Methods for Evaluating Thermal Runaway Fire Propagation in Battery ESS | UL 9540A
12. Energy Management Equipment | UL 916



UL Standards & Engagement

UL Standards & Engagement: 120 years in standards development

UL Standards & Engagement is a nonprofit standards development and advocacy organization that translates safety science into practical, action-oriented standards, from toasters to life jackets, and lithium-ion batteries to solar power.

The organization also serves as a vital resource for policymakers and shares knowledge, advances partnerships, and advocates for standards and policies to create a safer, more sustainable world.

What is safety science?

Safety science engages the ingenuity of top minds across scientific fields to engineer a safer and more sustainable world in which every individual can thrive.

What is a standard?

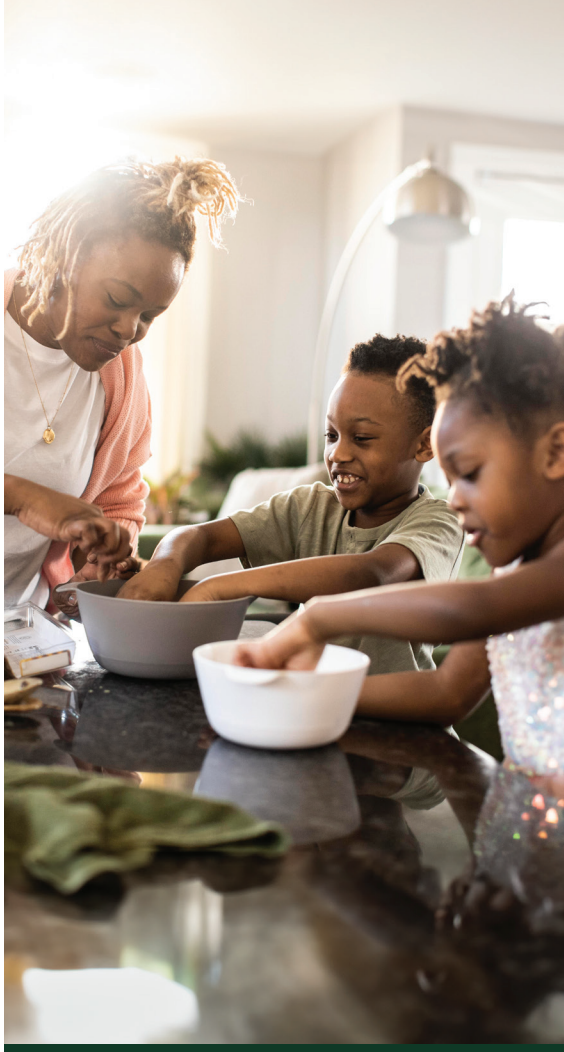
A standard is a document of best practices for manufacturing and testing the safety, security, and sustainability of a product or system, developed and voted on by experts across industries and interests.

How are standards developed?

UL Standards & Engagement convenes technical committees comprised of experts from manufacturing, government, academia, nonprofits, and other relevant groups to determine a standard. Technical committee members review proposals for new or revised standards and work together to achieve consensus through balloting in a fair and transparent process.

What happens after a standard is published?

All standards are free to view. Manufacturers and innovators can develop products, which can then be tested and certified that they conform to our standards to ensure they are as safe as possible. UL Standards & Engagement is continuously monitoring and revising standards to address a changing risk landscape and emerging technologies.



Fast Facts:

- 1,700+ standards and documents in use today
- 4,000+ individuals serve on ULSE Technical Committees
- 40+ countries are represented through our Technical Committees
- 81 MOUs with agreements in several countries and regions
- ULSE is the only standards organization accredited to publish for the U.S., Canada, and Mexico