

A close-up photograph of an e-bike's motor and handlebars. The motor is a large, black, rectangular unit mounted on the frame. The handlebars are black and curved. A red rear light is visible on the right side of the frame. The background is blurred, showing other parts of the bike and possibly a workshop setting.

# Micromobility How to Guide

Manufacturing safer micromobility  
products that consumers trust



Solutions

Safety. Science. Transformation.™

Understanding how to manage safety standards when producing new and innovative micromobility products that consumers trust is critical in today's environment.

# Introduction to micromobility

Micromobility products are small, lightweight electric vehicles that operate at a low speed of 25 miles per hour (mph) or less. This includes products such as e-bikes, electric pedal-assisted bicycles, electric scooters, electric skateboards, hoverboards and others.

## Several factors are contributing to an increase in demand for these products:

- Higher gas prices.
- Increased consumer interest in environmentally friendly products.
- The need for cost-effective and clean alternatives to traditional transportation.
- Rising trends of on-demand transportation services.
- Smart city government initiatives (micromobility vehicle lanes, charging stations and parking zones).
- Potential for time-saving travel, especially in highly congested urban areas.

In addition, these products have created a new segment in the recreational, fitness, health and wellness industries. As a result of all these factors, the global micromobility market size is projected to reach \$214.57 billion (USD) by 2030, growing at a compound annual growth rate of 17.4%.<sup>1</sup>

Advancements in battery technologies, such as higher energy density lithium-ion batteries, have made micromobility products more affordable, more powerful, easier to charge and lighter weight. To keep pace with these innovative products entering the market, specific safety standards have been developed to evaluate products' battery and electrical and charging systems. These safety standards help to mitigate electrical, fire and mechanical hazards of micromobility products.<sup>2</sup>

# How safe are your micromobility devices?

Micromobility products are practical and fun. However, they come with major safety concerns, including electrical, fire and mechanical hazards. These products are no longer just mechanical devices — they are sophisticated high-tech products incorporating hardware components and delicate software management systems. The motor operation, braking, stopping and battery charging are all controlled by advanced hidden onboard control systems and computers.

From 2015 through March 2019, more than 330 fire related incidents associated with micromobility devices occurred, leading to millions of dollars in property damage. Since January 2021 in New York City alone, over 300 micromobility related fires resulted in 10 deaths, including that of a 5-year-old girl and 9-year-old boy, 172 serious injuries and tens of millions of dollars in property damages.<sup>3</sup>

The batteries used in these devices pose a specific safety hazard called thermal runaway: an overheating of the battery system that may lead to an exothermic reaction that causes device breakdown or even an explosion. Batteries and battery-operated end products that have not undergone sufficient evaluation, testing and certification to known safety standards present a particular threat to consumer safety. The technology is generally safe when manufacturers take deliberate steps to minimize design flaws, vet material suppliers, control production quality and utilize best practices in product construction, including electronic circuits.

One factor leading to increased safety risks is consumer perception. Currently, consumers believe that products on the market have been reviewed for safety by regulatory agencies. But the truth is that fewer than 1% of products on the market overseen by the Consumer Product Safety Commission (CPSC) must comply with a mandatory safety standard according to statistics cited in 2021 by Consumer Reports.

In a recent public outreach, the National Bicycle Dealers Association (NBDA), an industry advocate for specialty bicycle retailers, called on retailers to encourage their vendors and suppliers to have their e-bikes and e-bike systems certified to UL 2849, the Standard for Electrical Systems for eBikes.

UL 2849 is the ANSI-accredited national safety Standard for electrical systems for e-bikes and covers safety requirements for e-bikes powered by lithium or other rechargeable batteries. It provides requirements that apply to the electrical drive train system, battery system, charger system combination, interconnecting wiring and e-bike power inlet.

According to NBDA President Heather Mason, “The bicycle industry needs to take immediate action. After extensive consultations with experts in the field, e-bike and e-scooter lithium-ion battery safety is a large and immediate subject that we need to act on now. The advisement statement we have prepared for retailers takes the interest of e-bike continued growth within the industry and safety for all. If we do not address the core issue, we may see this propel to something beyond our control.”<sup>4</sup>

## PRODUCT TESTING

### BELIEF



96%

of Americans believe products they buy for their home must adhere to a required safety standard.

### REALITY



<1%

of product categories overseen by the CPSC must comply with a mandatory safety standard.

# Why consider certification?

Manufacturers of battery-powered products like micromobility devices need to ensure that they integrate certified batteries safely into their products while also taking deliberate steps to ensure that their end products meet known safety standard requirements. Safety accidents can lead to the dramatic erosion of consumer trust in products, the retailers who sell them and the brands that manufacture them. Despite this, some companies and consumers continue to purchase and use self-declared products without independent, third-party certification of the battery, electronics and end-product construction.

## How to build trust in your brand

One of the simplest ways to help reduce risk and product liability is to involve an independent, third-party accredited certification organization to evaluate the battery and battery-operated end products' compliance to applicable safety standards for the purposes of product certification. As a required part of certification, manufacturers will undergo ongoing factory surveillance to verify that the product still meets the original requirements it was certified under. For consumers, the presence of the UL Mark provides confidence and trust that the product meets the applicable evaluation and testing requirements before going on the market.

With careful attention to established safety standards and the involvement of a safety science leader like UL Solutions, manufacturers may reduce their products' compliance risks and strengthen their reputations. Manufacturers should seek compliance to applicable standards and also partner with an accredited, independent, third-party certification organization. Self-declaring or only doing independent testing leaves key safety-critical items unaddressed, such as construction, design and material review. These steps can help reduce the likelihood of safety concerns:



### 1. Assessing and addressing risk

- Evaluate potential safety risks and hazards associated with the power source.
- Identify necessary design changes to address risks and hazards.
- Pinpoint other necessary safety evaluation and testing criteria.



### 2. Understand the regulatory landscape

- Identify target markets and relevant regulation in each geographic location.
- Investigate and outline baseline requirements.
- Map evaluation, testing and/or certification plans based on regulatory requirements.



### 3. Consider marketplace requirements and customer expectations

- Identify requirements or measures that could result in competitive advantage.
- Map any evaluations, tests and/or certifications required to validate product claims, enhance product acceptance or differentiate offerings.



### 4. Seek expert advice and counsel

- Identify independent accredited ISO/IEC 17065 product certification organizations.
- Outline cost-effective evaluation, testing and certification strategies for long-term savings.
- Ask questions about international requirements.

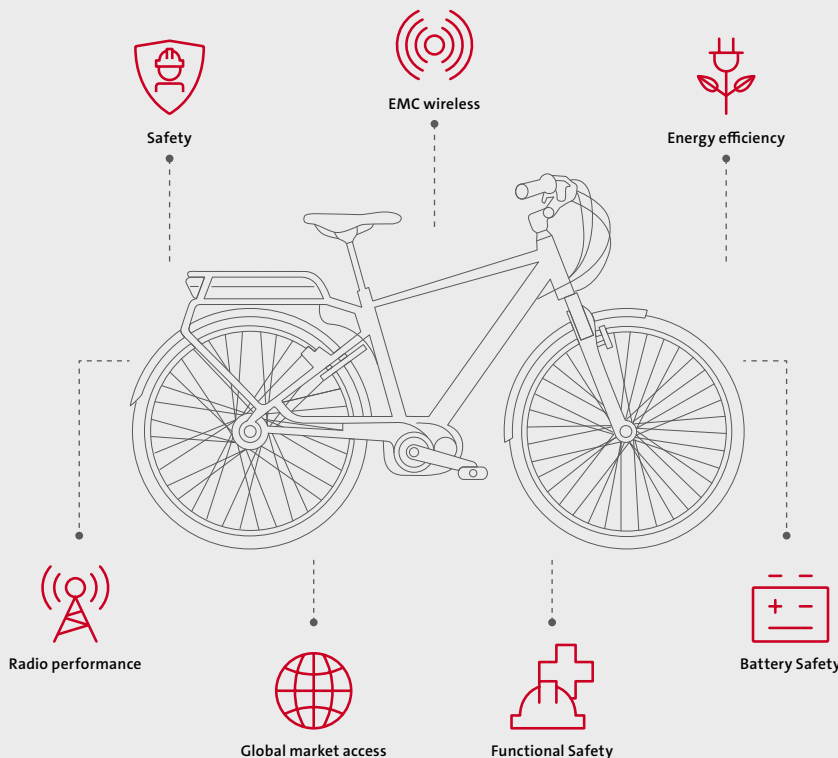
Making sure that your products comply with the appropriate standards can prove challenging. Fortunately, UL Solutions provides a comprehensive suite of testing and certification services for micromobility devices. We contributed to UL 2849, the Standard developed by UL Standards & Engagement, and are experts on the technical requirements for testing and certification. When you tap into our technical expertise and testing capabilities, we can help you increase your regulatory acceptance and brand recognition. More important, however, is the fact that we can help you get safer products to market — a critical responsibility of all e-bike manufacturers.

UL Solutions is recognized by the U.S. Occupational Safety and Health Administration (OSHA) as a Nationally Recognized Testing Laboratory (NRTL) to certify micromobility products to UL 2849, the Standard for Electrical Systems for eBikes, and UL 2272, the Standard for Electrical Systems for Personal E-Mobility Devices.

We can serve as your single source of knowledge by offering a comprehensive range of testing services for your e-bikes and electrically power-assisted cycles (EPACs). Our team of experts will help you understand the Consumer Product Safety Commission's standards for safety, enabling you to sell your products in the global marketplace. Plus, our familiarity with the Standard allows us to streamline the certification process, helping you to cut costs and accelerate your time to market.

**An incredible transformation of personal electrified transportation technology has taken place around the globe and shows no sign of slowing. More and more, light electric vehicles (LEVs) and personal transportation devices are populating worldwide markets.**

**The increasing demands put on e-transportation electrical systems and the associated safety challenges must be proactively addressed. In order to support this rapid market evolution, we have launched a platform of micromobility certification solutions.**



## A comprehensive solution

On top of our dedicated testing and certification solutions for micromobility devices, we also help manufacturers with a range of other tests, including:

- Safety
- EMC wireless
- Radio performance
- Battery safety
- Global market access
- Functional safety
- Energy efficiency



As experts in the relevant micromobility standards, we can provide you with the guidance you need to navigate the complexities of the market.

#### E-Bikes

##### **UL 2849 Electrical Systems for eBikes**

The standard covers electric bicycles, both pedal assisted and non-pedal assisted. An eBike is defined as a two or three wheeled electrical/mechanical device provided with functional pedals that includes one or more electric motors to either assist the rider when pedaling (EPAC versions) or provide motive power to the wheels when the rider is not pedaling.

#### E-Scooters and other micromobility devices

##### **UL 2272 Electrical Systems of Personal E-Mobility Device**

The standard covers consumer mobility devices intended for a single rider with a rechargeable electric drive train that balances and propels the rider, and which may be provided with a handle for grasping while riding. This device may or may not be self-balancing. This standard covers micromobility devices not intended for use on roadways, such as hoverboards, e-skateboards, e-scooters.



Download our micromobility brochure [here](#), to learn more about our comprehensive solutions for micromobility devices.

In addition, our UL Product IQ® database marries the longstanding UL certification information relied upon by millions of users with the intuitive design and user-friendliness of a modern search engine. You can access information for thousands of UL Certified products, components and materials with advanced search features that allow you to compare products, search by testing standards and more. This is a helpful resource that can be used to confirm whether products or components are certified by UL Solutions, helping you identify and source from suppliers that are strongly committed to safety and quality.

To learn more about UL Solutions micromobility testing and certification services, visit us at [www.ul.com/micromobility](http://www.ul.com/micromobility) or contact us at [www.ul.com/contact-us](http://www.ul.com/contact-us).

# Endnotes

1. Micromobility Global Opportunity Analysis and Industry Forecast, 2021–2030, Allied Market Research: <https://www.alliedmarketresearch.com/micro-mobility-market-A11372>
2. “Safety Concerns Associated with Micromobility Products,” Consumer Product Safety Commission, April 8, 2020,
3. <https://nypost.com/2022/08/07/mayor-adams-must-act-on-e-bikes-before-nyc-sees-a-mass-casualty-fire>
4. NBDA on E Bike Regulation and Safety — Statement to Retailers and Industry on UL 2849 Certification, Bicycle Retailer and Industry News, July 18, 2022.



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