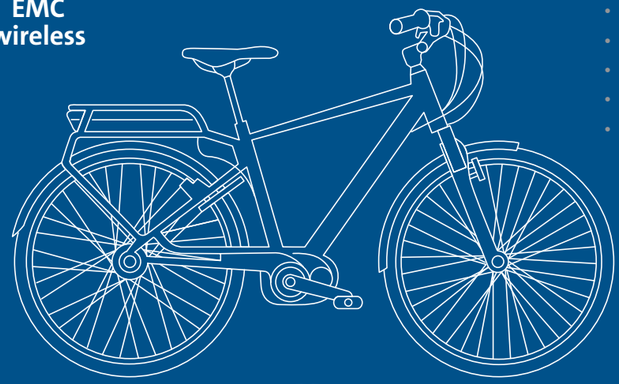
# Guide to micromobility

**Standards for Europe and United States**

Empowering Trust™

# The e-mobility transformation

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 e-mobility certification solutions.




## A comprehensive solution

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

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

# US Standards

## UL 2272 Electrical Systems of Personal E-Mobility Devices

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.

- UL 2272 is bi-national accredited consensus standard for USA and Canada.
- From 1 Jan 2021, only UL 2272 certified electric scooters will be allowed in Singapore.

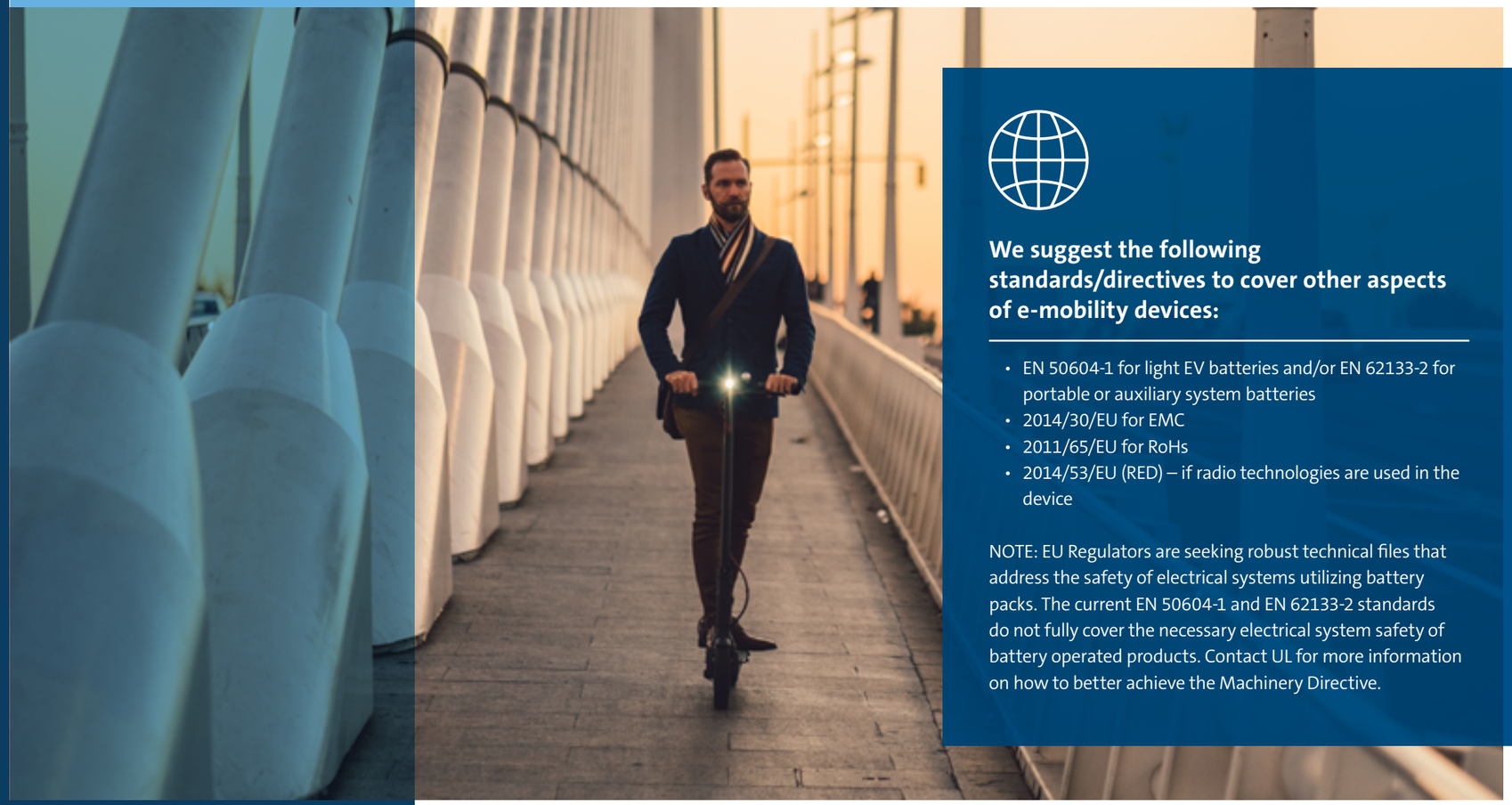
## UL 2849 Electrical Systems for eBikes

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.

- UL 2849 is bi-national accredited consensus standard for USA and Canada.
- As a minimum, the electrical system consists of the drive unit [electric motor], battery, battery management system (BMS), interconnecting wiring, and power inlet. Any additional components or systems required to demonstrate compliance are included based on the overall system application and risk.

**We suggest the following standards to cover other aspects of e-mobility devices:**

- FCC Rules for Radio performance and EMC requirements
- UL 2271 for light electric vehicles (LEV) batteries
- UN38.3 for batteries



# EU Standards

## E-bikes

- EN 15194 for e-bikes is the only specific standard that has been published. At this time EN 15194 does not cover the necessary safety of electrical systems utilizing battery packs in the same manner of how UL 2849 covers this subject.

## E-scooters

- EN 17128 (in development) and EN 60335-1 are often used for electric scooters. However, these are not covering the necessary safety aspects for full electrical systems utilizing battery packs. In the interim, UL Standards can continue to be used.

## Hoverboards

- EN 60335-1 is a generic standard commonly used for hoverboards. This standard does not cover the necessary safety of electrical systems utilizing battery packs in the same manner as UL 2272 covers this subject

## Safety

- From safety perspective, Machinery Directive 2006/42/EC is applicable and should be followed.

**We suggest the following standards/directives to cover other aspects of e-mobility devices:**

- EN 50604-1 for light EV batteries and/or EN 62133-2 for portable or auxiliary system batteries
- 2014/30/EU for EMC
- 2011/65/EU for RoHs
- 2014/53/EU (RED) – if radio technologies are used in the device

NOTE: EU Regulators are seeking robust technical files that address the safety of electrical systems utilizing battery packs. The current EN 50604-1 and EN 62133-2 standards do not fully cover the necessary electrical system safety of battery operated products. Contact UL for more information on how to better achieve the Machinery Directive.

# How we can help

**We deliver solutions for both the U.S. and EU.**

**We test safety, functional safety and radio/EMC aspects.**

**We provide technical advisory and continuous updates on the latest global regulatory landscape.**

**We provide combined evaluations of batteries and end products.**

**We help you navigate complex global market access.**



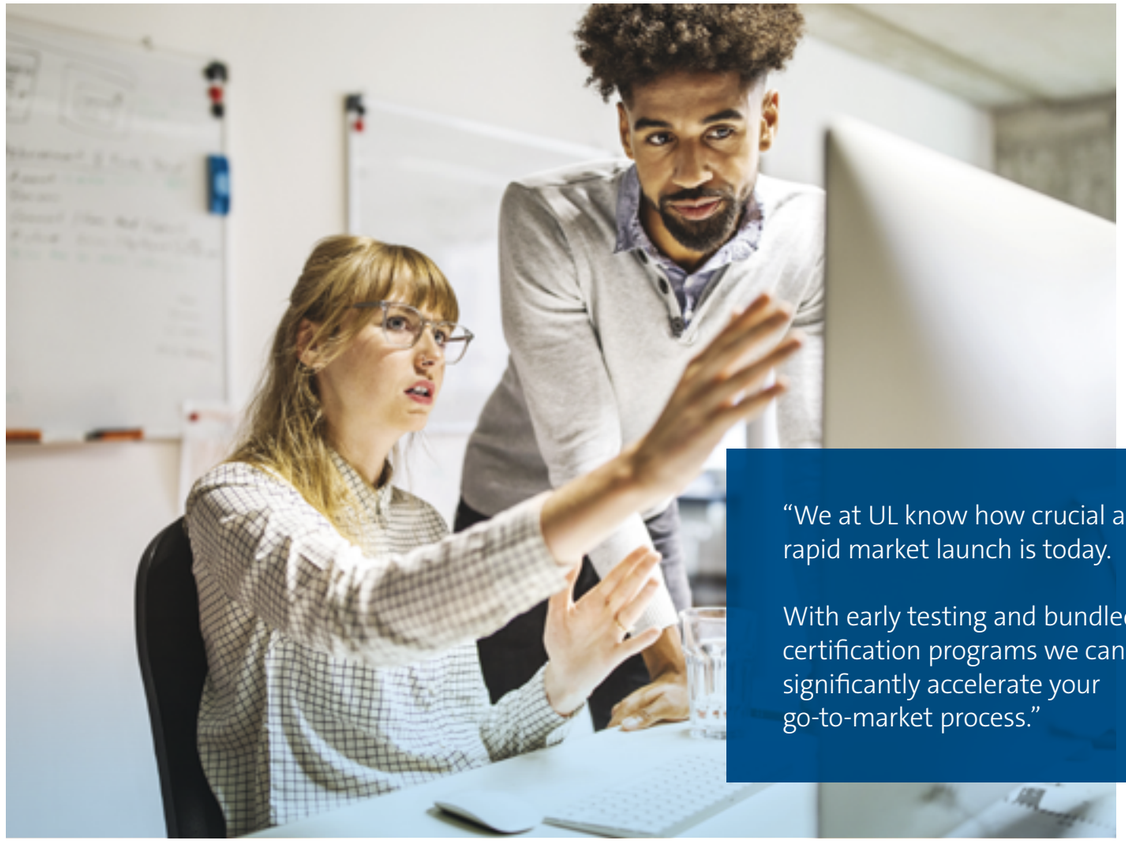
# Why UL

**Expertise**
We play a key role in the development of new standards through active leadership in the industry all around the global.

**Unparalleled experience**
We draw on more than 100 years of research and development experience in consumer technology.

**Knowledge**
We support manufacturers and regulators with webinars and dedicated training sessions on regulations worldwide.

**Trusted leadership**
We are highly regarded experts on e-mobility worldwide and stay on top of the latest developments.



"We at UL know how crucial a rapid market launch is today.

With early testing and bundled certification programs we can significantly accelerate your go-to-market process."

UL.com

© 2020 UL LLC. All rights reserved. This white paper may not be copied or distributed without permission. It is provided for general information purposes only and is not intended to convey legal or other professional advice.

698.01/20.11.en - CT25931378