



ENERGY & POWER TECHNOLOGIES

# Enable Safer Use of Next Generation Personal e-Transportation

## Updated UL 2272 & UL 2849 Standards and New UL 3030 Standard

*There is an incredible transformation of personal e-Transportation technology around the globe. Personal e-mobility devices (x-wheel products), electrically pedal assisted e-Bikes, e-Motorbikes, & e-Scooters are an emerging use of battery technologies.*

The increasing demands put on the electrical system present safety challenges that must be proactively addressed. Similarly, the exponential increase in the use of unmanned aerial vehicles (UAVs) or drones to fulfill commercial or tactical objectives will continue to rely on battery technology as the key solution, and safe battery and electrical systems are needed.

Batteries are at the heart of powering personal e-Transport products. New and updated electric shock and fire hazard safety standards establish a baseline that enables common expectation of safe use. Most of all, they enable a future where batteries help our society get from one place to another in a safe and recognizable way.

UL supports manufacturers, retailers, and end-users by offering testing and certification of the electrical systems for personal e-Transportation. Three UL Standards are the core of compliance for these innovative products:

### Personal e-Mobility – UL 2272 1st Edition

UL Standard Technical Panel (STP) of UL 2272 approved the 1st edition of ANSI/CAN/UL 2272 and it was published on November 21, 2016. It now extends the scope of UL 2272 to cover all types of personal e-Mobility devices (single rider; non-roadworthy; typically stand when operating; does not have pedals). So, two significant UL 2272 updates include:

- Supporting an updated list of products for personal e-Mobility 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. The device may or may not be self-balancing. As a result the name of the Standard is now changed to “Personal e-Mobility” (formerly “Self-Balancing Scooters”).
- UL 2272 becomes American and Canadian accredited standard.

The Consumer Product Safety Commission (CPSC) issued a letter on 2/18/16 to manufacturers, importers and retailers of hoverboards urging them to make certain the self-balancing scooters they “import, manufacture, distribute or sell in the United States comply with currently applicable voluntary safety standards, including all referenced standards and requirements contained in UL 2272.”

In addition to its existing compliance guidance, as part of its Fiscal Year 2017 Operating Plan, CPSC will work to address hazards associated with devices powered by high energy density batteries (lithium-ion), as well as “system safety features that ensure high energy density batteries, battery packs, safety circuits, end products and chargers all work together to achieve safe operation for the intended application.”



To learn more visit [UL.com/eMobility](http://UL.com/eMobility). For a quote, email: [eMobility@ul.com](mailto:eMobility@ul.com).



UL offers electric shock and fire-safety testing and certification under UL 2272, Electrical Systems of Personal e-Mobility Devices. This standard evaluates the safety of the electrical drive train system and battery and charger system combinations, but does NOT evaluate for performance, reliability, or rider safety.

**UL 2272 Test Scope (\*denotes new test added)**

<p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li>• Overcharge</li> <li>• Short Circuit</li> <li>• Over-discharge</li> <li>• Temperature</li> <li>• Dielectric Voltage</li> <li>• Isolation Resistance</li> <li>• Imbalanced Charging</li> <li>• Leakage Current*</li> <li>• Grounding Continuity*</li> </ul>	<p><b>MECHANICAL</b></p> <ul style="list-style-type: none"> <li>• Vibration</li> <li>• Shock</li> <li>• Crush</li> <li>• Drop</li> <li>• Mold Stress</li> <li>• Handle Loading*</li> <li>• Strain Relief Tests</li> </ul>	<p><b>ENVIRONMENTAL</b></p> <ul style="list-style-type: none"> <li>• Water Exposure               <ul style="list-style-type: none"> <li>• IPX4</li> <li>• Partial Immersion</li> </ul> </li> <li>• Thermal Cycling</li> </ul>	<p><b>COMPONENTS</b></p> <ul style="list-style-type: none"> <li>• Motor Overload</li> <li>• Motor Locked Rotor</li> <li>• Label Permanence</li> </ul>
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**Electrically Pedal Assisted Cycles (EPAC Bicycles, e-Motorbikes or e-Scooters) – UL 2849 3rd Edition**

The updated requirements of UL 2849 now address the most recent critical safety issues to support safe use of e-bikes (single rider, but may be able to accommodate passenger; typically considered over-the-road; typically sit to operate; may have pedals) and minimize risks from battery fires or explosions and shock hazards. Significant updates include:

- UL 2849 covers electrical systems of pedelecs type of e-Bikes and over-the-road use e-motorbikes & e-scooters.
- The standard addresses the risk of electric shock during charging over the life of the products and potential electrocution hazards. In addition, UL 2271 – Light EV Batteries or UL 2580 – EV battery certification is required.
  - e-Bike: Max Speed <= 20 mph (32.2 km/h)
  - e-Motorbike / e-Scooter: No maximum speed limit

**UL 2849 Test Scope (specific tests notated, not full test list)**

<p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li>• Motor Assistance Control</li> <li>• Startup Assistance Mode Test</li> <li>• Maximum Assistance Speed</li> </ul>	<p><b>MECHANICAL</b></p> <ul style="list-style-type: none"> <li>• Vibration</li> <li>• Impact</li> <li>• Mold Stress</li> </ul>	<p><b>ENVIRONMENTAL</b></p> <ul style="list-style-type: none"> <li>• Water Exposure</li> <li>• Thermal Cycling</li> </ul>	<p><b>COMPONENTS</b></p> <ul style="list-style-type: none"> <li>• Motor Overload</li> <li>• Motor Locked Rotor</li> </ul>
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**Unmanned Aerial Vehicles (UAVs) or Drones – New UL 3030**

UL 3030 addresses requirements for the electrical system of the UAV for commercial applications (agricultural, scientific, research, government, local police, search & rescue, video for film industry or news broadcasts, flight related to business for roof inspections). UAVs covered by UL 3030 are intended to be operated by trained pilots and while aspects such as airworthiness, efficacy of controls, and similar topics will be out of scope; these must be addressed by regulations, user programs and/or other standards.

<b>Enclosure Requirement</b>	Plastic Enclosure Metal Enclosure	<b>Motor Requirement</b>	Overload Conditions Maximum Anticipated Load Hazardous Voltage Circuits
<b>Functional Safety Requirement</b>	An Analysis of Potential Hazards Protection Circuits	<b>Protection Against Injury</b>	Sharp Edges Strength of Enclosures
<b>Battery and Charger Requirement</b>	Battery Cell Battery Pack BMS	<b>Performance</b>	A Myriad of Performance Tests

Manufacturers and retailers wishing to submit personal e-Transportation products for testing, or inquiring about battery testing with UL, email [eMobility@ul.com](mailto:eMobility@ul.com).

To learn more visit [UL.com/eMobility](http://UL.com/eMobility). For a quote, email: [eMobility@ul.com](mailto:eMobility@ul.com).