

## **UL2272 fire safety standard for motorised personal mobility devices**

The UL2272 fire safety standard improves safety against fire and electrical hazards significantly. Motorised personal mobility devices (PMDs) that are certified to the UL2272 standard have to pass a stringent set of tests conducted by accredited testing centres under extreme physical conditions.

Do not perform illegal modifications on your active mobility devices. Users who modify a UL2272-certified PMD may pose fire risks as well as render the device certification invalid.

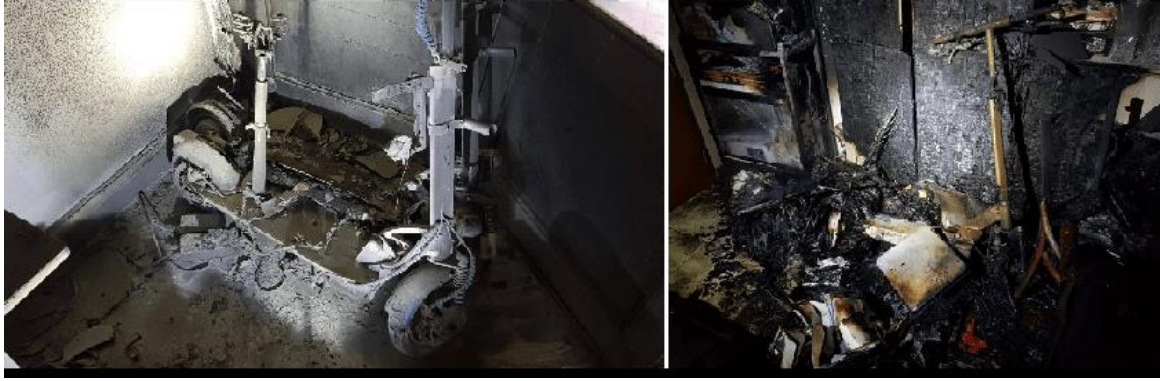
**Since 1 July 2020, only [UL2272 motorised PMDs \(PDF, 1.7MB\)](#) are allowed on cycling paths.** Non-UL2272 e-scooters that have been registered with LTA have been automatically de-registered on that date. Non-UL2272 and modified PMDs are a fire risk, and should be properly and safely disposed of. Find out more [details](#) on where to dispose your PMDs.

The e-scooter inspection regime was introduced in April 2020 to ensure that e-scooters comply with the device criteria for use on public paths. **You may face penalties if caught riding a device that is not compliant with LTA's device criteria on public paths.**

### **Why is the adoption of a device safety standard necessary?**

The number of fires caused by motorised PMDs have increased in the past few years, with more than 90 fire incidents involving PMDs since 2016. As PMDs only started gaining popularity in recent years, many of the motorised PMDs used do not conform to any reliable safety standards. The adoption of a safety device standard is therefore necessary to ensure the safe use of such devices.

LTA carefully studied the safety standards available and determined that the UL2272 standard is most suitable for the common types of motorised PMDs used in Singapore, such as e-scooters, self-balancing hoverboards and electric unicycles.



*Incidents of PMD-related fires over the last few years (photos credit from [Singapore Civil Defence Force's Facebook](#))*

### **Why was UL2272 chosen over other standards?**

It is often difficult to determine the exact cause of the fires due to the extent of fire damage to the PMDs involved. However, based on literature reviews and consultations with the Singapore Civil Defence Force (SCDF), PMD fires may be caused by an electrical anomaly to the electrical circuitry or batteries, which could result from various factors, but not limited to, physical damage to the device, overcharging of rechargeable batteries, use of an unsuitable charger/battery, or manufacturing defects.

UL2272 is assessed to be a suitable safety standard as it evaluates PMDs from a system-level perspective, which better anticipates the full spectrum of usage conditions of the entire PMD, instead of just assessing individual components of a device.

Getting a device certified for UL2272 requires passing a series of electrical, mechanical and environmental tests. Its testing parameters are based on several components like the electrical and mechanical factor for safety, as well as the impact of environmental factors such as exposure to water.

Evaluation tests for UL2272 can be broadly classified into 3 categories as follows:

#### **1. Electrical Tests**

Electrical tests typically cover a range of tests:

- Short circuit
- Over-charge
- Over-discharge
- Temperature
- Dielectric voltage
- Isolation resistance
- Imbalanced charging

A temperature test typically determines whether a device's battery cells and critical components are able to withstand specific operating current, voltage and temperature limits during charging and discharging conditions, e.g. when the device is in use/operation.



*Image on the left: A device undergoing a 'temperature test' (photo credit: SGS Testing & Control Services)*

## 2. Mechanical Tests

Mechanical tests typically cover a range of tests:

- Vibration
- Shock
- Crush
- Drop
- Mold stress release
- Handle loading
- Strain relief

A vibration test evaluates the device's ability to withstand vibration that may occur during its anticipated use. Device would be subjected to vibration in each axis for a stipulated period of time depending on the number of samples submitted.



*Image on the left: A device undergoing a 'vibration test' (photo credit: TUV Rheinland)*

During an 'IPX4 test', water is sprayed on devices from all directions using a rotating sprinkler system for 10 minutes to simulate rain and splashing of water. Following the test, device will be placed under an observation period to ensure that there is no explosion, fire, rupture, electrolyte leakage and shock based on the stipulated testing parameters.



*Image on the left: A device undergoing an 'IPX4 test' (photo credit: SGS Testing & Control Services)*

PMD models that have been awarded the UL2722 certification must also undergo regular factory inspections to verify that device production continues to comply with requirements under the UL2272 standard. Manufacturers who persistently do not demonstrate adherence to the standard and take subsequent actions to ensure that their production line adheres to the standard may have their certification cancelled.

**While the adoption of the UL2272 fire and electrical safety standard greatly reduces the risks of fire, PMD users should always practice [proper handling and safety tips](#) to prevent PMD fires and avoid exposing devices to extreme conditions or stress.**

View these [frequently-asked questions \(FAQs\) \(PDF, 219kB\)](#) for more information on UL2272 certified PMDs.