



December 7, 2023

Ms. Christina Garman
Task Group Chair for WK70724 under ASTM F15.58, Powered Scooters & Skateboards
c/o ASTM International
100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959

Dear Ms. Garman,

U.S. Consumer Product Safety Commission (CPSC) staff¹ supports the work the subcommittee has accomplished in developing a draft voluntary standard, WK70724, *New Standard Consumer Safety Specification for Commercial Electric-Powered Scooters for Adults*, which addresses performance requirements specific to commercial electric-powered scooters (e-scooters) for use in applications such as consumer rentals. In a letter to ASTM dated February 5, 2020, staff provided incident data (related to ride-share electric scooters) to the ASTM subcommittee and staff recommended that the ASTM working group develop requirements that address crash and/or fall hazards related to brake failure, system power loss, and structural failure. Specifically, staff recommended that the task group address brake failures, electrical and thermal related events, software issues, and product durability related to fatigue, static, and dynamic loads. In this letter, staff provides recommendations for improving safety provisions in the draft standard in response to ASTM Ballot F15 (23-15), item 2.

Brakes

1) Excerpt from draft:

5.16.1 Deceleration shall be determined by averaging the results of four test runs and shall be greater than 1.7 m/s^2 (0.173g).

...

6.2.6.4 Four test runs are required. The deceleration shall be determined by averaging the results of the four test runs and shall be greater than 3.5 m/s^2 .

Beyond the inconsistency between the two deceleration values cited above, staff recommends

¹ The views expressed in this letter are those of CPSC staff, and they have not been reviewed or approved by, and may not reflect the views of, the Commission.



increasing the minimum deceleration value from 3.5 m/s² to at least 4.9 m/s² to align with the deceleration requirements for bicycle performance as codified in 16 CFR part 1512. Bicycles are required to have a maximum stopping distance of 15 ft at 15 mph, which equates to a minimum deceleration of 4.9 m/s². In contrast, the proposed brake requirements for powered scooters would allow 37 feet of stopping distance (at 3.5 m/s² of deceleration) when the brakes are applied. Staff concludes that allowing a brake stopping distance that is more than double the allowable stopping distance on bicycles may pose a collision hazard on these products.

Structural Integrity

2) Excerpt from draft:

6.1 Frontal Impact Test

6.1.3.1 Drive the scooter into a high vertical fixed block that is at least the radius height of the wheel at 2 m/s (6.6ft/s). This is equal to 7.2 km/h (4.5 mph).

6.1.3.4 Repeat 6.1.3.1 for a total of six times on the same scooter.

CPSC staff recently published a report titled “Micromobility Products-Related Deaths, Injuries, and Hazard Patterns: 2017-2022.”² The report indicates e-scooters can and do run into curbs. Staff requests the task group provide rationale supporting the sufficiency of the current frontal impact performance requirement. In the absence of such support and given that energy exponentially increases as the velocity of an object increases and the maximum speed of an e-scooter is 20 mph, staff recommends increasing the test speed to 20 mph to make the requirement more stringent and representative of foreseeable use.

3) Excerpt from draft:

6.3 Dynamic Strength Test

6.3.1 Apply a weight to the deck or seat of the unit equivalent to the manufacturer’s specified upper weight limit.

6.3.2 Drop the product such that the front wheel(s) is 150 mm (6 in.) from the surface and the rear wheel(s) is 300 mm (12 in.) from the surface. The surface shall consist of vinyl tile over concrete.

6.3.3 Repeat the step in 6.3.2 for a total of three times.

² Micromobility Products-Related Deaths, Injuries, and Hazard Patterns: 2017-2022, James Tark retrieved at: <https://www.cpsc.gov/content/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns-2017%E2%80%932022>



6.3.4 Repeat the steps in 6.3.2 and 6.3.3 for the opposite wheel.

6.4 *Static Strength Test*

6.4.1 For units without a seating surface, apply a static load of three times the manufacturer's maximum specified weight limit to a nominal 150 by 150 by 50-mm (6 by 6 by 2-in.) wooden block centered between the front and rear axles of the unit's deck and centered axially.

In staff's annual report, staff notes that five incidents (of 89 reviewed incidents) reported issues with the deck breaking, handlebar steering column detaching, and front wheel detaching. Staff also requests that ASTM provide the rationale why the current dynamic strength test is considered sufficient. Staff is concerned that three drops from a small height is not sufficient compared to the expected long-term usage patterns of a rental e-scooter. To better address these hazards and to represent foreseeable use, staff recommends improving the performance requirement in the dynamic strength test by increasing the number of cycles, increasing the weight applied to the deck to be greater than the manufacturer's recommended weight, or both, which would provide a greater factor of safety when addressing crash/fall hazards due to failures of the product frame. Additionally, staff recommends reevaluating whether vinyl is the appropriate drop test surface, inasmuch as vinyl may become damaged during testing with heavily loaded e-scooters.

Electrical

Staff supports the effort to ballot the standard and agrees with the electrical requirements listed below to require e-scooters to conform to the UL2271 and UL2272 standards for electrical requirements. Staff agrees with the ingress protection (IP) rating requirement of the battery packs to provide resistance against intrusion of liquids. Additionally, staff agrees that e-scooters should be limited to 750 watts, which is consistent with the definition of a low-speed electric bicycle in 15 U.S.C. § 2085 and 16 CFR part 1512.

4) Excerpt from draft:

5.2 *Electrical Systems*

5.2.1 All battery packs shall conform to the requirements outlined in UL2271, as well as IEC 62133-2 or IEC 50604-1.

5.2.2 All vehicles shall conform to the requirements outlined in UL2272.

5.2.3 All battery packs shall be protected from dust and water ingress, adhering to International Protection Code (IPC) rating of IP67.

5.2.4 The motor power shall not exceed 750W.

5.2.5 Chargers shall be certified and marked by an appropriate Nationally



Recognized Testing Laboratory.

5.2.6 Units shall have charger connect-interlock so that the vehicle motor cannot be activated when the charger is plugged in.

5.2.7 Controllers shall have the following protections and lockouts:

5.2.7.1 Hand brake activation shall cut off positive torque power to the motor.

5.2.7.2 Scooters intended as rental vehicles, while unattended and awaiting a rental, shall be disabled from motorized use by unauthorized users.

5.2.7.3 Cutting (opening the circuit) or shorting (connecting wires together) on any exposed electrical cabling on the scooter shall not allow unauthorized motorized use of the scooter.

5.2.7.4 Cutting (opening the circuit) or shorting (connecting wires together) on any exposed electrical cabling on the scooter shall not result in operation in an unsafe manner as intended by the manufacturer.

Staff looks forward to discussion on these topics and welcomes comments from the task group.

Sincerely,

A handwritten signature in black ink that reads "Lawrence Mella". The signature is written in a cursive, flowing style.

Lawrence Mella
Mechanical Engineering
Engineering Sciences

Enclosure(s):

Molly Lynyak, ASTM Committee F15 Staff Manager
David Dick, Subcommittee Chair for ASTM F15.58 Powered Scooters &
Skateboards
Jacqueline Campbell, CPSC Voluntary Standards Coordinator