Designation: F2641 – 08 (Reapproved 2015)

Standard Consumer Safety Specification for Recreational Powered Scooters and Pocket Bikes[1]

This standard is issued under the fixed designation F2641; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

During the period from July 1, 2003 through June 30, 2004, the U.S. Consumer Product Safety Commission (CPSC) staff estimates that there were 10 015 emergency-room-treated injuries related to powered scooters. In addition, CPSC received reports of 49 deaths attributed to powered scooters from October 1998 through November 2004. These losses are described in "Powered Scooter Special Study" 7/1/03-6/30/04 dated April 2005.

1. Scope

1.1 This consumer safety specification covers the establishment of performance requirements and corresponding test methods used to minimize the hazards to users of recreational powered scooters and pocket bikes.

1.2 This specification is intended to cover use of these products for children:

1.2.1 Age eight to twelve for units limited to speeds 16 km/h (10 miles/h) or less.

1.2.2 Age 13 and above for fast-moving units capable of achieving speeds >16 km/h (>10 miles/h).

1.3 This consumer safety specification is not intended for units designed or licensed for roadway use regulated by transportation regulations (Department of Transportation (DOT) or state).

1.4 This specification is not intended for units designed and sold as "Adult Use Only" and are prominently labeled and marked as such.

1.5 This consumer safety specification is not intended for nonpowered scooters (Consumer Safety Specification F2264), battery powered ride-on toys (Consumer Safety Specification F963), skateboards, motorcycles, all-terrain vehicles, go-carts (Practice F2007), fun-karts (Specification F2011), snowmobiles, motorized trail bikes, lawnmowers, or motorized wheelchairs including mobility scooters.

1.6 No product covered by this specification produced after the approval date of this consumer safety specification shall, by label, marking, or other means, indicate compliance with this consumer safety specification unless it conforms to all requirements herein.

1.7 The values given in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.8 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D3359 Test Methods for Measuring Adhesion by Tape Test

F963 Consumer Safety Specification for Toy Safety

F2007 Practice for Design, Manufacture, and Operation of Concession Go-Karts and Facilities

F2011 Specification for Safety and Performance of Fun-Karts

F2264 Consumer Safety Specification for Non-Powered Scooters

2.2 *ANSI Standard:*[3]

ANSI/OPEI B71.1 Consumer Turf Care Equipment—Walk-Behind Mowers and Ride-On Machines with Mowers—Safety Specifications

2.3 *SAE Standard:*[4]

SAE J386 Operator Restraint Systems for Off-Road Work Machines

[1] This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.58 on Powered Scooters & Skateboards.

Current edition approved June 1, 2015. Published September 2015. Originally approved in 2008. Last previous edition approved in 2008 as F2641 – 08. DOI: 10.1520/F2641-08R15.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

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2.4 *Federal Standards:*[5]
16 CFR 1303 Lead Containing Paints
Federal Hazardous Substance Act (FHSA) and regulations promulgated under this act

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *accelerator system, n*—mechanical system that is used to control the throttle position.

3.1.2 *axle guard, n*—device that covers the drive axle so that the possibility of injury resulting from hand, hair, body parts or loose clothing contacting the axle is reduced.

3.1.3 *conspicuous, adj*—label or marking that is visible when the unit is assembled.

3.1.4 *deck, n*—generally, low horizontal platform upon which the user places one or both feet.

3.1.5 *deck plate, n*—form of guarding through the use of relatively flat barriers to cover rotating components.

3.1.6 *dynamic load, n*—force applied to an item by means of motion or impact.

3.1.7 *locking fastener, n*—includes prevailing torque locknuts, cotter pins, serrated surface lock nuts, pal nuts, safety wire, and similar hardware intended to prevent unintended loosening when properly used.

3.1.8 *manufacturer's recommended use position, n*—any position that is presented as a normal, allowable, or acceptable configuration for use of the product by the manufacturer in any descriptive or instructional literature. This specifically excludes conditions such as when the unit is unassembled (completely or partially) or folded and positions that the manufacturer shows or explains as being unacceptable, unsafe, or not recommended.

3.1.9 *motor stop switch, n*—toggle switch, or other two-position positively engaging switch, that, when activated, causes the motor to stop, not operate or both.

3.1.10 *pocket bike, n*—motorized two-wheel vehicle designed for a single occupant in the seated position typically designed to look like a motorcycle but scaled down to one quarter to one half the size of a typical motorcycle and not intended for use on public roads.

3.1.11 *protective components, n*—specific items added to a product with the primary purpose of reducing a hazard such as sharp edges, entrapment holes, protrusions, and so forth; normally, these components cover or shield the area of the hazard.

3.1.12 *scooter, n*—vehicle that has two or more wheels, a low platform, a vertical element for the user to grasp, and a method of steering.

3.1.13 *static load, n*—vertically downward load applied by a dead weight or other means.

3.1.14 *throttle stop, n*—device used to limit the travel of the throttle control.

3.1.15 *unit, n*—any of the items listed in 1.1.

4. General Requirements

4.1 Before testing, the units shall be completely assembled, unless otherwise noted, in accordance with the manufacturer's instructions.

4.2 The unit or segment to be tested shall be in a room with an ambient temperature of 23 ± 5°C (73 ± 9°F) for at least 1 h before testing.

4.3 All testing required by this consumer safety specification shall be conducted on the same unit unless otherwise specified.

4.4 All components tested under Section 6 shall not show any evidence of permanent deformation, material separation, visible cracking, or component failure that presents a hazard to the user.

4.5 The unit shall conform to 16 CFR 1303 and the Federal Hazardous Substance Act (FHSA) both before and after all testing.

4.6 All exposed parts shall be smooth and free of splinters, spurs, burrs, and sharp edges.

4.7 Units shall meet the specific requirements of Section 5.

5. Specific Requirements

5.1 *Brakes*—Units shall meet the dynamic brake test specified in 6.2. Hand brake levers shall be located on the handlebars in a position that is readily accessible to the rider in the recommended use position. Hand brake levers shall have a maximum reach (dimension between the hand brake lever(s) and the handle bars) of not more than 89 mm (3.5 in.) at any point between the pivot point of the lever and the lever midpoint. At no point along the lever shall the grip dimension exceed 102 mm (4 in.). An operating force of equal to or less than 44.5 N (10 lbf) applied to the hand lever at a point 25 mm (1.0 in.) from the open end of the hand lever shall cause the brake to begin its retarding function.

5.2 *Electrical Systems:*

5.2.1 All vented batteries shall have a vent tube, which is pointed downwards and extends below the bottom of the battery. The battery end of the vent tube shall be attached securely to the battery. The drain end of the vent tube shall be secured within 25 mm (1 in.) of the end of the tube.

5.2.2 All positively charged electrical connections at battery shall have insulated coverings.

5.2.3 Units that are designed for children eight to twelve shall not exceed 36 V nominal.

5.2.4 Chargers shall be UL or equivalent listed for use as battery chargers.

5.2.5 Unit shall have charger connect-interlock so that the unit cannot be activated when the charger is plugged in.

5.2.6 Controllers shall have the following protections:

5.2.6.1 Brake activation cutoff to cut off power when brake is applied.

5.2.6.2 *Field-Effect Transistor (FET) Short Sensing*—Controller shall be able to compare power transistor versus

[5] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

speed controller/throttle to prevent any power to the motor if and when the FET is shorted.

5.2.7 Resettable circuit breakers or fuses shall be used to protect the system.

5.3 *Latching Devices*—Any unit that folds shall have a latching device or other provision in the design that will prevent the unit from unintentional folding when placed in the manufacturer's recommended use position. Latching devices for folding steering handles on scooters shall be tested in accordance with 6.9. During and upon completion of this test, the unit shall remain latched in its manufacturer's recommended use position.

5.4 *Curb Impact Tests*—Units shall be tested per 6.1.

5.5 *Folding Mechanisms, Hinges, and Clearances*—This requirement is intended to eliminate possible crushing, laceration, or pinching hazards that might occur in folding mechanisms and hinges. Examples are the motion of a hinge that produces a scissor action and the changing clearances at the hinge line between two hinged portions, such that the gap will admit fingers at one position of the hinge but not at all positions. This requirement is also intended to eliminate possible hazards that may be caused by changing clearances. The different pinch clearance requirements listed reflect the different modes of entrapment or pinching that may be encountered.

5.5.1 *Hinge-Line Clearance*—Units having a gap or clearance along the hinge line between a stationary portion and a moveable portion that weighs more than 0.2 kg (½ lb) shall be so constructed that, if the accessible gap at the hinge line will admit a 5-mm (3⁄16-in.) diameter rod, it will also admit a 13-mm (½-in.) diameter rod at all positions of the hinge.

5.5.2 Hinge-line clearance (5.5.1) and accessible clearance (5.5.3) requirements shall not apply to drive trains, wheels, or brake systems.

5.5.3 *Accessible Clearances for Moveable Segments*—This requirement concerns clearances between movable segments intended for children in which the potential for pinching or crushing fingers or other appendages exists. If such accessible clearances admit a 5-mm (3⁄16-in.) diameter rod, they shall also admit a 13-mm (½-in.) diameter rod to prevent the trapping of fingers.

5.5.4 *Inaccessibility of Mechanisms*—Mechanisms shall not have any accessible part of the mechanism present a pinch or laceration hazard.

5.6 *Fasteners*—Fasteners used for wheel hubs, brake pivots, accelerator pivots, steering linkage pivots, axle attachments, and brush-bar attachments shall be locking fasteners.

5.7 *Plastics*—Exposed components made of plastic shall have an ultraviolet (UV) inhibitor.

5.8 *Shields and Guards:*

5.8.1 Does not apply to spoked wheels and disk brakes.

5.8.2 Guards for rotating components shall be permitted to have multiple holes each no larger than 32-mm^2 (0.05-in.^{2}) area.

5.8.3 All guards and shields for pulleys and sprockets shall be secured permanently or attached to prevent their removal from the unit without tools. The fasteners for those guards and shields shall be reusable.

5.8.4 The entry and exit points on and off of the sprockets or pulleys of drivetrains (chain and sprocket or belt and pulley) and open running chain and belt sections shall be covered on top and outwardly to prevent inadvertent touching from a normal riding position. A section of the rear sprocket or pulley drive may be exposed to facilitate the inspection and maintenance of the drivetrain. The inside and bottom may be exposed. The drivetrain is not exempt from the finger-probe standard, but the probe (Fig. 1) shall be applied at angles relative to the normal riding position and not applied from rearward or underneath positions. A specific drivetrain warning shall be permanently engraved, stamped, or applied to the guard. The warning shall read "WARNING—Keep away from moving parts" or equivalent.

5.9 *Dynamic Strength*—All units shall be tested per 6.3.

5.10 *Static Strength*—All units shall meet the static strength test specified in 6.4.

5.11 *Wheel Retention*—All units shall meet the wheel retention test specified in 6.10.

5.12 *Grip Retention*—All units shall meet the grip retention test specified in 6.5.

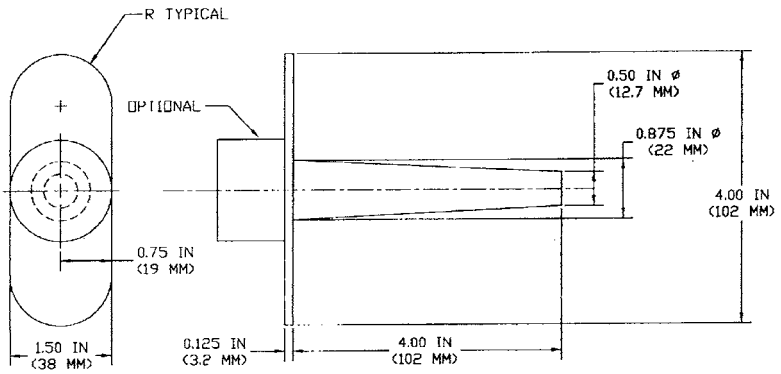

FIG. 1 Finger Probe

5.13 *Handle Stem*—All units shall meet the handle stem tests specified in 6.7 and 6.8.

5.14 *Dynamic Brake Test*—All units shall meet the dynamic brake test specified in 6.2.

5.15 *Paint*—Paint on all units shall comply with the lead content provisions of 16 CFR 1303.

5.16 *Material Quality*—Units shall be made from new or reprocessed materials and shall be visually clean and free from infestation. The materials shall be assessed visually by the unaided eye rather than under magnification. If reprocessed materials are used, they shall be refined so that the level of hazardous substances conforms to the requirements of 5.17.

5.17 *Toxicology, Hazardous Substances*—Materials used shall conform to the Federal Hazardous Substance Act (FHSA).

5.18 *Molded Edges*—Accessible edges, corners, or mold-parting areas shall be free of hazardous edges produced by burrs and flash or so protected that hazardous edges are not exposed.

5.19 *Exposed Bolts or Threaded Rods*—If the ends of more than three threads on bolts or threaded rods are accessible, the ends shall be covered by smooth finish caps.

5.20 *Accessible Points*—Units shall not have accessible potentially hazardous sharp points that may occur because of the following: configuration, assembly devices that are fastened poorly, poorly sheared sheet metal, burrs on screws, and splintered wood. Units that are intended to be assembled by an adult and contain potentially hazardous sharp points in the unassembled state shall be so labeled.

5.21 *Accessible Edges*—Units shall not have accessible, potentially hazardous sharp edges. Units that are intended to be assembled by an adult and may contain unprotected potentially hazardous sharp edges in the unassembled state shall be so labeled.

5.22 *Labels and Warning Labels:*

5.22.1 Labels and warning labels shall be tested per 6.11 and 6.12.

5.22.2 All labels, warnings, and instructions are to meet all requirements of this consumer safety specification.

6. Test Methods

6.1 *Curb Impact Test:*

6.1.1 Apply a weight to the center of the unit equivalent to the manufacturer's specified upper weight limit.

6.1.2 Drive the scooter into a high vertical fixed curb that is at least the radius height of the wheel at 2 m/s (6.6 ft/s).

6.1.3 Repeat 6.1.2 for a total of three times.

6.1.4 Following the impact tests, the unit shall be completely functional.

6.2 *Dynamic Brake Test:*

6.2.1 A unit shall be tested with a rider of at least 68.1-kg (150-lb) weight and shall have a stopping distance of no greater than 4.57 m (15 ft) from an actual test speed of 16 km/h (10 mph) or greater as determined by the equivalent ground speed specified in the following.

6.2.2 The following test conditions shall be followed:

6.2.2.1 The unit shall be ridden over a dry, clean, smooth paved test course free from protruding aggregate. The test course shall provide a coefficient of friction of less than 1.0 and shall have a slope of less than 1 %.

6.2.2.2 The wind velocity shall be less than 11 km/h (7 mph).

6.2.2.3 The unit shall attain the specified ground speed while the rider is in the normal riding position.

6.2.2.4 The rider shall remain in the normal riding position throughout the test.

6.2.2.5 The unit must be moving in a straight line at the start of the brake application.

6.2.2.6 Corrections for velocity at the initiation of braking may be made. The corrected braking distance shall be computed as follows:

$$S_c = (V_s/V_m)^2 S_m \quad (1)$$

where:

S_c = corrected braking distance,
V_s = specified test velocity,
V_m = measured test velocity, and
S_m = measured braking distance.

(1) The test run is invalid if at the commencement of the test, the measured test speed of the unit is not less than nor greater than the test speed required by 1.5 km/h (0.9 mph).

6.2.2.7 Four test runs are required. The stopping distance shall be determined by averaging the results of the four test runs.

6.2.2.8 The stopping distances specified are based on a rider weight of at least 68.1 kg (150 lb) and a maximum rider and unit weight combination of 91 kg (200 lb). Greater stopping distances are allowable for heavier riders and test equipment weights at the rate of 0.30 m per 4.5 kg (1.0 ft per 10 lb).

6.2.2.9 A test run is invalid if wheel lockup occurs.

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.

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. For units with a seating surface, apply a static of 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 the unit's seating surface. Units that have multiple recommended use positions shall be tested (*1*) with the seat off and (*2*) with the seat on and mounted in the adjustment position (if any are

provided) deemed most likely to cause a failure. Apply the load gradually over a period of 5 s and maintain for 30 s.

6.5 *Grip Retention Test/Handle Retention Test*—Apply 67 N (15 lbf) to the grips along the axis of the handlebar gradually over a period of 5 s and maintain for 10 s. If the grip is removed from the handlebar as a result of the loading, it fails this test.

6.6 *Guarding Test (***Warning—***The following procedures shall not be conducted with the motor running):*

6.6.1 Insert the probe (see Fig. 1) into all openings to its maximum depth (102 mm (4 in.)) or until a force of 4.5 N (1 lb) is attained. As the probe is inserted, rotate and position it in all possible angles within the opening, attempting to contact the part or parts under test. The finger probe shall not be inserted beyond the length of the probe (102 mm (4 in.)). The probe cannot contact any rotating component.

6.6.2 The hazards shall be considered "guarded by location" if one of the following applies:

6.6.2.1 The hazard is covered by other parts or components or, because of its location, cannot be contacted with the finger probe shown in Fig. 1 (see ANSI/OPEI B71.1, 1998) while maneuvering the probe in any manner, or

6.6.2.2 The hazard is under and within the perimeter of the chassis components such that the hazard cannot be reached with the finger probe shown in Fig. 1 (see ANSI/OPEI B71.1, 1998) while maneuvering the probe as follows:

(1) From above the chassis, downward through openings in or between the components, and

(2) Underneath the chassis components, allowing only horizontal or downward probe movement or both.

6.7 *Handle/Stem Compression Test:*

6.7.1 Close the handle bar/stem adjustment lock in the uppermost position according to the manufacturer's instructions. If a quick-release mechanism is used (that is, no tools required), the maximum force used to close the quick release shall not exceed 67 N (15 lbf) when applied to a point 6 mm (¼ in.) from the end of the lever.

6.7.2 Apply a static 45-kg (100-lb) load in compression to the center top of the handlebar gradually over a period of 5 s and maintain for 10 s.

6.8 *Handle/Stem Fatigue Test:*

6.8.1 Secure the unit so that it cannot move and the front wheel so that it cannot rotate about its steering axis.

6.8.2 Apply a 267-N (60-lbf) total force 25 mm (1 in.) from the ends of both hand grips in the upward/rearward direction, 45° from vertical, then in the opposite (downward/forward) direction.

6.8.3 Repeat the step in 6.8.2 for 5000 cycles, not to exceed 1 cycle per second.

6.9 *Latching Mechanisms for Prevention of Unintentional Folding of Steering Handle (Scooters):*

6.9.1 Erect the product in accordance with the manufacturer's instructions.

6.9.2 Place the product in the manufacturer's recommended use position so that the normal folding motion is not impeded.

6.9.3 Apply a force of 880 N (200 lbf) at the location normally associated with the folding action and in the direction normally associated with folding the product in accordance with the manufacturer's instructions. Gradually apply the force within 5 s and maintain for an additional 10 s. Do not apply this force to the latching or unlatching means itself.

6.9.4 Repeat the step in 6.9.3 for a total of five times within 2 min.

6.9.5 Fold the unit in accordance with the manufacturer's instructions and repeat the steps in 6.9.1 – 6.9.4 one additional time.

6.10 *Wheel Retention Test*—Secure the unit so that it cannot move. There shall be no relative motion between the axle and the frame when a force of 1780 N (400 lbf) is applied one at a time to each wheel axle for a period of 30 s. The load shall be applied symmetrically to each wheel axle in the direction designed for removal from the frame or fork of the unit.

6.11 *Warning Labels*—A label shall be considered permanent if, during an attempt to remove it without the aid of tools or solvents, it cannot be removed or such action damages the surface to which it is attached.

6.12 *Warning Label—Adhesion:*

6.12.1 Apply the tape test method defined in Test Method B of Test Methods D3359 eliminating the parallel cuts.

6.12.2 Perform this test method once in each different location where warnings are applied.

6.12.3 The warning statements will be considered permanent if the printing in the area tested is still legible and attached after being subjected to this test.

6.13 *Method of Measuring the Maximum Design Speed:*

6.13.1 Driver load mass shall be 50 % of the manufacturer's maximum recommended weight ±4.5 kg (±10 lb).

6.13.2 Tire pressure shall be as required by manufacturer.

6.13.3 Vehicle shall be at normal operation temperature.

6.13.4 Driver shall be positioned as recommended by manufacturer.

6.13.4.1 If a fixed seat or a removable seat exists, the driver shall be positioned in a seated position throughout the test.

6.13.5 Test shall be carried out in an open area that is clean, smooth, dry, asphalted, or surfaced in an equivalent manner, having a longitudinal gradient of not more than 1 % and a degree of banking of not more then 3 % over a length of 656 ft (200 m).

6.13.6 Tests shall be conducted with a new fully charged battery at full throttle. The speed will be measured between two designated reference points and a stop watch.

6.13.7 Maximum speed as determined from the values specified by the testing body by ±10 %.

7. Keywords

7.1 pocket bikes; powered scooters

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