Designation: F1951 – 14

An American National Standard

Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment[1]

This standard is issued under the fixed designation F1951; 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

The need for systematic and consistent means of evaluating the capability of surface systems to provide access to playgrounds has been amplified by the passage of the Federal Americans with Disabilities Act. The goal of this specification is to establish uniform means to measure the characteristics of surface systems in order to provide the potential buyer with performance specifications to select materials for use as an accessible surface under and around playground equipment.

1. Scope

1.1 This specification establishes minimum characteristics for those factors that determine accessibility. This specification applies to all types of materials that can be used under and around playground equipment.

1.2 The material under and around playground equipment that meets this specification must also comply with Specification F1292 if the surface is within the fall zone.

1.3 This specification does not imply that an injury cannot be incurred if the surface system complies with this specification.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard. (See IEEE/ASTM SI 10.)

1.5 The following precautionary statement pertains only to the test method portions, Sections 6 and 7, of this specification: *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]

IEEE/ASTM SI 10 American National Standard for Use of the International System of Units (SI): The Modern Metric System

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

F1292 Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment

F1487 Consumer Safety Performance Specification for Playground Equipment for Public Use

2.2 *U.S. Architectural and Transportation Barriers Compliance Board Document:*[3]

Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities

2.3 *U.S. Consumer Product Safety Commission Document:*[4]

US CPSC Publication No. 325 Handbook for Public Playground Safety (2010)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

[1] This specification is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.63 on Playground Surfacing Systems.

Current edition approved June 1, 2014. Published July 2014. Originally approved in 1999. Last previous edition approved in 2009 as F1951 – 09b. DOI: 10.1520/F1951-14.

[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 United States Access Board, 1331 F Street, NW, Suite 1000, Washington, DC 20004-1111, http://www.access-board.gov/.

[4] Available from United States Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD, 20814, http://www.cpsc.gov/.

3.1.1 *camber, n*—the angular position in the vertical direction of the individual main wheel axis.

3.1.1.1 *Discussion*—Zero camber occurs when the wheel axis is parallel to the ground surface.

3.1.2 *loose fill system, n*—a surface system consisting of small independent, movable components.

3.1.2.1 *Discussion*—Examples of movable components include sand, gravel, wood chips, loose rubber, and engineered wood fiber.

3.1.3 *maneuverability, n*—the ability of a surfacing material to allow unencumbered traversing or locomotion of a person with or without prosthetic aids or wheelchair.

3.1.4 *toe, n*—the difference in separation distance between the front of the two main wheels and the rear of the two main wheels of a wheelchair.

3.1.4.1 *Discussion*—Proper toe alignment occurs when the axle is perpendicular to the direction of rolling.

3.1.5 *use zone, n*—area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

3.1.5.1 *Discussion*—The surface area within the use zone shall meet the minimum impact attenuation requirements of Specification F1292 from the maximum fall height.

4. General Requirements

4.1 Playground surfaces represented as complying with this specification shall meet all applicable requirements regarding accessibility specified herein. Anyone representing compliance with this specification shall keep such essential records as are necessary to document any claim that the requirements within this specification have been met.

4.2 Surface systems that are within the use zone of the surrounded playground equipment shall be tested in accordance with Specification F1292 and shall comply with the impact performance requirements of Specification F1292. Thus, surface systems shall exhibit a head injury criterion (HIC) not exceeding 1000 and a value of acceleration recorded during an impact (g-max) not exceeding 200 from a height at or greater than the fall height of the play structure.

NOTE 1—This is consistent with the guidance contained in US CPSC Publication No. 325.

4.3 Accessibility specification certification compliance shall be conducted by an independent accredited testing laboratory.

5. Performance Requirement

5.1 The tests shall be conducted on a surface that is installed per the manufacturers' installation instructions. No additional compaction or other modification shall be permitted, other than what is required for test specimen preparation with Specification F1292.

5.2 *Maneuverability*—When tested in accordance with the test methods described in Sections 6 and 7 of this specification, a surface in place shall have average work per foot (work per meter) values for straight propulsion and for turning less than the average work per foot (work per meter) values for straight propulsion and for turning, respectively, on a hard, smooth surface with a grade of 7.1 ± 0.2 % (1:14).

6. Wheelchair Work Measurement Method—Straight Propulsion

6.1 *Test Equipment and Setup:*

6.1.1 *Test Wheelchair*—A 16-in. (40.64-cm) width rehabilitation wheelchair with pneumatic rear tires, front wheels with pneumatic tires, and a total weight of 31 ± 4.4 lb (14 ± 2 kg) shall be used as the test wheelchair. The rear wheels shall be identical with 24 by 1.375-in. (61 by 3.5-cm) pneumatic tires and pushrim diameters of 20 in. (50.8 cm). The front wheels with pneumatic tires shall be identical with 8 by 1-in. (20.3 by 2.54-cm) wheels with pneumatic tires. One main rear wheel shall be capable of measuring the forces applied to the pushrim that are tangential to the pushrim and parallel to the direction of travel. The wheelchair shall be adjusted such that there is minimal toe and minimal camber. Tire pressures shall be set to the maximum pressure specified by the manufacturer ±2 psi.

6.1.2 *Test Wheelchair Rider*—A165 +11, –4.4-lb (75 +5, –2 kg) test wheelchair rider shall propel the wheelchair during testing.

6.1.3 *Weight of Total System*—The total weight of the wheelchair-rider system, including any distance measurement or data acquisition equipment residing on the wheelchair, shall be a minimum of 187.2 lb (85 kg) and a maximum of 255 lb (116 kg).

6.1.4 *Weight Distribution*—The wheelchair rider shall be seated in the wheelchair such that 40± 2 % of the total weight is supported by the front casters and the rear wheels support the remaining 60 ± 2 % when measured in a static position with the wheelchair rider's hands placed on the rear wheel pushrims in the topmost position.

6.1.5 *Distance Measurement*—A method to measure the total distance that the wheelchair has been propelled must be present. This distance shall be 6.56 +0.66 / –0 ft (2.0 +0.20 / –0 m) from its starting, measured to an accuracy of ± 0.79 in. (2 cm).

6.1.6 *Wheel Angular Displacement Measurement (Optional)*—A method to measure the angular displacement of the pushrim force measuring wheel can be used. It shall have an accuracy of at least ± 0.5°.

6.1.7 *Data Acquisition*—A data acquisition system shall be used to record the forces applied to the pushrim and the end of the trial at a minimum frequency of 50 Hz.

6.2 *Test Specimen:*

6.2.1 An installed site of playground surfacing shall be used as the test specimen. The minimum test specimen size shall be 4 ft (1.22 m) wide by 8 ft (2.44 m) in length.

6.2.2 The surface shall be level and free of surface dirt, ice, or contaminants.

6.2.3 Testing shall be conducted when surface temperature, as measured by a temperature probe, is between 40 and 100°F (4 and 38°C).

6.3 *Test Procedure:*

6.3.1 Starting from a stationary position with the wheelchair casters in the trailing position, the test wheelchair rider shall