



# Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment<sup>1</sup>

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## INTRODUCTION

The federal accessibility standards require newly constructed and altered public playgrounds by accessible to and usable by people with disabilities. Both the Architectural Barriers Act<sup>2</sup> and the 2010 ADA Standards for Accessible Design<sup>3</sup> require accessible surfaces, including the accessible route within the play area to be firm and stable. At this time, there is no standard specification to measure firmness and stability, which is related to the work for a person with a mobility impairment to traverse a surface, thus highlighting the need for a systematic and consistent means of evaluating the capability of surface systems. The goal of this specification is to establish a uniform means to measure the work for a person with mobility impairment to traverse surface systems in order to provide the potential buyer with performance specifications to select materials and maintain the surface as an accessible surface through the accessible route and at accessible 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 as the accessible route through the play area, under and around playground equipment.

1.2 The material used as the accessible route through the play area, under and around playground equipment that meets this specification must also comply with Specification F1292 or Test Method F3351, or both, if the surface is within the fall zone.

1.3 Surface systems in compliance with this specification will not prevent all types of injuries from occurring when the surface is used.

1.4 The SI unit of work is the joule (J), which is defined as the work expended by a force of one newton through a displacement of one meter. The dimensionally equivalent newton-meter (N\*m) shall be used only if it is followed by the term “work” so it is not confused to be a torque value. (1 N\*m = 0.73756215 pound-force-feet).

1.5 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 for further details.

1.6 The following precautionary statement pertains only to the test method portions 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 ASTM Standards:<sup>4</sup>

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

<sup>1</sup> 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.

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<sup>2</sup> Applicable to facilities owned, operated or leased by the federal government.

<sup>3</sup> Applicable to facilities owned, operated or leased by units of state or local government and public accommodations.

<sup>4</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- 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
- F2075** Specification for Engineered Wood Fiber for Use as a Playground Safety Surface Under and Around Playground Equipment
- F3351** Test Method for Playground Surface Impact Testing in Laboratory at Specified Test Height
- 2.2 U.S. Department of Justice:<sup>5</sup>
- 28 CFR Part 35** Nondiscrimination on the Basis of Disability in State and Local Government Services
- 28 CFR Part 36** Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities
- 2010 ADA Standards for Accessible Design**
- 2.3 U.S. Consumer Product Safety Commission Document:<sup>6</sup>
- US CPSC Publication No. 325 Handbook for Public Playground Safety (2015)**

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *accessible, adj*—a site, building, facility, or portion thereof that complies with the 2010 ADA Standards for Accessible Design.

3.1.2 *accessible route, n*—the pathway connecting the site arrival point to the accessible features of a site including the entry to the playground, the points of entry to accessible play components and their points of egress.

3.1.2.1 *Discussion*—The accessible route meets the minimum technical provisions for running slope, cross slope, ground walking surface, changes in level, openings, firmness, and stability as defined in Chapter 4 of the 2010 ADA Standards for Accessible Design.

3.1.3 *baseline ramp, n*—a ramp with a hard, smooth surface with grade of  $7.1 \pm 0.2\%$  (1:14).

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

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

3.1.5 *cross slope, n*—the slope that is perpendicular to the direction of travel.

3.1.6 *firm or firm surface, v/n*—a firm surface resists deformation by either indentations or particles moving on its surface.<sup>7</sup>

3.1.7 *firmness – with respect to a surface, adj*—the degree to which a surface material resists deformation, especially by indentation.

3.1.8 *loose fill system, n*—a surface system consisting of individual particles, for example, engineered wood fiber, bark mulch, wood chips, shredded foam, shredded rubber, sand, pea gravel, and so forth.

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

3.1.10 *pushrim, n*—the outer grip-able tube connected to the wheel of a wheelchair for the purpose of manually propelling a wheelchair. The terms pushrim and handrim shall be used interchangeably.

3.1.11 *qualified personnel, n*—those with current knowledge, training, skill, education and experience who have successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work through the application of professional judgement.

3.1.12 *running slope, n*—the slope that is parallel to the direction of travel.

3.1.13 *stable surface, v/n*—a stable surface resists additional deformation by an indentation that tries to twist or turn on the surface as a result of applied forces.

3.1.14 *stability – with respect to a surface, n*—the degree to which a surface material resists deformation that is twisting or turning on the surface.

3.1.15 *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.

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

3.1.16 *unitary surface, n*—a top layer of one or more material components bound together to form a continuous surface; for example, urethane and rubber composites, molded foam, molded rubber mats.

3.1.17 *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.

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

3.1.18 *wheelchair work, n*—a measurement of work, using an instrumented handrim on a manual wheelchair, that calculates the varying torque when propelled for a specified time and distance across a specific surface and slope.

### 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** or Test Method **F3351**, or both,

<sup>5</sup> Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

<sup>6</sup> Available from United States Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD, 20814, <http://www.cpsc.gov/>.

<sup>7</sup> 2010 ADA Standards for Accessible Design, advisory note 302.1.

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 Specification certification compliance for the surface sample shall be conducted by an independent accredited testing laboratory.

## 5. Performance Requirement

5.1 *Accessible Surface Performance Parameters*—Playground surface materials and surface systems that are used as the accessible route through the playground, under and around accessible play equipment shall be required to comply with technical provisions for the accessible route and clear ground space including running slope, cross slope, openings in the surface, changes in level, pile height, firmness and stability.

5.2 The Accessible Surface Performance Criterion shall apply to the site or play surface sample to be tested, as specified in the 2010 ADA Standards for Accessible Design including the follow provisions. Any deviation from these criteria shall be documented in the resulting report.

5.2.1 The ground level accessible route through the play area and the surface sample to be tested shall be maintained with a minimum 60 in. (1525 mm) clear width, a running slope not to exceed 1:16 (6.25 %) maximum and a cross slope not to exceed 1:48 (2.08 %) maximum.<sup>8</sup>

5.2.2 The clear ground space for the approach and use of accessible play components and the surface sample to be tested shall be maintained with a slope not to exceed 1:48 (2.08 %) maximum in all directions.<sup>9</sup>

5.2.3 Openings in the ground surfaces shall not allow passage of a sphere more than 0.5 in. (13 mm) maximum.<sup>10</sup>

5.2.4 Changes in level shall not exceed 0.25 in. (6.4 mm) vertical maximum or 0.5 in. (13 mm) beveled maximum with a slope not steeper than 1:2.<sup>11</sup>

5.2.5 Turf, artificial turf, carpet or carpet tile shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall not exceed 0.5 in. (13 mm) maximum or be otherwise documented in the report.<sup>12</sup>

5.2.6 The playground surface and/or the surface sample to be tested shall be stable and firm. The wheelchair work test method described here shall serve as a means to determine if the surface is firm and stable in the absence of a specific test method.

5.3 *Maneuverability*—When tested in accordance with the wheelchair work test method described in this standard, a surface in place shall have combined average work per foot

(work per meter) value for straight propulsion and for turning less than the combined average work per foot (work per meter) value for straight propulsion and for turning, respectively, on a hard, smooth surface with a grade of  $7.1 \pm 0.2$  % (1:14).

5.3.1 *Calculation of Work Ratio*—The work ratios for straight propulsion and turning shall be calculated by dividing the average work per foot (work per meter) measured using the wheelchair work measurement test procedure by the average work per foot (work per meter) on a hard, smooth surface with a grade of  $7.1 \pm 0.2$  % (1:14) and shall be less than or equal to 1.0.

5.3.2 The test used to determine accessibility, shall have been conducted on surfacing material samples that are the same regarding their design, materials, components, thickness, and manufacture as the installed playground surface.

5.4 Test material from the same lot number or date of manufacture from the manufacturer shall be used to determine the accessibility of the surface using the Specification F1951 wheelchair work test method and shall also be tested to Specification **F1292** or Test Method **F3351**, or both, to the drop height specified by the manufacturer/supplier. The drop height, g, and HIC results of the test shall be recorded and compared with the results of the same product tested to Specification **F1292** or Test Method **F3351**, or both.

5.5 The test used to determine accessibility of materials specified for use in a playground shall have been conducted no more than five years prior to the date of installation of the playground surface.

5.6 It would be permissible to use the wheelchair work test method at an installed playground at the accessible point of entry into the play surface, along the accessible route, and at the clear ground space for each accessible play component.

5.7 Ground surfaces shall be inspected and maintained regularly and frequently to ensure continued compliance with Specification F1951 and the ADA and ABA accessibility standards.<sup>13</sup>

## 6. Summary of Test Method

6.1 *Wheelchair Work Test Method – Baseline*—The wheelchair work measurement test methods shall be conducted on a hard, smooth surface with a grade of  $7.1 \pm 0.2$  % (1:14) utilizing the straight propulsion test method and the turning propulsion test method to determine the work required to propel a test wheelchair on a reference surface and specified slope.

6.2 *Wheelchair Work Test Method – Surface Sample*—The wheelchair work measurement test methods for straight and turning propulsion shall then be conducted on a level sample surface. The work values obtained on the level sample surface shall be compared to the baseline work value obtained in **6.1**.

<sup>8</sup> 2010 ADA Standards for Accessible Design: 1008.2, 1008.2.4.1, 1008.2.5.1, 1008.4.2.

<sup>9</sup> 2010 ADA Standards for Accessible Design, 305.

<sup>10</sup> 2010 ADA Standards for Accessible Design, 302.3.

<sup>11</sup> 2010 ADA Standards for Accessible Design: 303.2, 303.3.

<sup>12</sup> 2010 ADA Standards for Accessible Design, 302.2.

<sup>13</sup> 2010 ADA Standards for Accessible Design, 1008.2.6.1. The frequency by which a playground surface is tested and maintained is likely to be different for every playground and dependent on both the type of surface and the number of daily users.