

### How are surfaces tested according to ASTM F1951?

There are two wheelchair maneuverability tests specified in ASTM F1951 (formerly ASTM PS 83): Wheelchair Work Measurement Method — Straight Propulsion and Wheelchair Work Measurement Method — Turning. Both tests utilize a rehabilitation wheelchair with pneumatic rear tires and front casters. A 75 kg person is seated in the wheelchair such that 40% of the total weight is supported by the front casters and the rear wheels support the remaining 60%.

For the **straight propulsion** test, the person propels the wheelchair across the surface a distance of 2 m, in 7 seconds, using four uniform pushes. The forces applied to the wheelchair pushrim are measured and recorded. The test is then repeated on a 1:14 (7.1%) ramp. The amount of work required to negotiate the level playground surface and the 1:14 ramp are calculated and compared. The **turning** test is similar to the straight propulsion test except that the person propels the wheelchair around a turn guide test fixture through a 90 degree turn. To comply with ASTM F1951, a level surface system must require less work to negotiate than the 1:14 ramp for both straight propulsion and turning.

### What is Rotational Penetrometer testing?

Beneficial Designs, Inc. has developed the **Rotational Penetrometer**, a portable device for testing the firmness and stability of surfaces. The Rotational Penetrometer obtains surface measurements by pressing a caster into a surface with a given amount of force and measuring the amount of vertical penetration into the surface. The caster is then rotated back and forth on the surface, and a stability measurement is obtained by measuring the total amount of vertical displacement after rotation. Research has shown that the Rotational Penetrometer produces repeatable results that correlate with the amount of work required to propel a wheelchair across the surface. A national standard test method for firmness and stability is being developed by the RESNA Standards Subcommittee on Ground and Floor Surfaces. The test method is based upon the Rotational Penetrometer technology.

### Are there ADA standards for playground surfaces?

In October 2000, the Architectural and Transportation Barriers Compliance Board (Access Board) issued final accessibility guidelines to serve as the basis for standards to be adopted by the Department of Justice for new construction and alterations of play areas covered by the Americans with Disabilities Act (ADA). The guidelines include scoping and technical provisions for ground surfaces, and specify that ground surfaces must comply with ASTM F1951. The Department of Justice must adopt the guidelines as standards for them to be enforceable under the ADA. For more information, visit their Web site at [www.access-board.gov](http://www.access-board.gov).

### Who is Beneficial Designs, Inc.?

Beneficial Designs is a rehabilitation research and design firm located in Minden, Nevada. We develop assistive and adaptive technology, perform rehabilitation research, legal consultation, and contract design work. We are active in developing national and international wheelchair standards, accessibility standards for ski facilities, recreational facilities and outdoor developed areas (including outdoor recreation access routes and recreation trails), and surfaces (indoor and outdoor). Beneficial Designs assisted the ASTM F08.63 Playground Surfacing Systems Subcommittee in the development of ASTM F1951 by conducting research, developing the wheelchair work measurement test methods, and drafting the provisional standard (ASTM PS 83). For more information, please visit our Web site at [www.beneficialdesigns.com](http://www.beneficialdesigns.com).