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# Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment[1]

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## INTRODUCTION

Surveys by the United States Consumer Product Safety Commission (CPSC)[2] and others have shown that falls from playground equipment onto the underlying surface are a significant cause of injuries to children. Severe head injuries are the most frequently implicated cause of death in playground equipment-related falls. Use of appropriate impact-attenuating surfacing materials in the use zone of playground equipment can reduce the risk of fall-related injury. In particular, it is believed that the risk of life-threatening head injuries is reduced when appropriate surfacing materials are installed.

This specification specifies impact attenuation performance requirements for playground surfaces and surfacing materials and provides a means of determining impact attenuation performance using a test method that simulates the impact of a child's head with the surface. The test method quantifies impact in terms of *g*-max and Head Injury Criterion (HIC) scores. *G*-max is the measure of the maximum acceleration (shock) produced by an impact. The Head Injury Criterion or HIC score is an empirical measure of impact severity based on published research describing the relationship between the magnitude and duration of impact accelerations and the risk of head trauma. The standard includes procedures allowing surfacing materials to be performance-rated before installation and for installed surfacing materials to be tested for conformance with the specification.

The purpose of this specification is to reduce the frequency and severity of fall-related head injuries to children by establishing a uniform and reliable means of comparing and specifying the impact attenuation of playground surfaces. Its use will give designers, manufacturers, installers, prospective purchasers, owners, and operators of playgrounds a means of objectively assessing the performance of surfacing materials under and around playground equipment and hence of evaluating the associated injury risk.

## 1. Scope

1.1 This specification establishes minimum performance requirements for the impact attenuation of playground surfacing materials installed within the use zone of playground equipment.

1.2 This specification is specific to surfacing used in conjunction with playground equipment, such as that described in Specifications F 1148, F 1487, F 1918, F 1951, and F 2075.

1.3 This specification establishes an impact attenuation performance criterion for playground surfacing materials; expressed as a critical fall height.

1.4 This specification establishes procedures for determining the critical fall height of playground surfacing materials under laboratory conditions. The laboratory test is mandatory for surfaces to conform to the requirements of this specification.

1.5 The laboratory test required by this specification addresses the performance of dry surfacing materials.

1.6 The critical fall height of a playground surfacing material determined under laboratory conditions does not account for important factors that may influence the actual performance of installed surfacing materials. Factors that are known to affect surfacing material performance include but are not

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

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[2] U.S. CPSC Special Study. Injuries and Deaths Associated with Children's Playground Equipment, April 2001. US Consumer Product Safety Commission, Washington DC.

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