

New Guidance, Understanding, Considerations, Explanations

ASTM REVISES STANDARD GUIDE FOR PLAYGROUND SURFACES

In 1999, there was a determination that the Standards written by ASTM for "surface systems under and around Playground Equipment" were of a highly technical nature and most owners of playgrounds were not well served by these standards in the understanding of what was required of them. As a result, a task group was established to write a document that would provide guidance, understanding, considerations and explanations of how and where the technical documents would be used.

The Standard Specifications described in this document are the technical requirements and the determinant of performance.

The ASTM F2223 was first published in 2003. It provides the reader with the following:

- a short history and need for the playground surfacing standards,
- factors to consider when using a surfacing standard,
- terminology that is commonly used,
- the need for impact attenuation and the role of ASTM F1292,
- issues of providing accessibility for persons with disabilities and the role of ASTM F1951,
- an introduction to engineered wood fiber (likely the most prominent surfacing system) and the role of ASTM F2075,
- and the need to develop and maintain records as part of any playground.

There is a requirement to revise this document as the technical sub-committee determines or as the technical standards are revised and published. This was the case in late 2003 when it was determined that ASTM

F1292 would be revised in 2004 and therefore this document needed to be revised to reflect that changes and any other explanations that were determined to be helpful.

In providing guidance and explanations, the document provides insights of expectations for the activity of play and the playground. Since falls result in up to 70 percent of all injuries in the playground, generally as a result of an impact with the surfacing system, this document clearly points out that it is a very real and reasonable expectation that impact injuries can and will occur in the playground and these could include long bone injuries.

Since the current technical changes relate primarily to ASTM F1292, changes to the Guide are primarily the impact attenuation section. The first change is the explanation that surfaces having "lower values of g-max and HIC signify better performance for impact absorption."

This is important to users of surface systems that specify lower values that they are actually reducing the risk of a life-threatening and debilitating injury as well as further reducing the severity of all other impact related injuries when they occur. This also allows the owner/operator, designer/specifier and manufacturer/installer of more impact absorbing surfaces to discuss these merits in context of performance to the Standard.

Additionally, this document clearly states that the technical standards set minimum performance and procedures. It is the responsibility of the designer/specifier and owner/operator to determine if these minimums are adequate for the needs of their playground and users (children).

This Standard Guide discusses the importance of testing surfaces for impact attenuation in the field. The test of the playground surface as it is actually installed is the only way for the owner/operator, parent and other stakeholders to determine the degree of protection being provided.

This is also the place where those persons expect that the children are protected beyond the minimum performance of platforms to specify that the drop be from the tops of barriers and guard rails (the location from which children will actually fall). As a result, the playgrounds that are in place should be installed and maintained in a manner that has accountability built in.

As the ASTM F08.63 sub-committee on playground surfacing continues to revise and write new performance standards, the ASTM F2223 will continue to be revised to help the reader in understanding the less technical aspects.

At the present time, there is ongoing work with ASTM F1292, with regard to precision and bias reflecting the technology of the 04 revision, as well as a study to research a pre-test that might further simplify field testing, the ASTM F1951 is being reviewed with regard to potential alternate test procedures for accessible surfacing, ASTM F2075 is being reviewed as technology in the testing area is changed.

In addition to these existing standards, work has begun on documents for "poured in place" unitary surfaces and surfacing systems that are installed in waterplay facilities.

For the non-technical person the purchase of and addition to your

playground library of the ASTM F2223 would greatly enhance your knowledge in this field. This newsletter will attempt to keep its readers current with the changes and highlights. However, it can never provide the detailed information that you should have. You can get a copy of the Standard at www.ASTM.org.

In January of 2004, ASTM published the revision of the Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment (ASTM F1292-04) and some of these changes are reflected and highlighted in the ASTM F2223-04, published in May 2004. The ASTM F1292 revision has technical changes to the instrumentation and test procedures to provide the stakeholders with a greater degree of information about the surfaces they are responsible for.

This article highlights some of the technical changes and their implication to the designer/specifier, manufacturer/installer, owner/operators, parent/care givers and regulators.

Since the ASTM F1292 is utilized

and required as a performance measure in other Standards in the United States, Canada and other countries, some of the implications in relation to these standards will be discussed.

A companion article to this outlines the content and changes to the ASTM F2223 "Standard Guide for ASTM Standards on Playground Surfacing". This is a non-technical document that outlines how and under what circumstances various Standards are used.

The ASTM F1292 can be typified to have four sections:

1. the issues regarding the measure and prevention of life-threatening and debilitating head injuries and the reduction in the severity of all impact injuries
2. the requirements of all manufacturers and suppliers of surfacing materials to submit their products for testing in a laboratory at three temperatures that reflect the temperature extremes that are anticipated during typical use
3. the requirements for testing playground surfaces in the field once they have been installed and throughout their entire life in the playground

4. the technical requirements for the instrumentation utilized in the laboratory or the field to perform the procedures in this standard.

Risk of Injury Determination

The ASTM F1292 recognizes two measures and provides pass/fail values that measure the impact attenuation of a playground surface. The g-max measures the maximum acceleration of the falling object at impact, while the HIC (Head Injury Criteria) measures a specific integral of the acceleration-time history of an impact, used to determine relative risk of head injury. It has become commonly accepted and empirically proven that either a g-max greater than 200 or HIC greater than 1000 can result in a life-threatening head injury. These values are traditional and historic and were generated originally by testing on human cadavers and for this reason, we know these values are the point at which a death can be expected. The g-max has been in this standard since its first publication in 1991, with HIC being added in 1993 as

the pass/fail measures and values.

The 2004 revision of this standard provides additional information with regard to the risk of head injuries other than death at a range of HIC values. Injury types are ranked as minor (skull trauma without loss of consciousness; fracture of nose or teeth; superficial face injuries), moderate (skull trauma with or without dislocated skull fracture and brief loss of consciousness).

Fracture of facial bones without dislocation; deep wound(s), and critical (cerebral contusion, loss of consciousness for more than 12 hours with intracranial hemorrhaging and other neurological signs; recovery uncertain).

This risk of injury chart is used by all stakeholders to assess the potential of injury that would be related to various levels of performance of surfaces. It is generally the responsibility of the owner/operator or their designer/specifier to evaluate and apply lower impact attenuation values as they deem best suits their user group.

An example of the use of this information in evaluating risk of head injury would be

- HIC value of 500 has an 80 percent risk of a minor injury, a 40 percent risk of a moderate injury, 0 percent risk of critical or fatal injury.
- HIC value of 800 has a >95 percent risk of a minor injury, 75 percent risk of a moderate injury, 2 percent risk of a critical injury and 0 percent risk of fatality.
- HIC value of 1000 has a 99 percent risk of a minor injury, a 90 percent chance of a moderate injury, a 4 percent chance of a critical injury and the beginnings of risk of a fatality.
- HIC value of 1500 has a 100 percent risk of a minor and moderate injury, an 18 percent risk of a critical injury and 3 percent risk of a fatality.

This information is used in conjunction with determination of drop height by the owner/operator in the writing of specifications for the surface to be purchased and/or maintained. It is important to realize that all surface need maintenance in relation to impact performance and this function must be rigorously pursued.

Three Temperature Suitability Testing

There has always been a requirement of all manufacturers and providers of play surfacing system to submit reproducible samples to a laboratory to have them tested for compliance to this Standard and determine the critical height (failure point). This test does provide information to the user that the supplier is capable of engineering as

many as nine samples that will have this critical height. It is the responsibility of the manufacturer/supplier and the prudent owner/operator to ensure that the same raw materials, manufacturing techniques and installation procedures that have produced twenty and one-fourth square feet of sample can be translated to the entire playground.

The most significant change to the
(Continued on page 40)



Imagine a warranty that lasts longer than summer vacation.



Try 100 years longer and 50% stronger.

Your playground is a big investment, and you want it to last a long time. That's why BCI Burke manufactures only the highest quality park and playground equipment on the market today. And we back that up with the longest and strongest warranty in the industry.

Shop and compare warranties. When we say longest, we mean 100 years on posts, clamps and hardware. No wishy-washy "lifetime" language to wonder about like "Whose lifetime?" Or "What do you mean by lifetime...2, 5, 10 years?"

Burke makes it clear and simple. 100 years. Period. And we can back that up by being the oldest playground manufacturing company in the United States. We were founded nearly 100 years ago by J.E. Burke whose motto was "Burke Better Built."

When we say 50% stronger, we're talking plastic parts that have a 15 year warranty...that's 50% longer than nearly all of our competitors.

Should one of our slides crack or break due to a manufacturing defect, we'll replace it FREE!* Because we don't prorate our warranties like low price manufacturers do, you never have to worry about unexpected prorated replacement part costs.

Remember: it's not the lowest cost at time of purchase that counts, but the Total Cost of Ownership over time.

Choose Burke for your next playground and you can relax this summer and next summer and the next summer and the next summer...



For more information

about total cost of ownership contact your Burke representative at

1-800-266-1250.
bciburke.com



*There is no charge for the warranted parts or shipping. Customer is responsible for installation costs.
© Registered and ™ Trademark of BCI Burke Company, LLC, Fond du Lac, WI 54936 © 2004 BCI. All Rights Reserved.

READER SERVICE NO. 21

New Guidance, Understanding, Considerations, Explanations

(Continued from page 17)

testing at the three temperatures is that the lower limit, 300F, in the 1999 version has been further lowered to 250F to ensure that the surface is actually below the freezing temperature of water during this portion of the test. The sample size has also been increased to provide more accurate and repeatable results that would actually reflect conditions in the playground.

An additional change is that all loose fill materials must be subject to compaction prior to the impact test being performed. This ensures that the test more accurately reflects the traffic and compression that is expected in the playground.

The three temperature test progressively increases the drop height on each sample tested until either the g-max exceeds 200 or the HIC exceeds 1000. The lowest full foot measurement below the failure is the critical height. No surface shall be installed with a critical height below that set by the owner/operator prior to purchase with the minimum drop height being the fall heights stipulated in national playground standards such as ASTM F1487 or CSA Z164.

There is the addition of an optional laboratory test in the ASTM F129-04 to determine the properties of a surface in a wet and frozen condition. This procedure and test apparatus are provided in the appendix of the document and provide the owner/operator and their consultant with performance information they may expect in their local

Testing Of Installed Systems

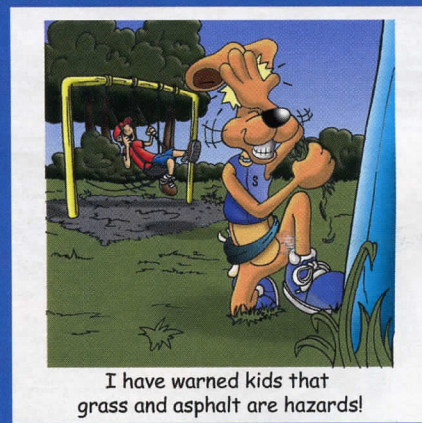
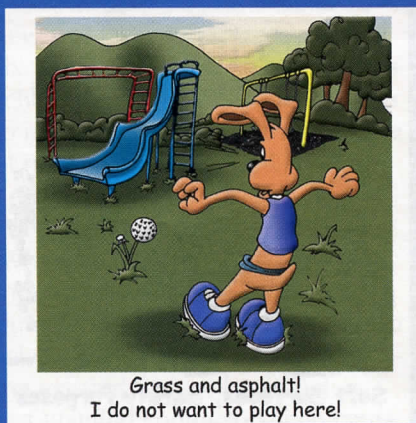
The field test procedure has been significantly modified to make testing and the results more reflective of the actual performance of the surface in the playground. This is still a test that is directed at the discovery of areas that would fail to meet the requirements of this Standard or the contract specifications for the surface. There is still the requirement to perform a minimum of 3 drop tests in 3 locations per playspace, however the size of the playspace has been defined. In addition the compression of loose fill materials prior testing has been added.

The Standard makes it clear that the person performing the test shall determine the drop height for the test based on the highest of; the height specified or

agreed to by the owner/operator prior to purchase, the critical fall height specified when the playground was installed, the equipment fall height, or the critical height of the surface at the time of installation. This clearly allows the owner/operator through their risk management and specifications to provide for the surfacing with better g-max and HIC performance than the minimums set in other Standards. A typical use of this clause would be to raise the drop height from the minimum of deck heights as in many standards to the tops of barriers and guardrails to reflect the height from where children actually fall and from where they will need protection.

Inspectors are specifically directed to divide the playspace into structures and use. This would mean that where some inspectors might have considered that for a surface encompassing multiple structures for various age groups that only 3 set of drops would be required, they are now required to test per structure or functionally linked structures.

This will provide better risk management and protection. In addition the inspection is directed to test surfaces that will exhibit variation and particular



attention is given to surfaces of varying colour.

Although all manufacturers of play surfacing systems have always been required to submit their samples for the 3 temperature testing, this has only recently become true for the suppliers of loose fill materials such as sand, pea gravel, etc. Since these materials will be compressed, disturbed and removed during active play and require topping up, there is a requirement in the reports for ASTM F1292 that the source of the materials be determined and reported to allow replacement with the same materials in the future, thereby reducing the potential for contamination and reduced performance of the surface in relation to impact absorption. This reporting is of particular importance to these materials, but is a requirement for all materials including unitary surfaces.

The Standard still requires that as a minimum where the results of the testing of any installed surface from the drop height stipulated if the g-max values are above 200 or HIC values are above 1000 that the play structure serviced by the surface be taken out of service until the surface complies. The removal from service will be the responsibility of the owner/operator as they are the most proximate to the playground, however bringing the surface

into compliance may be an issue that is the responsibility of the owner/operator or manufacturer/installer depending upon warranty stipulations at the time of installation.

Technical Requirements

For those that are so inclined, the technical aspects of the standard are more properly read in their entirety and only highlights are presented here. The most significant change is that the headform and electronics of ASTM F355 procedure C have been removed and the headform and technical requirements for the test apparatus is totally described in this Standard.

An additional change between the 1999 revision and the 2004 revision is that there has been a change in the accelerometer and the angle of impact must not exceed 100 from horizontal. These changes have been required, since there is a possibility that they could influence the repeatability and reproducibility of the test to the tolerances that are being sought by the Standard's sub-committee.

This should be proven during the coming year as work on a new precision and bias statement is developed. Since the precision and bias statement for this Standard has not changed from the 1999 revision, instruments used for

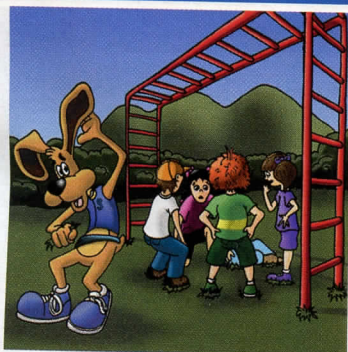
the freefall test method complying to the 1999 revision are fully expected to fall within the current precision and bias of the Standard.

Application & Use of ASTM F1292

The use of the ASTM F1292 is set by other standards (ASTM F1487, CSA Z164, etc.) as well as contracts and legislation. ASTM F1487 requires that all surfaces in the protective surfacing zone must both be installed and maintained to the requirements of the ASTM F1292. As a result for all jurisdictions that have adopted ASTM F1487, the requirements of the ASTM F1292-04 are automatically adopted and testing should comply with this Standard.

For other jurisdictions, such as Canada, the CSA Z614 references the ASTM F1292-99 in its reference documents and therefore the requirement to change to the ASTM F1292-04 is at the option of the person requesting or performing the test.

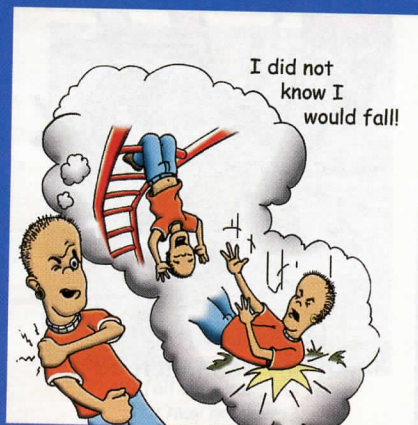
Since the CSA Z164 is not expected to be revised prior to 2007, this will remain the case in all likelihood until the precision and bias of the ASTM F1292 has been revised. As with all technology, upgrading to the new technology and procedures allow the inspector to stay current. ■



Grass and asphalt are accidents waiting to happen.



I always say watch where you play.



I did not know I would fall!