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Playground Surfacing

Playguide™ Bulletin No. 6

Falls to the surface account for 80 percent of all playground injuries, according to the U.S. Consumer Products Safety Commission (CPSC). Yet playground surfacing is often little more than an afterthought in the design process.

This attitude isn't completely surprising. Unlike new play equipment, a safety surface is about as glamorous as a car's seat belts—and nearly as important, especially to the more than 190,000 children who are injured in playground falls every year.

"You need to consider the shock absorbency of the different materials available."

The CPSC *Handbook on Public Playground Safety* emphasizes the need for adequate surface protection. The Handbook's authors say:

The surface under and around playground equipment can be a major factor in determining the injury-causing potential of a fall. A fall onto a shock-absorbing surface is less likely to cause a serious injury than a fall onto a hard surface. Because head-impact injuries from a fall have the potential for being life threatening, the more shock-absorbing a surface can be made, the greater is the likelihood of reducing severe injuries. However, it should be recognized that some injuries from falls will occur no matter what playground surfacing material is used.

Shock absorbency and critical height

When specifying a playground surface, you need to consider the *shock absorbency* of the different materials available.

The standard measure of shock absorbency is "critical height," a term that originated in Europe. The CPSC defines critical height for a surfacing material as "an approximation of the fall height below which a life-threatening head injury would not be expected to occur."

The CPSC Handbook goes on to say that the surfacing material used under and around a particular piece of playground equipment should have a Critical Height value of at least the height of the *highest designated play surface of the equipment.* This height is the fall height for the equipment. This is interpreted differently for each type of play event: the *highest deck* on most composite structures; the *height of the entrance platform* to a slide; or the *top rung* on a horizontal ladder, etc.

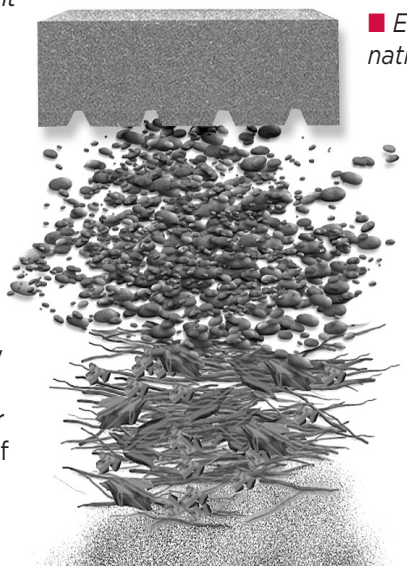
Loose-fill materials

The surfaces most commonly found on playgrounds are loose-fill materials. Loose-fill protective surfacing has traditionally meant readily-available, loose materials such as sand, gravel, wood chips and shredded rubber. These materials vary considerably in their ability to absorb impact. As the accompanying table from the *CPSC Handbook* demonstrates, the critical height for a 9-inch compressed depth of loose-fill material ranges from 4 feet (coarse sand) to 10 feet (wood mulch).

Sobering Statistics

A 2000 study by the U.S. Public Interest Research Group (PIRG) and the Consumer Federation of America (CFA) showed the dangers posed by inadequate surfacing on most U.S. playgrounds.

- *80 percent of the 1,024 surveyed playgrounds lacked adequate protective surfacing.*
- *Eight out of 10 playgrounds across the nation had surfacing that was too hard.*



Critical Heights of Tested Materials

	Uncompressed depth			Compressed depth*
Material	**6 in.**	**9 in.**	**12 in.**	**to 9 in.**
Wood Chips	7 ft.	10 ft.	11 ft.	10 ft.*
Double-Shredded Bark Mulch	6 ft.	10 ft.	11 ft.	7 ft.*
Engineered Wood Fiber	6 ft.	7 ft.	>12 ft.	6 ft.*
Fine Sand	5 ft.	5 ft.	9 ft.	5 ft.*
Coarse Sand	5 ft.	5 ft.	6 ft.	4 ft.*
Fine Gravel	6 ft.	7 ft.	10 ft.	6 ft.*
Medium Gravel	5 ft.	5 ft.	6 ft.	5 ft.*
Shredded Tires	10-12 ft.	n/a	n/a	n/a

1. Source: US CPSC Playground Surfacing, Technical Information
2. Source: Independent test at Penn State University in accordance with ASTM F1292
* Note: This column more accurately represents conditions found on playgrounds.

These critical height figures are theoretical maximums based on tests in a controlled environment. In a real-life playground setting, loose-fill materials are subject to rain, compaction, and being kicked out or carried away in children's shoes, pockets and hands. The resulting attrition and uneven distribution can reduce a loose-fill material's original depth significantly—thereby lowering its critical height several feet. Also a factor is that materials which absorb water (such as wood products) are much less impact-absorbing when wet or frozen. All these factors make it necessary to allow a safety margin when calculating the amount of loose material needed for shock absorption.

Unitary materials

In addition to loose-fill surfaces, playground owners can choose from two types of unitary or continuous surfacing. These alternatives are made of synthetic materials and offer the advantages of consistent impact-absorbing characteristics and easy maintenance.

- *Poured-in-place surfaces.* These smooth, seamless surfaces look much like outdoor carpeting. They are easy to maintain (no collection points for debris) and provide an excellent surface for accessibility. Because the material is poured on-site, the thickness can be varied according to the fall height requirements of the equipment. For example, the surfacing can be poured thicker under a 72-inch deck, but only a minimum thickness would be required under and around a balance beam. The shock-absorbing qualities of a poured-in-place surface are determined largely by the quality of the installation.

- *Pre-manufactured tiles.* These products are similar in appearance to poured-in-place surfaces, but their shock-absorbing characteristics are predictable because the tiles are manufactured under controlled conditions. TuffTurf® Tiles from Landscape Structures are a good example. TuffTurf Tiles are molded from shredded and compressed recycled rubber from tires.

The only downside of unitary synthetic materials is the initial cost. Poured-in-place or tile surfaces are more expensive to buy and install than traditional loose-fill materials. However, lower maintenance costs (and, in some cases, reduced insurance premiums) can make them more cost-effective in the long run.

As a compromise, you can consider a loose-fill material such as wood mulch or fine gravel for most of your playground, with TuffTurf Tiles or a poured-in-place surface for accessibility and heavy use areas.

Additional factors

It can be tempting to skimp on a playground safety surface, but this temptation can result in injuries and lawsuits.

The Americans with Disabilities Act (ADA) is another factor to consider. With accessible playgrounds a requirement of the ADA, the appropriate surfacing materials to meet this more tightly defined criteria are ever more critical. A unitary surface, like TuffTurf Tiles, offers an easy and cost-effective solution to providing a route of travel leading to and around the accessible events on your playstructure.

Finding expert advice

At Landscape Structures, we have a long history of involvement in playground safety issues. Chairman Steve King is the task group Chairman of the ASTM Committee that developed and updates the 1993 standards concerning accessibility and safety in public playground equipment. For help in choosing a cost-effective playground surface, or for free resource materials that can help in your planning, call your local Landscape Structures representative.

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