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Is Your Playground Safe for Kids?

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For publications about playground safety, visit *www.cpsc.gov/CPSCPUB/PUBS/playpubs.html.*

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We want our kids to "play hard," but we want them to play safely, too. Parents and caregivers need to be aware of potential safety issues and what a properly maintained playground looks like.

This publication provides information about surfacing materials and safety standards.

In a survey conducted in 2004, U.S. playgrounds received a grade of C+ on overall safety, according to a study done by the University of Northern Iowa.

- About four out of five playground-related injuries occur on public playgrounds. One out of five injuries occur on home playgrounds. On average, 15 children die each year as a result of these accidents.
- The majority of playground injuries (about 63 percent) are equipment-related.
- About 80 percent of public playgrounds have some kind of protective surfacing, but only 9 percent of home playgrounds have protective surfacing.

Source: Consumer Product Safety Commission, www.cpsc.gov

Injury Risk

- Children ages 5 to 9 account for more than half of all playground-related injuries.
- Children age 4 and under are more likely to suffer injuries to the head and face.
- Children ages 5 to 14 are more likely to suffer hand and arm injuries.
- Young children are at higher risk for injury when playing on age-inappropriate equipment. Children under 5 should have a separate, age-appropriate play area.
- Children who fall on concrete or asphalt are more than twice as likely to be injured, compared with children who fall on shock-absorbing material.

Source: Safe Kids USA, www.safekids.org

Surfacing Materials

The material used under and around playground equipment can influence the outcome of a fall greatly.

- Asphalt and concrete are not acceptable for use as playground surfaces because they have no shock-absorbing abilities.
- Grass, found under many swing sets and home play areas, should not be used as a protective surface. Weather and wear can reduce its shock-absorbing abilities greatly.
- Loose-fill materials, such as sand, pea gravel, wood chips and shredded tires, have adequate shock-absorbing qualities with proper depths and maintenance. *(See Table 1)*
- Poured rubber or rubber mats require minimal upkeep after installation to maintain shock-absorption quality.

Advantages and disadvantages are associated with all surface materials. No material will prevent all injuries.

Table 1. Minimum compressed loose-fill surfacing depths.

Inches of Loose-fill Material	Protects to Fall Height (feet)
9 Shredded rubber	10
9 Sand	4
9 Pea gravel	5
9 Wood mulch	7
9 Wood chips	10

Source: Consumer Product Safety Commission, www.cpsc.gov

How Surfaces are Tested

The ASTM, originally known as the American Society for Testing and Materials, is an international standards organization. It has set requirements that playground surfaces must meet to be considered safe.

The testing takes note of a variety of factors:

- Material used
- Depth of material
- "G-max"
- HIC (Head Injury Criterion)

The G-max and HIC values help evaluate the shock-absorbing ability of the surfacing material and allow for comparison.

With these values, a critical height is determined. Remember that these numbers are simply estimates. The exact impact threshold for a head injury cannot be determined due to individual and situational differences.

The most common method of testing the shock-absorbing capacity of playground surfaces is to drop a metal form (shaped like a head) from various heights on playground equipment onto the material being tested. For more information, visit the ASTM Web site at *www.astm.org*.

1. A point from which a child could fall is chosen and the height is measured.
2. The depth of the protective surfacing material under the drop point is measured.
3. The head form is dropped. It senses the impact and reads back the G-max and HIC values.
4. This procedure is repeated from different heights on various pieces of playground equipment.

North Dakota Study

According to a study of 19 North Dakota playgrounds, most did not meet the safety requirements for surfacing. Only two of the 19 areas tested had the recommended 12 inches of loose fill. Forty-two drop points were tested on 19 different playgrounds. Nearly 55 percent of them did not meet the standards set by the ASTM. **Table 2** provides some of the data from the study.

How to Maintain Playgrounds

Regular maintenance is required for all playground equipment, including the protective surfacing on the playground.

Loose-fill surfaces are displaced easily with use.

The solution for this safety issue is simply to move the fill that has been pushed to the edges back to the center around the equipment. More fill may need to be added to restore appropriate depths.

Did you know?

More than 240,000 children in the U.S. visit the emergency room with playground-related injuries each year.

Table 2. Results from selected playgrounds in North Dakota using ASTM standards.

Material	Height of Fall	Surface Depth	G-max*	HIC Avg*	Meets ASTM Standard
		(inches)			
Wood chips	9' 4"	8	85	311.5	Yes
Sand	6' 5.5"	8.5	189.5	963	Yes
Sand	8' 3.8"	14	250.5	1,523.5	No
Pea gravel	9' 0"	3	255.5	1,409.5	No
Pea gravel	10' 0"	5	191	936	Yes
Poured rubber	6' 4.5"	n/a	168	1,029	No
Poured rubber	9' 1"	n/a	251.5	2,156	No

Source: Research presented by T. Barnhart, Ph.D., Professor, NDSU, at 2008 ACA Camp Research Symposium, Nashville, Tenn.

* To meet ASTM standards, the G-max must be under 200 and the HIC value less than 1,000. If these standards are met, a life-threatening head injury is not likely to occur due to a fall.

The Consumer Product Safety Commission (CPSC) recommends a minimum of 12 inches of loose-fill surfacing under and around public playground equipment to reduce the risk of potentially life-threatening injuries from falls.

Home playgrounds should have an initial fill level of 12 inches.

Due to wear, some compression will occur.

Levels should be maintained at a minimum of 9 inches.

Playground Safety Checklist

Playground safety involves much more than just proper surfacing.
This list of questions was adapted from the Consumer Product Safety Commission:

Do the surfaces around playground equipment have at least 12 inches of loose fill, as recommended? Suitable playground fills include wood chips, mulch, sand or pea gravel, or mats made of safety-tested rubber or rubberlike materials.	**Yes No**
Does the protective surfacing extend at least 6 feet in all directions from play equipment, as recommended? For swings, be sure protective surfacing extends twice the height of the suspending bar in front and back of where the swing hangs when not in use.	**Yes No**
Is playground equipment more than 30 inches high spaced at least 9 feet apart, as recommended?	**Yes No**
Does the equipment have any dangerous hardware, such as worn or open "S" hooks or protruding bolt ends?	**Yes* No**
Does the equipment have spaces that could trap/endanger children, such as openings in guardrails or between ladder rungs that measure less than 3.5 inches or more than 9 inches?	**Yes* No**
Does the equipment have sharp points or edges?	**Yes* No**
Does the playground have tripping hazards, such as exposed concrete footings, tree stumps and rocks?	**Yes* No**
To help prevent falls, does the playground have guardrails at the proper height for children on elevated surfaces, such as platforms and ramps?	**Yes No**
Are playgrounds regularly inspected to ensure that equipment and surfacing are in good condition?	**Yes No**
Are children supervised on playgrounds? Playgrounds should be well-lit and designed so adults easily can observe children at play.	**Yes No**

*** A "yes" response means you should take correction action to reduce or eliminate the hazard. For example, repair or replace equipment with safety hazards.**

Source: www.cpsc.gov

For more information on this and other topics, see www.ag.ndsu.edu

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