

What We Don't Understand About Playground Surfacing

By: Frances Wallach, Ed.D.

We have, since 1981, had a set of federal guidelines, *The Handbook for Public Playground Safety* (Handbook), which pointed out that the major cause of children's injuries on the playground was from falls onto the surface underneath the equipment on which they were playing. This amounted to almost 60% of all injuries on the playground. We have, since 1990, had a national standard for playground safety surfaces. This standard was developed by the American Society for Testing and Materials (ASTMI), an amalgam of interested parties in making playgrounds safer for children who face the dangers of injury on the playground. The CPSC Handbook was published with the prime goal of eliminating or reducing serious injury or death in playground accidents. At ASTM, safety surface manufacturers, architects, landscape architects, playground owner/operators, consumer interests, all gathered together to develop a standard which would meet the recommendations of the U.S. Consumer Product Safety Commission (CPSC) for playground surfacing. The CPSC had issued the Handbook and in it made great focus on not only the injuries by falls to the surface, but the benchmark by which safety surfacing could be measured.

In studies done by the National Bureau of Standards in 1979, the CPSC determined, and the ASTMI Committee that developed the Standard concurred, that the benchmark for measuring playground safety surfacing should be the following: an object dropped upon that surfacing should measure no more than 200g's (units of energy) when dropped, and the measurement was based upon a fall which would cause concussion or skull fracture, which were considered to be the most devastating of injuries on the playground. Therefore, the first requirement for safety surfacing was that whatever was dropped upon the surfacing should measure no more than 200g's. Some years later, an additional requirement was added. That requirement had been used in Europe for a good many years and it said that the object dropped should not measure more than 1000 HIC (Head Injury Criteria). This was not a testing process, but was a calculation. Here, in this country, we use both those requirements, testing of the object when dropped should measure no more than 200g's, or 1000 HIC, whichever came first. Anything that exceeded those measurements would fail for safety purposes and should not be used.

Unfortunately, it took a great many years and a lot of education to make people understand what all of this meant, and to this day we still have a lot of confusion in this area. Some of it arises from not knowing what is meant by these requirements; some of it is caused by those

of us who do not pay attention to what is being told to us; and some of it is caused by misinterpretation of the requirements and the guidelines.

One of the biggest problems we face is that of misunderstanding. Take two examples of what I am referring to. First, the CPSC in 1991 issued a revision of its Handbook and in that Handbook gave some testing results for various popular playground surfaces which were basically loose materials. They did that because it was assumed that local entities would not do their own testing on surfacing or would not know whether the amount of sand being used was sufficient, or the pea gravel, or anything else. Only one of the loose surfaces was a manufactured surface where results from the testing could be gotten from the manufacturer, and that was the engineered wood fiber. They did not test unitary surfaces such as rubber mats or poured-in-place rubber, since those were manufactured items and it was considered to be the responsibility of the manufacturer to provide the testing results.

The CPSC, in its testing of materials, identified the fall height for equipment, which was the height of the highest designated play surface on the equipment, and then identified the critical height, which was the fall height below which a life-threatening head injury would not be expected to occur. As an example, on climbers and horizontal ladders the fall height was the maximum height of the structure, and that was because it was anticipated that children might walk on top of a horizontal ladder in play. On other equipment, however, the platforms were considered to be the fall height, since that was where the child would be standing. The critical height was that which would not exceed the 200g's and the 1000 HIC. The first confusion was in the chart in the CPSC Handbook, which dealt with the loose materials. The materials ranged from 6 inches in depth to 9 inches in depth and the chart showed what the critical fall height might be. However, the thickness of the unitary materials had a very different tolerance for falls, and depending upon the height from which the child fell, a 2-inch thick or 3-in thick rubber mat or poured-in-place rubber might do very well. But there was a lot of misunderstanding when people thought (especially attorneys) that 6 inches in depth for the loose materials also meant 6 inches in depth for the unitary materials and we saw lawsuits which stated that the rubber mats were not 6 inches deep and therefore were improper and dangerous.

Another confusion was in the use of the measurements of the critical fall height. Actually, there were two major factors which determined these critical fall heights:

1. It is impossible to determine these heights by adding in the height of the child, since all heights are different.
2. The engineers determined that, when children fall, they do not fall from the top of the head straight down, but fall from where they are standing. This is why the platform was chosen for the Consumer Federation of American (CFA), except for equipment like overhead ladders. On overhead ladders the fall height is measured

from the top of the ladder since it is anticipated that children will walk on the top of the ladder.

3. Today, we define the fall height on climbers as being measured from the point at which the feet can stand, so that if you were looking at a pyramid, for example, climbing up that pyramid you would not be measuring the fall height from the very tip of the pyramid since you can't stand on top of it, but from the top point at which the feet can rest.

Over the years, we have had any number of questions and challenges on how we measure the fall height. There are proponents of the fact that if you measure from the platform you do not take into consideration the height of the child and the child's head. As you can see, CPSC did address that, and very clearly set the platform as the measuring point for the fall height.

It may take years, but it is expected that eventually all owner/operators will understand the very simple facts about playground surfacing safety:

1. We are using the benchmark of 200g's and 1000 HIC to determine the safe height from which a child can fall. Once testing exceeds those numbers, you should not be using that surfacing.
2. We need to understand the critical height and fall height designations in both the CPSC and the ASTM Standards.
3. We also need to know that although the CPSC tested sand and pea gravel, these are no longer acceptable since they do not meet the federal requirements for accessibility for children and adults with disabilities. (We'll go into that one next time)

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