

PLAYGROUND SAFETY, THE NEXT GENERATION, HAZARD PATTERNS

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The April 1993 "NRPA Law Review" column, entitled *Playground Safety Maintenance Guidelines, the Next Generation*, provided an overview of maintenance considerations addressed in the revised *Handbook for Public Playground Safety* produced by the U.S. Consumer Product Safety Commission (CPSC) in 1991. The initial CPSC handbook appeared in 1980. According to CPSC, the safety guidelines for public playground equipment contained in the handbook are "intended for use by parks and recreation personnel, school officials, equipment purchasers and installers, and any other members of the general public concerned with public playground safety such as parents and school groups." As noted in the April law review column, the CPSC determined "guidelines, rather than a mandatory rule" are appropriate because "many factors may affect playground safety." This month's column reviews recommendations to alleviate specific hazard patterns identified in the CPSC *Handbook for Public Playground Safety*

PLAYGROUND HAZARDS

Based upon a study of playground equipment-related injuries treated in U.S. hospital emergency rooms, the CPSC identified specific hazards associated with "protrusions, pinch points, sharp edges, hot surfaces" as well as "entanglement of clothing or other items on equipment such as slides, entanglement in ropes tied to or caught on equipment, head entrapment in openings."

The recommendations include those which address... openings with the potential for head entrapment, the scale of equipment and other design features related to user age, layout of equipment on a playground, and general hazards presented by protrusions, sharp edges, and pinch points...

The safety of each individual piece of playground equipment as well as the layout of the entire play area should be considered when evaluating a playground for safety.

AGE SEPARATION OF EQUIPMENT

To accommodate the significant developmental differences in pre-school and school-age children, the CPSC handbook suggests that "playgrounds have separate areas for younger children with appropriately sized equipment and materials to serve their less advanced developmental levels."

Because all playgrounds present some challenge and because children can be expected to use equipment in unintended and unanticipated ways... A playground should allow children to develop progressively and test their skills by providing a series of graduated

challenges. The challenges presented should be appropriate for age-related abilities and should be ones that children can perceive and choose to undertake.

Preschool and school-age children differ dramatically not only in physical size and ability, but also in their cognitive and social skills. Therefore, age-appropriate playground designs should accommodate these differences with regard to the type, scale, and the layout of equipment. Recommendations throughout this handbook address the different needs of preschool and school-age children; "preschool" refers to children 2 to 5 years old, and "school-age" refers to children 5 to 12 years old.

The design and scale of equipment should make the intended user group obvious. Some playgrounds, often referred to as "tot lots," are designed only for younger children, so separation is not an issue.

In playgrounds intended to serve children of *all* ages the layout of pathways and the landscaping of the playground should show the two distinct areas for the two age groups. The areas should be separated at least by a buffer zone of ample physical space. Signs posted in the playground area can be used to give some guidance to adults as to the age appropriateness of the equipment.

USE ZONES FOR EQUIPMENT

The CPSC guidelines describe two types of use zones for each piece of equipment which should be free of obstacles:

(1) the Fall Zone: an area under and around the equipment where protective surfacing is required, and, (2) the No-Encroachment Zone: an additional area beyond the fall zone where children using the equipment can be expected to move about and should have no encroaching obstacles.

The fall zone should extend a minimum of 6 feet in all directions from the perimeter of the equipment. No-encroachment zones extending beyond the fall zones are recommended for moving equipment or equipment from which the child is in motion as he or she exits. This allows more space for children to regain their balance upon exiting the equipment and also provides added protection against other children running into a moving part.

Regardless of the type of equipment, the use zone should be free of obstacles that children could run into or fall on top of and thus be injured. For example, there should not be any vertical posts or other objects protruding from the ground onto which a child may fall.

TRIPPING AND SUSPENSION HAZARDS

In addition to recommending obstacle-free use zones, the CPSC handbook recommends the following precautions be taken to prevent injuries due to exposed footings and support cables.

All anchoring devices for playground equipment, such as concrete footings or horizontal bars at the bottom of flexible climbers, should be installed below the playing surface to eliminate the hazard of tripping... In addition, attention should be given to environmental obstacles in the play area, including rocks, roots, and other protrusions from the ground that may cause children to trip.

Retaining walls are commonly used to help contain loose surfacing materials. In order to minimize the trip hazard, retaining walls should be highly visible and any change of elevation should be obvious. The use of bright colors can contribute to better visibility...

Cables, wires, ropes, or similar flexible components suspended between play units or from the ground to a play unit within 45 degrees of horizontal should not be located in areas of high traffic because they may cause injuries to a running child. It is recommended that these suspended members be either brightly colored or contrast with surrounding equipment to add to their visibility. This recommendation does not apply to suspended members that are located 7 feet or more above the playground surface.

MATERIALS & HARDWARE CONSIDERATIONS

In addressing the materials used in the manufacture and construction of playground equipment, the CPSC handbook recommends that "[p]urchasers and installers of playground equipment should obtain documentation from the manufacturer that the preservatives or other treatments applied to the equipment would not present a hazard to the consumer."

A major concern for playground equipment materials is corrosion or deterioration. Ferrous metals should be painted, galvanized, or otherwise treated to prevent rust... Wood should either be naturally rot and insect-resistant or treated to avoid such deterioration. Creosote, pentachlorophenol, and tributyl tin oxide are too toxic or irritating and should not be used as preservatives for playground equipment wood. Pesticide-containing finishes should also not be used. Other preservatives that have low toxicity and may be suitable for playground equipment wood are copper or zinc naphthenates, and borates.

The CPSC handbook also suggests that "hardware" materials "[w]hen installed and tightened in accordance with the manufacturer's instructions, all fasteners, connecting, and covering devices should not loosen or be removable without the use of tools."

Lock washers, self-locking nuts, or other locking means should be provided for all nuts and bolts to protect them from detachment. Hardware in moving joints should also be secured against unintentional or unauthorized loosening. In addition, all fasteners should be corrosion resistant and be selected to minimize the likelihood of corrosion to the materials they connect. Bearings used in moving joints should be easy to lubricate or be self-lubricating. All hooks, including S-hooks, should be closed as tightly as possible.

The CPSC handbook further acknowledges the risks associated with metal surfaces on playground equipment. Specifically, the CPSC recommends that "[m]etal slides should either be in shaded areas or face north to prevent burns and glare problems caused by direct sun on the slide chute."

To avoid the risk of contact burn injury in geographical regions where intense sunlight can be expected, bare or painted metal surfaces on platforms and slide beds should be avoided unless they can be located out of the direct rays of the sun. As an alternative to bare or painted metal, platforms may be fabricated from wood or vinyl coated metal and slide beds may be fabricated from plastic.

POINTS, PROTRUSION, & ENTRAPMENT HAZARDS

The CPSC handbook recommends that playground equipment surfaces contain "no sharp points, corners, or edges on any components of playground equipment which could cut or puncture children's skin."

Frequent inspections are important in order to prevent injuries caused by the exposure of sharp points, corners, or edges due to wear and tear on the equipment... Wood parts should be smooth and free from splinters. All corners, metal and wood, should be rounded. All metal edges should be rolled or have rounded capping. Special attention to sharp edges on slides, especially metal edges, is warranted. The exit end and the sides along a slide bed can be particularly dangerous if protective measures are not taken.

Similarly, the CPSC guidelines indicate that any "[p]rotrusions or projections on playground equipment should not be capable of entangling children's clothing, because such entanglement can cause serious injuries or death by strangulation.

Particular attention should be given to avoiding protrusions or projections at the top of slides to minimize the risk of entanglement with clothing. Jackets with hoods and/or drawstrings have been implicated in such entanglement/strangulation incidents.

There should be no accessible pinch, crush, or shearing points on playground equipment that could injure children or catch their clothing. Such points can be caused by components moving relative to each other or to a fixed component when the equipment moves through its anticipated use cycle. To determine if there is a possible pinch, crush

or shear point, consider the likelihood of entrapping a body part and the configuration and closing force of the components.

Similar to the risk of strangulation posed by protrusions or projections, the guidelines note that any "V" shaped angle in the configuration of playground equipment may pose similar risk. For example, a "V" shaped opening between the opening of a tunnel slide and the guardrails or barrier on an adjacent platform could catch a child's clothing upon entering the slide or pose an entrapment risk to the child's arm, leg, or head. To address this potential hazard, the CPSC guidelines indicate that any "V" shaped angle "formed by adjacent components should not be less than 55 degrees, unless the lower leg is horizontal or projects downwards."

In addition to these angle hazards, the CPSC notes that an individual piece of playground equipment "or a group of components should not form openings that could trap a child's head." According to the CPSC, "an opening may present an entrapment hazard if the distance between any interior opposing surfaces is greater than 3.5 inches and less than 9 inches."

When one dimension of an opening is within this potentially hazardous range, all dimensions of the opening must be considered together to fully evaluate the possibility of entrapment. Further, it applies to all openings regardless of their height above the ground. Even those openings that are low enough to permit children to touch the ground with their feet can present a risk of strangulation for an entrapped child, because younger children may not have the necessary cognitive ability and motor skills to extricate their heads, especially if scared or panicked...

A child's head may become entrapped if the child attempts to enter an opening either feet first or head first. Head entrapment by head-first entry generally occurs when children place their heads through an opening in one orientation, then, after turning their heads to a different orientation, they are unable to withdraw from the opening. Head entrapment by feet-first entry involves children who are generally sitting or lying down and slide their feet into an opening that is large enough to permit passage of their bodies but is not large enough to permit passage of their heads which then become entrapped...

Openings between adjacent steps or rungs and between the top step or rung and underside of a platform should preclude the possibility of entrapment.

The CPSC handbook describes a series of simple tools, templates and probes, to determine whether a particular opening "is greater than 3.5 inches and less than 9 inches" and, thus, an entrapment hazard. (Probe devices, which help identify potential entrapment and protrusion hazards identified in the CPSC handbook, are available through NRPA.)